US Army Corps 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
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-0898

INTERIM FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

NAVIGATION IMPROVEMENTS AKUTAN, ALASKA

July 2004

SUMMARY

This report examines the need for protected harbor space at Akutan, Alaska and determines the feasibility of Federal participation in harbor improvements.

There are no permanent moorage facilities for the fishing fleet operating out of Akutan. Vessels must travel to other locations to find moorage when fishing seasons are closed. Vessels seek protection in Akutan from storms during the fishing season. The current practice is to anchor with engines running in case the anchors drag or cruise around the bay. This increases the risk of vessels running aground and of oil spills from damaged vessels.

Two sites were evaluated, North Point and at the head of the bay. An economically justified project was not possible at North Point, so alternatives at the head of the bay were investigated. Three concepts were developed: offshore harbor, inland/offshore harbor, and inland harbor. The inland concept proved to be most cost effective, and 12-, 15-, and 20-acre basin alternatives were developed. The 20-acre basin had the highest net economic benefits, indicating that the NED plan would be a 20-acre basin or larger. The environmentally and locally preferred plan is the 12-acre basin alternative, because it has the least environmental impact to the adjacent wetlands and avoids anadromous fish streams on either side of the site. The 12-acre basin was reconfigured to with the intent to increase water exchange in the basin and further reduce impacts to the adjacent wetlands. The recommended plan and locally preferred plan is the reconfigured 12-acre basin, which provides protected moorage for 58 vessels ranging in length from under 24 feet up to 180 feet.

The features contributing to the recommended plan have a construction cost of $18,998,000 (October 2003 price level), excluding navigation aids, an annual NED investment cost of $1,242,000, and annual benefits of $2,267,000. The project's benefit-to-cost-ratio is 1.8 with annual net benefits of $1,025,000.

The local sponsor is required to pay the non-federal share of the costs of constructing the general navigation features (GNF) as specified by Section 101 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended. This amount is currently estimated at $2,264,000. The local sponsor must also pay the entire cost of local NED features, including the mooring basin and float system. The current estimate of the total non-federal share of all costs of the project is $9,828,000. The Federal share of the project is $9,170,000, excluding $15,000 for navigational aids. The U.S. Coast Guard provides these navigation aids. The fully funded cost of the NED plan, escalated to the mid-point of construction, is estimated at $20,699,000.

PERTINENT DATA

Recommended Plan (Reconfigured 12-Acre Basin)

Basin		Breakwaters	
Area	14.9 acre	Rubblemound	
Basin depth	-14,-16,-18 ft MLLW	Design wave	3.94 ft
Entrance channel depth	-18 ft MLLW	Length, total	700 ft
Dredging volume		Crest elevation	13.0 ft MLLW
Entrance channel	82,000 yd^3	Crest width	5.0 ft
Turning basin	280,000 yd^3	Primary armor	15,000 yd^3
Mooring basin	481,000 yd^3	Secondary (B) rock	8,000 yd^3
Total	843,000 yd^3	Core rock	45,000 yd^3

Project Cost[a]

Item	Federal ($)	Non-federal ($)	Total ($)
General Navigation Features[b]	9,170,000	2,152,000	11,322,000
Associated costs[c]	—	7,564,000	7,564,000
LERRD (GNF)	—	112,000	112,000
Navigation aids (U.S. Coast Guard)	15,000	—	15,000
TOTAL NED PROJECT COST	9,185,000	9,828,000	19,013,000
NED investment cost (includes interest during construction)			19,815,000
Annualized initial cost plus interest during construction			1,192,000
Annual NED maintenance cost			50,000
Total average annual NED cost			1,242,000
Average annual NED benefits			2,267,000
Net annual NED benefits			1,025,000
Benefit/cost ratio			1.8

[a] Basic assumptions: (1) October 2003 price levels; (2) 50-year project life; (3) 5-5/8% interest

[b] Cost sharing reflects provisions of the Water Resources Development Act of 1986 – non-federal initial share 10% of GNF plus reimbursement of 10% GNF minus LERRD credit

[c] NED = National Economic Development

CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1. Study Authority

This feasibility study was recommended in an August 1997 report by the Alaska District, U.S. Army Corps of Engineers, entitled "Section 905(b) (WRDA 86) Analysis, Akutan Harbor, Alaska."

This study is authorized by a resolution, adopted on December 2, 1970, by the Committee on Public Works of the U.S. House of Representatives. The resolution states:

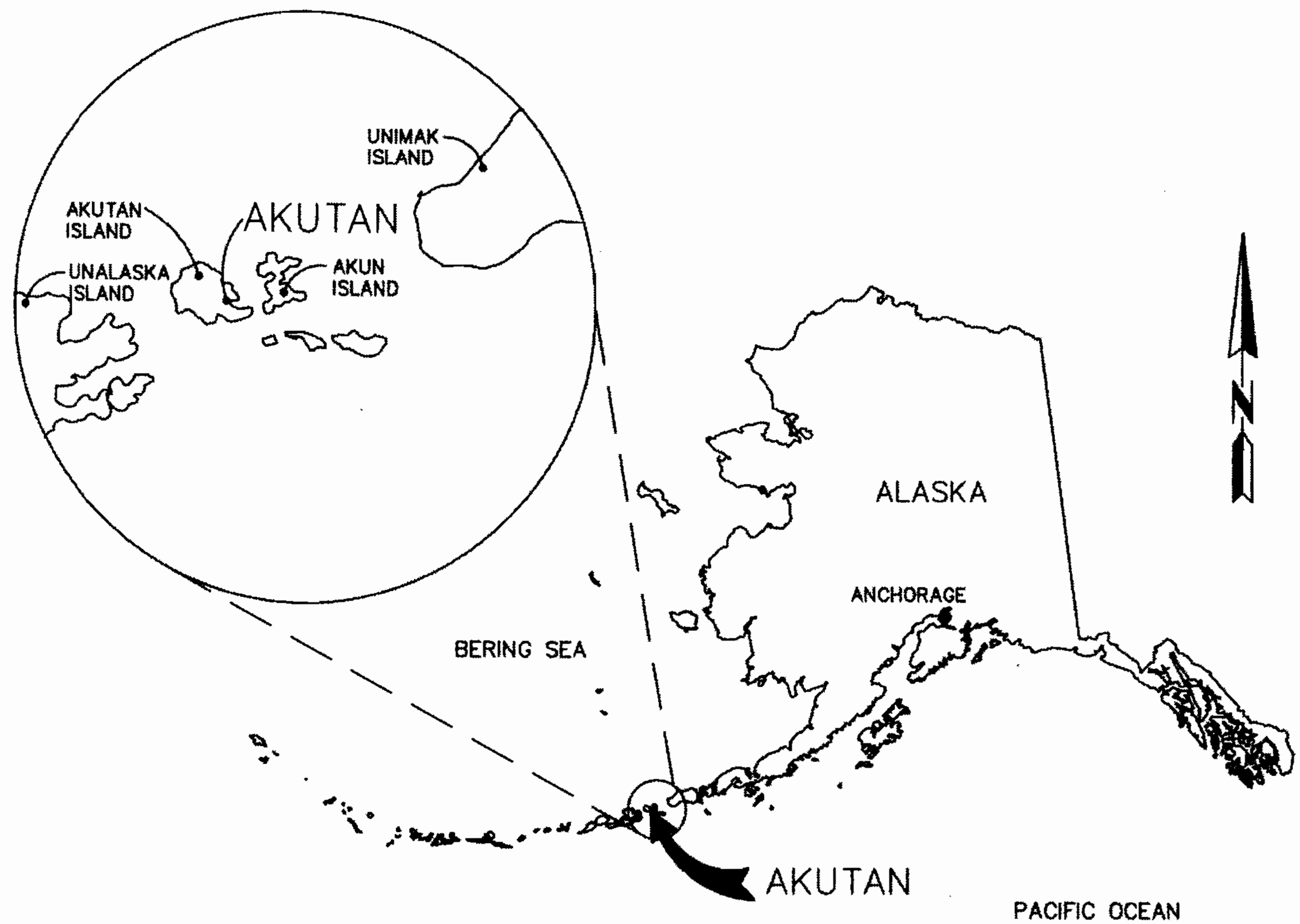
Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Rivers and Harbors in Alaska, published as House Document Numbered 414, 83rd Congress, 22nd Session; and other pertinent reports, with a view to determine whether any modifications of the recommendations contained therein are advisable at the present time.

1.2. Scope of Study

This study examines the feasibility of navigation improvements at Akutan, Alaska (figure 1), a community on Akutan Island in the Aleutian Island chain. This study was conducted and the report prepared in accordance with the Principles and Guidelines adopted by the Water Resources Council and the procedures for water resources planning as contained in Engineer Regulation (ER) 1105-2-100. Alternatives are examined for feasibility, considering engineering, economic, environmental, and other criteria. A determination of Federal interest in accordance with present laws and policies is included.

1.3. Study Participation

The Alaska District, U.S. Army Corps of Engineers, has primary responsibility for this study. The report was prepared with assistance from many individuals and agencies, including the city of Akutan, the Aleutians East Borough, the U.S. Fish and Wildlife Service (USFWS), and the Alaska Department of Fish and Game (ADF&G). Tryck Nyman Hayes Inc., with its subcontractors under contract to the Alaska District, prepared many of the appendixes.



LOCATION MAP, AKUTAN, AK

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE
-1

1.4. Environmental Coordination

The Corps of Engineers began conducting navigation and environmental studies in Akutan Harbor in the early 1980s in conjunction with its bottomfish harbor investigations. Many of the issues raised in the 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 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 of the project on tribally recognized rights or protected resources. The Corps conducted a public meeting on the project draft feasibility report and EIS in Akutan, Alaska, on November 6, 2002.

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. This scooping effort identified the following issues of concern (see the EIS for details):

- 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.
- Petroleum spills 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, 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 poor water circulation in each of them.

1.5. Related Reports and Studies

1.5.1. Corps Reports

USACE. 1997. "Akutan Small Boat Harbor Expedited Reconnaissance Study."

USACE. 1993. "Navigation Improvements Preliminary Reconnaissance Report, Section 107, Akutan, Alaska."

1.5.2. Reports by Others

Aleutians East Borough. 2000 (February). "Preliminary Engineering Report for Akutan Harbor Access Road," prepared for U.S. Army Corps of Engineers, Alaska District.

Northern Economics. 1997 (June). "Fleet Survey Project," prepared for Aleutians East Borough and North Pacific Fisheries Management Council.

Northern Economics. 1995 (March). "Evaluation of Potential Harbor Improvements, Akutan, King Cove, and Sand Point," prepared for Aleutians East Borough.

Peratrovich, Nottingham & Drage, Inc. 1996 (October). "Aleutians East Borough Wave Study, Akutan, Alaska," prepared for Aleutians East Borough.

2.0 DESCRIPTION OF STUDY AREA

2.1. General Area

Akutan is in the Aleutian Island chain 766 air miles southwest of Anchorage and 35 miles east of Unalaska/Dutch Harbor. The city of Akutan (See figure 2) is on the north shore of Akutan Harbor on Akutan Island at latitude 54°08' N and longitude 165°46' W. Akutan Harbor opens to Akutan Bay and Akun Strait to the east.

The 2000 census population of Akutan was 713, a combination of 112 village residents living in 38 households, and 601 workers residing in Trident Seafoods' plant group quarters. The number of workers varies with the time of year, rarely less than 100 and up to 1,000 during peak processing periods in February, March, and April.

Boats and amphibious aircraft are currently the only means of transportation into Akutan. The Alaska State ferry *M/V Tustemena* makes one run per month between Homer and Unalaska, stopping in Akutan, May through September. Daily air service is provided from nearby Dutch Harbor airport subject to weather.

Akutan has a state ferry dock, working docks at the Trident plant, and limited fair weather moorage for small boats and skiffs.

Figure 2 Aerial photo of Akutan city area and adjacent Trident Seafoods' plant (Source: City of Akutan and Trident Seafoods, 1989 photo)

2.2. Hydrology and Hydraulics

2.2.1. Climate and Topography

Akutan has a maritime climate primarily influenced by strong low-pressure centers generated in the Bering Sea and western Pacific Ocean. The high frequency of cyclonic storms crossing the north Pacific and the Bering Sea are dominant factors in the weather at Akutan. These storms account for the persistent high winds and the frequent occurrences of low ceilings and low visibility. Cool summers, mild winters, and year-round rainfall characterize the climate. Snow falls primarily between November and April, with an average annual snowfall of 19.5 inches. Rains occur any time of the year, with average annual precipitation of 79 inches. The wettest month is October, with a record of 13.4 inches and an average of 11.3 inches of precipitation. Fog is common from September through December. Normal winter temperatures range within a few degrees above and below freezing (32 °F), and summer temperatures range from +39 °F to +60 °F. Temperatures can reach lows of 8 °F and highs of 72 °F.

2.2.2. Winds

No long-term wind record data for Akutan Harbor exists. The nearest long-term wind record is collected at Unalaska Airport. Because of the topography of the harbor, wind directions seem to align with the long axis (east and west) of the harbor. On the north and south sides, the terrain directly adjacent to the bay rapidly ascends to 1,000 feet or more. This severely restricts cross-harbor winds. See appendix A for wind discussions.

2.2.3. Tides and Currents

The mean tide range at Akutan is 2.37 feet and the diurnal range is 4.03 feet. The tides are generally diurnal with two highs and two lows occurring daily. Tide levels, referenced to mean lower low water (MLLW), are shown in table 1. Extreme high water levels result from the combination of astronomic tides and rises in local water levels due to atmospheric and wave conditions.

Table 1. Akutan tide elevations

Level	Elevation (ft MLLW))
Highest Tide (predicted)	+7.15
Mean Higher High Water (MHHW)	+4.03
Mean High Water	+3.74
Mean Low Water	+1.07
Mean Lower Low Water (MLLW)	0.0
Lowest Tide (predicted)	-2.90

Source: NOAA National Ocean Service.

The currents in Akutan Harbor are driven primarily by wind and only partially by the tide. Wind direction is the predominant factor in determining current direction and orientation of the gyre patterns. A study of currents indicates velocities are generally driven by winds and are seasonal in nature. Only during periods of low velocity winds do tidal currents dominate the circulation patterns in the harbor.

2.3. Biological Resources

2.3.1. Vegetation

Vegetation in the Akutan Harbor area is primarily moist tundra and alpine tundra/barren ground. Trees are limited to a few low-growing willows near streams and drainages. Plant communities in the project area are generally sedges and grasses. Wetlands occur throughout the Akutan Harbor area with the largest wetland at the head of the bay behind a naturally occurring beach berm.

2.3.2. Wildlife

Akutan Island is used by 33 bird species for feeding, nesting, molting, and over-wintering. The most abundant birds in Akutan Harbor are seabirds and waterfowl, but shorebirds and passerines (wrens, sparrows, etc.) commonly use local wetlands and coastal habitats as well. Bald eagles are year-round residents, and the only known bald eagle nest in the area is at Akutan Point. Terrestrial mammals on Akutan Island include red fox and Norway rat. The Norway rat was introduced to the island. Marine mammals seen in Akutan Harbor include the minke and killer whale, Dall's and harbor porpoise, Steller sea lion, harbor seal, and sea otter.

2.3.3. Freshwater Fish

Few freshwater streams in Akutan Harbor support fish. At the head of the bay, North and South Creeks support pink and coho salmon and Dolly Varden. Central Creek and associated streamlets in the same area support stickleback and Dolly Varden. Near the mouth of Akutan Harbor on the south shore, is a stream supporting salmon.

2.3.4. Threatened and Endangered Species

Steller's eider *(Polysticta stelleri),* listed as federally threatened under the Endangered Species Act in 1997, over-winter in the Akutan Harbor area. In addition, the Alaska Department of Fish and Game (ADF&G) has designated the Steller's eider as a State species of special concern (SSC). Other species of significance observed in Akutan Harbor, include the northern sea otter (candidate species), Steller sea lion (endangered species and SSC), and harbor seal (SSC). Local residents report that humpback whales (endangered species) have entered Akutan Harbor, presumably to forage on large schools of fish.

2.4. Economic Base

Commercial fish processing dominates Akutan's cash-based economy primarily thru the Trident Seafoods' plant. None of the plant workers live in the village, instead living and eating in company dormitories and mess hall. Akutan has six small businesses. Much of the community's operating budget is supported by fish taxes paid by the processing facility. Local government accounts for 55 percent of the jobs and commercial fishing, with eight residents holding commercial fishing permits, for 35 percent. All village residents use subsistence resources with 96 percent participating in subsistence harvests.

2.5. Existing Navigation Facilities

There are no facilities in Akutan for long-term moorage. There are two primary marine facilities in the Akutan city area, the city/ferry dock and the Trident Seafoods' dock. However these docks are working docks and not long-term moorage facilities. Also these docks do not have protection from storm waves.

The Aleutians East Borough built a fair weather skiff and small boat 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.

2.6. Problem Description

Akutan, Alaska, is a relatively small, remote community. Although it is one of the most important fishing ports in the United States in terms of volume and value of seafood production, it 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 report are focused on resolving several navigation problems currently facing vessels using Akutan Bay. 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 each 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.

The large and naturally deep Akutan Harbor is perfect for deep draft navigation and is in proximity to the fishing grounds of the rich waters bordering the Aleutian chain. This encouraged the establishment of the large Trident Seafood's plant, which is serviced by deep draft ships. However, there is no small embayment sufficiently protected from the weather conditions and yet large enough to harbor the size of the fishing fleet needed to supply the fish processing plant. There is no moorage for the small and large vessels comprising the fishing fleet. There is limited fair weather moorage for small boats and skiffs. Small locally owned skiffs are beached and/or taken from the water when not in use and during inclement weather.

Since there is no moorage in Akutan, the fishing fleet must seek shelter at other locations, which are overcrowded and do not have available space. Between seasons, vessels seek shelter in distant harbors, such as the Pacific Northwest. As a result, the fishing fleet is not able to minimize its operating expenses.

3.0 PLAN FORMULATION

3.1. Planning Criteria

3.1.1. National Economic Development Objective

The objective of Federal water and land resources planning is to contribute to the National Economic Development (NED) in a manner consistent with protecting the Nation's environment. NED features increase the net value of goods and services provided to the economy of the United States as a whole. Only benefits contributing to the NED may be claimed for economic justification of the project. For the Akutan navigation improvements, NED features include the breakwaters, channels, basins, and float system.

Resource planning must be consistent with the NED objective and consider engineering and economic factors, as well as environmental and social considerations. Each alternative must be complete, effective, efficient, and acceptable. The following criteria are guidelines for developing alternative plans and are used to evaluate those plans.

3.1.2. Engineering Criteria

The plans should be adequately sized to accommodate user needs and provide for development of harbor-related facilities. They should protect against wind-generated waves and boat wakes. Adequate depths and entry are required for safe navigation. The plans must be feasible from an engineering standpoint and capable of being economically constructed.

3.1.3. Economic Criteria

Principles and guidelines for Federal water resources planning require a plan to be identified, producing the greatest contribution to the NED. The NED plan is defined as the plan providing the greatest net benefits as determined by subtracting annual costs from annual benefits. The Corps of Engineers' policy requires recommendation of the NED plan unless there is adequate justification to do otherwise. All alternatives considered to meet project needs should be presented in quantitative terms where possible. Benefits attributed to a plan must be expressed in terms of a time value of money and must exceed equivalent economic costs for the project. To be economically feasible each separate portion or purpose of the plan must provide benefits at least equal to the cost of that unit. The scope of development must be such that benefits exceed project costs to the maximum extent possible. The economic evaluation of alternative plans is on a common basis of October 2003 prices, a project life of 50 years, and an interest rate of 5-5/8 percent.

3.1.4. Environmental Criteria

Environmental considerations include (1) identifying forms of aquatic life and wildlife that might be impacted by a plan's implementation, (2) minimizing disruption of the area's natural resources, (3) maintaining consistency with the Alaska Coastal Management Program, and (4) using measures to protect or enhance existing environmental values.

3.1.5. Social Criteria

Plans considered must minimize adverse social impacts and must be consistent with state, regional, and local land use and development plans, both public and private. The selected plan must be acceptable to the non-federal sponsor.

3.1.6. Plan Objectives

National Objectives

- Provide protected permanent moorage for commercial fleet operations.
- Reduce damages and operating costs related to rafting.
- Reduce travel related costs for the fishing fleet due to unavailability of moorage.
- Preserve environmental resources to the maximum level consistent with maximizing the net NED benefits and other objectives.

Local Objectives

- Increased access to subsistence resources.
- Increased opportunities to participate in the developing near shore fisheries.

3.1.7. Without-Project Conditions

There will not be any permanent moorage facilities in Akutan for either the resident local small boat fleet or the larger vessel commercial fleet servicing the Trident Seafoods' processing plant. Most vessels in the Bering Sea fleet, including vessels delivering to Akutan or supported by the local plant, will continue to seek moorage in western Alaska on a first-come, first-served basis between fishing seasons. As a result, some vessels will travel to Seattle or other Pacific Northwest ports for moorage because they will be unable to find moorage in western Alaska. Increased operating costs and loss of time for the vessels' crew will continue from travel to distant ports. Increased risk of vessel damage and potential for spills will continue as vessels anchor or cruise Akutan harbor during storms.

Local residents will continue to haul their small vessels from the water to be stored onshore during inclement weather. Local residents will not be able obtain vessels larger than their current skiffs and will not participate in the developing local near shore fisheries.

Currently the Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Federal Aviation Administration (FAA) are preparing an Airport Master Plan for construction of an airport on Akutan Island. Road access between the city of Akutan and either of 2 proposed airport locations require the road to pass by the head of the bay. Completion of a planning level design document for the road and airport is expected sometime in 2005 or early 2006. If adequate funding becomes available, project plans and specifications will be prepared in 2007 and construction could begin as early as 2008.

3.1.8. Plan Constraints

The project constraint is land access to the harbor project. This access translates to costs of implementing a project if lengthy roads must be constructed. Currently the only road in Akutan is between the seaplane ramp next to the village and the Trident Seafoods' plant.

3.1.9. Major Planning Assumptions

A new airport will be constructed on Akutan Island. Construction of the airport road from the village to the head of the bay in Akutan Harbor will be complete when the harbor becomes operational.

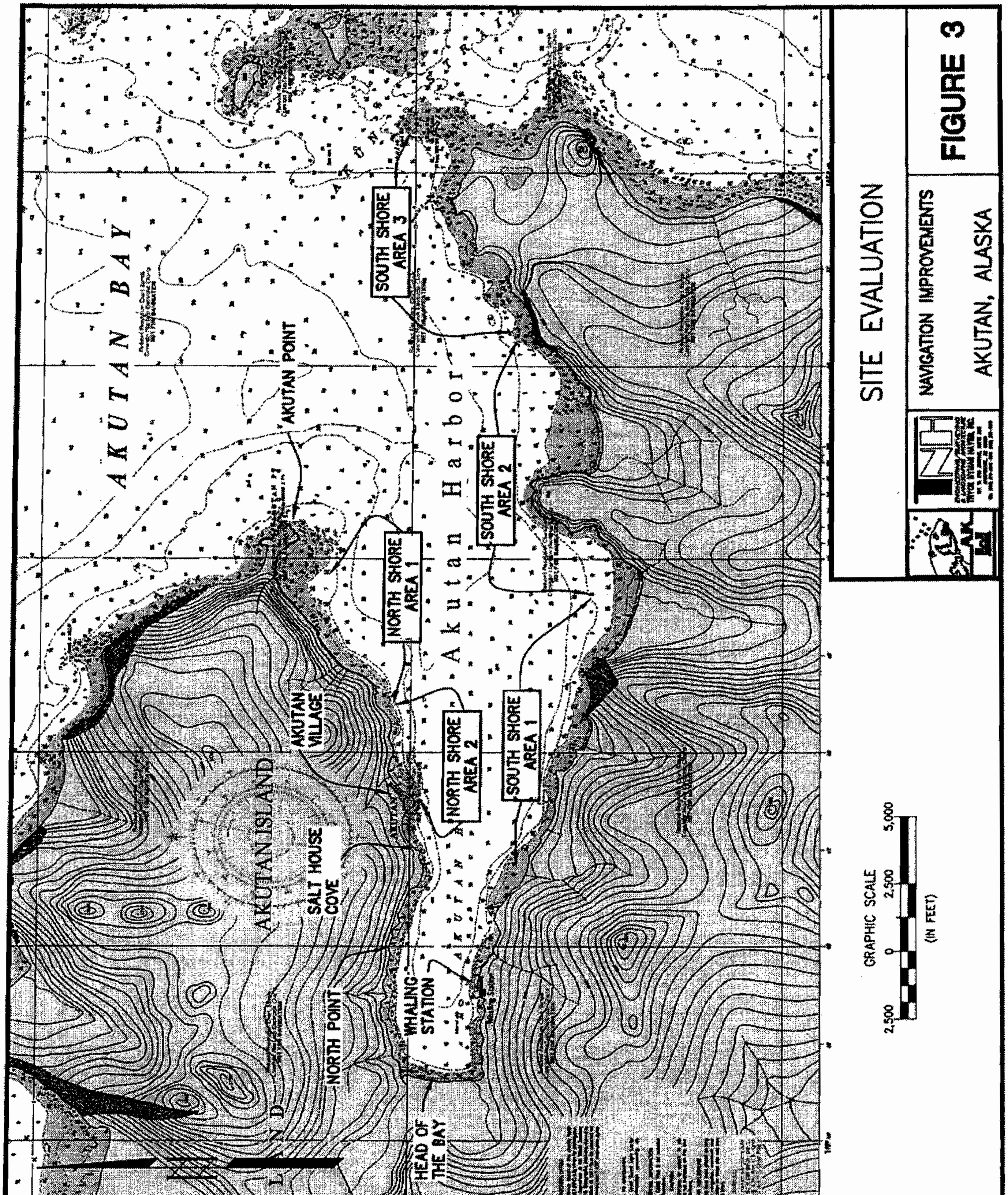
Usable dredge material such as sands can be stockpiled for reuse. Sands are a scarce commodity on the Alaska Peninsula and Aleutian Islands. Dredge material could be used in airport construction or barged to other locations for construction projects.

3.2. Initial Site Evaluation

Steep hillsides and rocky cliffs plunging to the sea and rapidly dropping into deep water characterize shorelines in Akutan Harbor. Flat lands within Akutan Harbor are scarce and generally limited in size. Akutan Harbor is subdivided into 10 areas for initial discussion. The 5 shore areas discussed below are not selected as potential harbor locations because of lack of uplands or the distance access roads must be constructed. Within Akutan Harbor five possible locations for a harbor have been identified for initial screening. These are North Point, Akutan Point, Salthouse Cove, Whaling Station, and the head of the bay. Figure 3 shows Akutan Harbor and the 10 areas.

North Shore Area 1 is east of the community of Akutan. The site is bordered by steeply sloping bluffs on the upland side. A relatively shallow bench with depths to 25 feet extends offshore for 400 feet. From there the bottom drops off rapidly in excess of 60 feet.

North Shore Area 2 is between the community of Akutan and North Shore Area 1. The site is bordered by steeply sloping upland terrain and relatively deep water (90 feet deep at 400 feet offshore).


AKUTAN BAY
AKUTAN POINT
Akutan Harbor
SOUTH SHORE AREA 3
SOUTH SHORE AREA 2
SOUTH SHORE AREA 1
NORTH SHORE AREA 1
NORTH SHORE AREA 2
AKUTAN VILLAGE
AKUTAN ISLAND
SALT HOUSE COVE
NORTH POINT
WHALING STATION
HEAD OF THE BAY
GRAPHIC SCALE
2,500 0 2,500 5,000
(IN FEET)
SITE EVALUATION
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA
FIGURE 3

South Shore Area 1 extends east of the Whaling Station to near the mouth of Akutan Harbor. It is characterized by steeply sloping on shore terrain and relatively deep offshore bathymetry. There is a large landslide area near the east end. South Shore Area 1 receives a lot of wave energy from Akutan Bay to the northeast.

South Shore Area 2 includes the shoreline just west of a small peninsula near the mouth of Akutan Harbor. The area is characterized by a slight cove like feature resulting in an offshore bench. South Shore Area 2 receives a lot of wave energy from Akutan Bay to the northeast.

South Shore Area 3 includes the area just east of a small peninsula near the mouth of Akutan Harbor. This area is outside Akutan Harbor. A slight pocket beach resulting in an offshore bench characterizes the shoreline. South Shore Area 3 is exposed to the full fetch and resultant wave energy from outside of Akutan Harbor to the north and east.

3.2.1. North Point

A rocky coastline, with rock outcrops and rocky points, extends west of the Trident Seafoods' (Trident) plant to the head of the bay. Steep hillsides extend directly to the edge of the high water line and the bathymetry drops off rapidly into deep water. There are two creeks and their alluvial fans along this coastline. The second and larger creek is 4,000 feet west of the Trident plant. Four submerged pipes carry water to the Trident complex from a hillside dam on this creek.

Dredging and filling of nearshore and subtidal areas adversely impacts a limited amount of marine resources. Terrestrial biological resources near the site are sparse and not significantly impacted. 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.

The study team including the City of Akutan and the Aleutians East Borough (local sponsor) considered this location as first choice for a harbor location. The site is fairly close to the village although access is through the Trident plant. Also this location does not impact the wetlands and habitat at the head of the bay.

This site is carried forward for screening of alternative plans.

3.2.2. Akutan Point

Course gravel beaches and sea-cliffs characterize the site's shoreline in a small cove at the entrance to Akutan Harbor 2 miles east of the village. Village residents access the site by boat for recreational and subsistence purposes. Subsistence set nets for salmon are placed in the area.

Of all the sites considered, this location is the most exposed to wind and waves with large ocean waves/swells from the southerly direction. Upland development areas are limited. Bathymetry is not available, however the area appears shallow and will need to be dredged to basin depth. Fixed breakwaters of rubblemound construction appear to be the best wave protection.

A harbor here requires construction of a 2-mile intertidal-fill road past the village connecting to the existing road at Salthouse Cove. Akutan occupies all available flat land so the road will be placed in front of the village or behind the village. The road in front of the village would disrupt access to the beach and impact the front view of all dwellings. Also, a front road as it approaches Salthouse Cove is constrained by the existing Alaska State Ferry dock and existing buildings. Construction of a front road may require tidal fill and relocation or demolition and replacement of some existing buildings. High steep slopes immediately behind the village require blasting for road construction. The nearest houses are within 50 feet of any blasting. Blasting so close to houses is extremely expensive and unsafe for structures and people. Also the village hydropower and water supply lines must be moved disrupting service. Either road location may require moving one or more buildings.

Akutan Point is one of Akutan Harbor's most environmentally sensitive areas. Project features will eliminate kelp beds and diverse and species-rich nearshore and subtidal habitats. The adjacent terrestrial habitat supports nesting bald eagles and cliff-nesting/burrow-nesting seabirds. This habitat would be either physically destroyed or rendered useless by proximity to harbor-related activities. A few threatened Steller's eider use the site. Anecdotal evidence suggests there may be prehistoric sites in the uplands area.

This site is dropped from further study because of the cost for building road access. Initial study for road access, wave protection, and moorage facilities could not be justified by potential project benefits. Additionally the unique adjacent habitats lead the study team to evaluate other locations.

3.2.3. Salthouse Cove

Salthouse Cove, in a shallow bight, serves as a buffer between the Trident industrial complex on the west and the community of Akutan on the east. Trident Seafoods' Corporation built a church with a large gymnasium in the limited upland of Salthouse Cove. The church/gymnasium is used extensively by villagers and Trident plant workers and serves as the social and recreational interface between the two groups.

The cove is naturally protected from the east and west directions. 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 is on the east edge adjacent to the village. The east uplands are occupied by the edge of the village.

Few fish and wildlife resources will be impacted here due to the developed setting of the area. The threatened Steller's eider is known to over-winter in the area, and schools of juvenile pink salmon inhabit the near shore environment in the spring.

Trident Seafoods has a lease for most of the west uplands to the plant and plans to construct expanded dock between Salthouse Cove and the plant. This expansion will likely be completed by the time a harbor could be constructed. Wave protection and moorage facilities will displace access to the seaplane ramp rendering it unusable for air transportation. The limited uplands are already used by the church and seaplane ramp.

Salthouse Cove has bathymetry similar to the rest of Akutan Harbor. Steep hillsides plunge to the sea and rapidly drop into deep water particularly to the west. East is the Akutan city dock and the village. A harbor could be constructed toward the west approaching the Trident plant and avoiding the existing church and seaplane ramp area. However the conditions and harbor here have the same constraints as a harbor at North Creek. The long narrow mooring basin cannot accommodate the number of vessels needed to justify the cost.

The local community for socio-environmental reasons opposes the site. A harbor at this site will impact current upland and adjacent near shore uses and is not economically justified. Therefore Salthouse Cove is not considered for further evaluation.

3.2.4. Whaling Station

Uplands consisting of natural and constructed fill front steep mountain hillsides at the southwest corner at the head of the bay. Originally a whaling station, the U.S. Navy occupied the site during World War II. An individual residing in Seattle, Washington owns the land and apparently leases it to Trident. The area is unused other than for gear storage by Trident boats. The upland area is contaminated with Bunker C fuel oil resulting from military spills.

The Corps' Formerly Used Defense Sites (FUDS) program conducted a cleanup of the site in 1998 and 1999, but deteriorated timber docks and pilings, and abandoned steel and equipment still litter the site. The Corps-installed subsurface bio-remediation venting system is still in place, treating remaining contaminated insitu soils. Subtidal areas may be petroleum hydrocarbon contaminated.

Existing docks were constructed near shore, however bathymetry drops off rapidly into deep water. Deep water limits offshore expansion and cost effectiveness of rubblemound breakwaters and wave barriers. A 2½ mile access road from the village and the Trident plant is needed. Although with the road to the airport being a separate project, the access road to the harbor site is reduce to 1 mile.

Basin areas require chemical testing and careful planning on how to dredge and dispose of contaminated materials. Despite known offshore contamination, the subtidal habitat supports a diverse and species-rich biological community. Because the area has been previously disturbed, environmental considerations will be less restrictive than at undisturbed sites.

This site was not carried into further evaluation because of access road length, contamination concerns, and depth of water. The experience gained in trying to produce a positive project at North Creek under similar bathymetry also indicated this site was not feasible.

3.2.5. Head of the Bay

A vast wetland complex behind a heavily vegetated beach berm characterizes the terrain at the head of the bay. Seaward of the berm is a sandy beach sloping to –60 feet as close as 200 feet offshore and continues to drop to deep water. Anadromous fish streams flow out of two distinct drainages along the northwest and southwest corners of the bay. These creeks are 10–25 feet wide and support seasonal pink and silver salmon, and Dolly Varden fish species. A much smaller third creek drains the middle wetland complex, and supports Dolly Varden and stickleback fish species. The northwest and southwest corners of the bay support resting and foraging Steller's eiders from November to March.

The head of the bay location was the sponsor's and community's second choice for harbor location because of distance from the community and the impacts to the wetlands. A 1½ mile road access from the village and Trident plant is needed. Although with a road to an airport, access for the harbor site is reduced to a few hundred feet. Of all the alternative sites evaluated, this location supports the most potential for upland development.

This site is carried forward for screening of alternatives.

3.3. Screening of Alternative Plans

3.3.1. No Action

The no action, without-project, and existing conditions are the same. There will continue to be no permanent moorage facilities in Akutan. Larger vessels will continue to travel to other areas or ports for long-term moorage. Small vessels will be pulled out of the water for severe weather and when not in use. The local small boat fleet will continue to miss opportunities for developing the near shore fisheries and CDQs.

Vessels will continue to raft at floats or working docks and seek shelter during storms by jogging back and forth around Akutan Harbor. Vessels will continue to lose moorings and pose a hazard from oil and lubricant spills from potentially running aground.

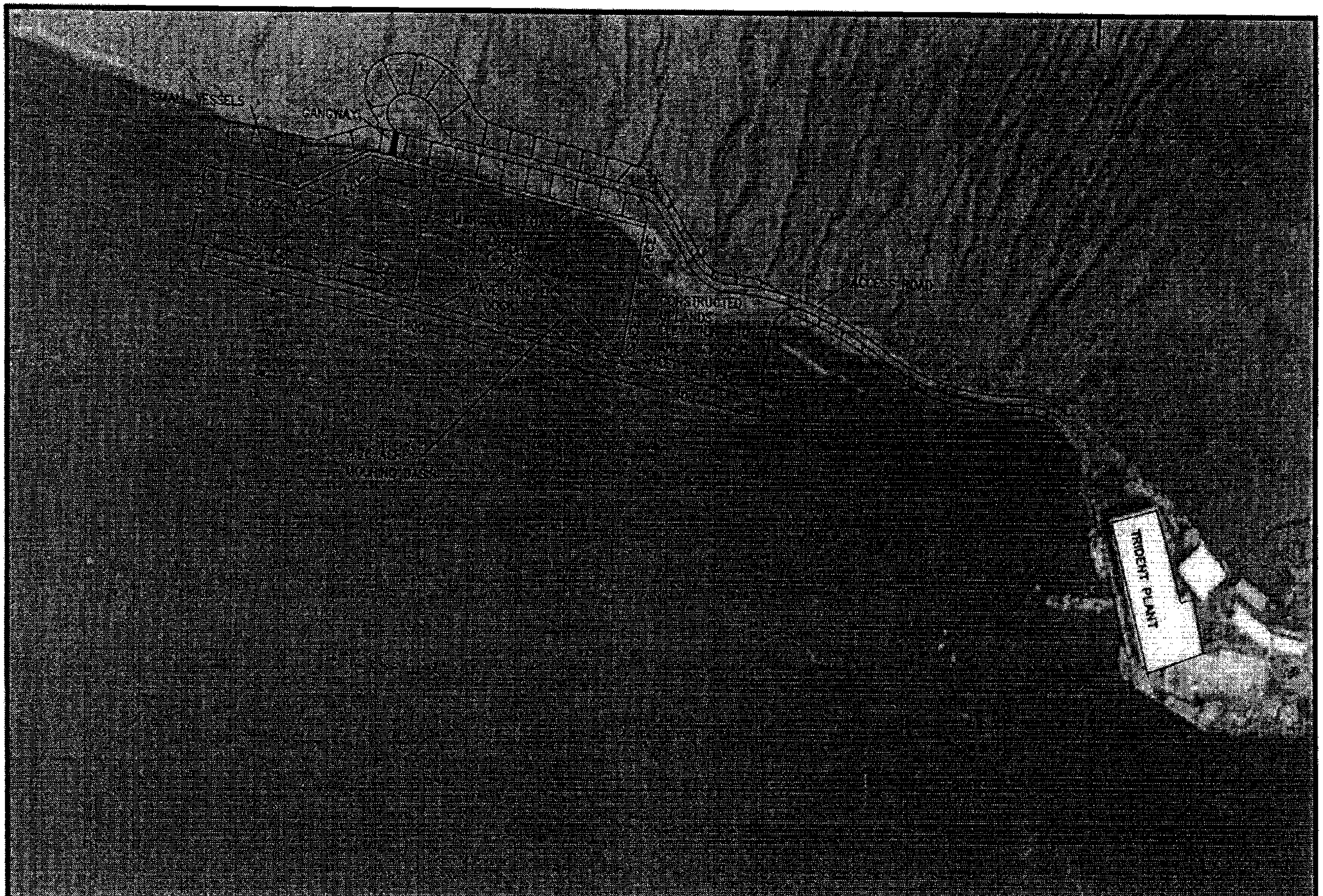
3.3.2. Nonstructural Alternatives

There are no nonstructural measures that will in anyway provide solutions to damages, lack of adequate moorage, and other problems identified. The nearest port is Dutch Harbor, 40 miles west of Akutan. Dutch Harbor does not have any permanent moorage for any vessels of the same size operating out of Akutan or Dutch Harbor. Other Alaskan 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.

3.3.3. North Point

Major environmental constraints to development are not as apparent here as they are for some of the other sites. The road to a new airport will probably go along the top of the slope and not go along the beach to reach the head of the bay. Therefore, a ¼-mile access road to the site will be constructed. This road from the existing trail/road system at the west end of the Trident plant will be primarily within the tideland region due to the steep topography of the hillside. Tideland fill contained by structural bulkheads or conventional slopes is required to construct uplands adjacent to the harbor. Deep water in the area limits offshore expansion and cost effectiveness of conventional fill construction for breakwaters.

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 geotechnical investigations were performed and preliminary designs were developed. The most cost effective protection was determined to be a pile supported wave barrier (wall) limited to 60 feet of water depth. The steep bathymetry limited the wave barrier to 320 feet offshore.



GRAPHIC SCALE
400 0 200 400
(IN FEET)

NORTH POINT CONCEPT LAYOUT

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE 4

A concept harbor 1200 feet long by 320 feet wide with a moorage basin of 8.8 acres was evaluated at North Point. See figure 4. This basin holds 46 vessels of the identified fleet. The initial construction cost estimate is 16–17 million dollars. Adding Planning, Engineering, and Design (PED), Supervision and Inspection (S&I), and NED investment cost, results in a total cost of $19,400,000 for an annual cost of $1,167,000. Real Estate and O&M costs are not included in the total project cost estimate. The estimated annual benefits are $1,081,000 consisting of (1) reduced travel to Pacific Northwest, –$479,000; (2) in-season moorage travel costs, –$521,000; (3) prevention of rafting damage, –$33,000; (4) increase to subsistence production, –$48,000. This results in a BCR of 0.9 and net annual benefits of –86,000. With negative net annual benefits the number of boats accommodated in this harbor will not justify the cost. Physical constraints limit size increases to linear expansion. Increasing harbor size by linear expansion also results in increasing costs by the same amount, therefore no economies of scale can be realized by lengthening the harbor.

The study team looked at several ideas to expand a harbor at this location, but linear expansions were the lowest-cost concepts. When engineering and economic analyses could not economically justify a harbor at this location, the study team evaluated the second choice location.

3.3.4. Head of the Bay

The head of the bay location was the second choice location because of the presence of wetlands and streams on either side of the harbor site and the accompanying environmental concerns. Operating a harbor at the head of the bay, regardless of the selected design and size, might affect over-wintering, Steller's eiders, as they presently congregate in large flocks at the north and south corners of the bay. Steller's eider is a threatened species.

Tides have little influence on circulation in Akutan Harbor and particularly at the head of the bay. Circulation at the head of the bay is driven primarily by winds. Construction at the head of the bay would impact surface and groundwater flow in the adjacent wetlands through uplands and basin construction. If inland basins are dredged, the saltwater interface would move inland and the wetlands water table would adjust to the basin water elevations. The adjacent North and South Creeks would be impacted depending on the size of harbors and uplands constructed. Central Creek would be impacted by any harbor construction.

The head of the bay insitu materials are clean saturated sands. Study team geotechnical engineers raised concerns about the stability of these materials and the potential for facility damage during an earthquake. Additional geotechnical investigations were performed in the spring of 2001. Three designs (offshore, inland, offshore/onshore) are considered for a harbor at the head of the bay. Head of the bay concepts are screened using 15-acre basins. This allows an initial comparison based on costs.

Offshore Harbor. An offshore harbor basin design minimizes direct impacts to adjoining wetlands and anadromous fish streams. This design also directly and adversely impacts the intertidal and subtidal habitat the threatened Steller's eiders rely on for foraging. These birds would be expected to reduce their use of the area for resting and refuge from bad weather due to the proximity of harbor activities. See figure 5.

The depth of water (in excess of 80 feet) points toward the use of floating breakwaters. Generally, floating breakwaters are used in limited fetch areas subjected to waves of less than a 4 second period and a wave height of 4 feet or less. This type of wave climate is generally found in relatively short fetches. The period of the design wave for this project is 4.7 seconds. The height of the design wave (H_{10}) is 3.9 feet. The deep-water wavelength associated with a 4.7 second period is 113 feet. This wavelength requires a 50-foot wide floating breakwater.

In this alternative, (15-acre basin), a floating breakwater, 1,500 feet long, is anchored near the head of the bay to provide protected moorage. Rubblemound breakwaters protect the north and south ends of the basin. Most of the moorage area is offshore with part of the existing shoreline area developed for related upland facilities and access.

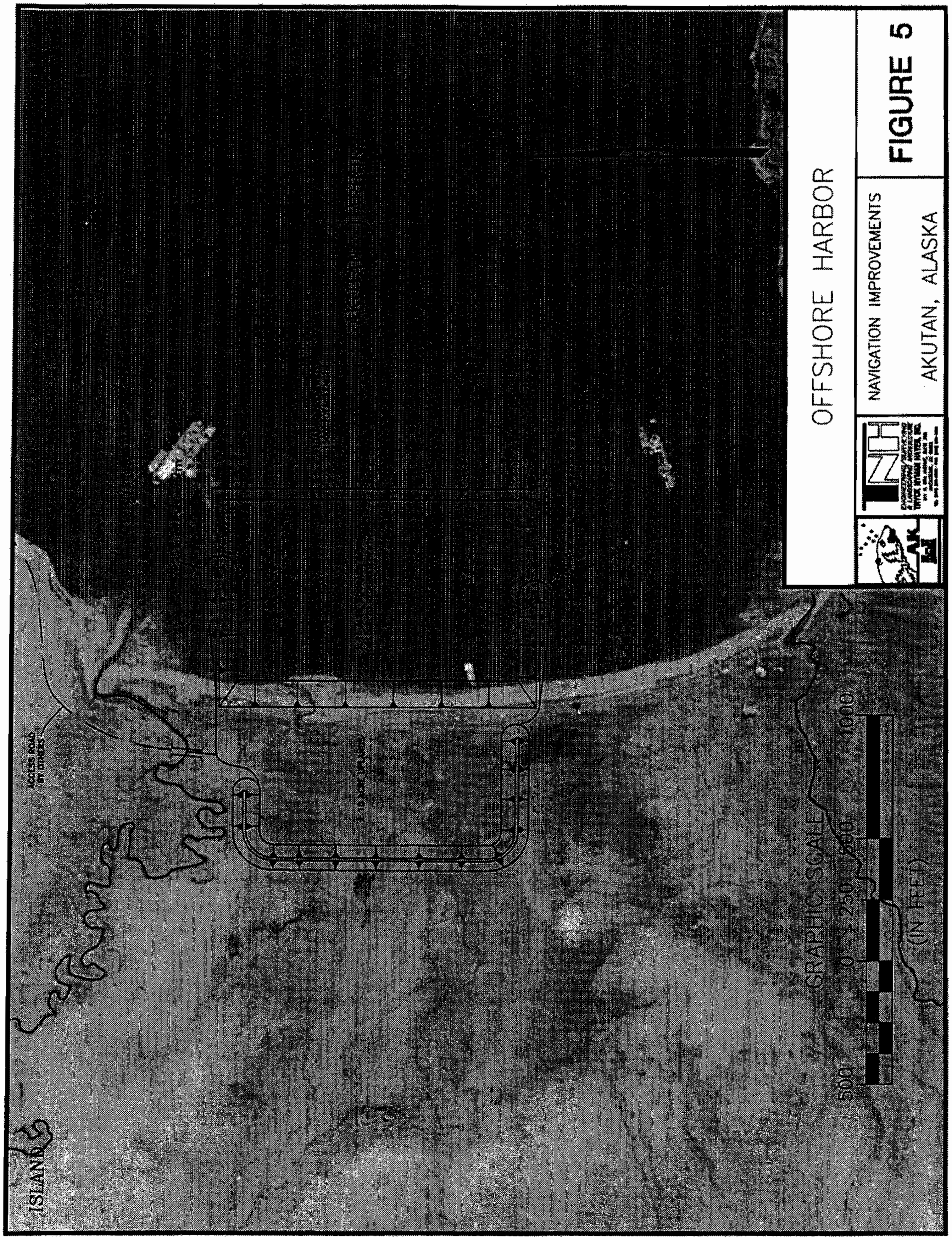
A concrete floating breakwater 40 feet wide and 1,500 feet long costs $18,000,000. Add rubblemound breakwaters, docks, dredging, and mob/demob for a total construction cost. Maintenance and inspection is more frequent and involved than with other structures. This is primarily due to the frequent periodic inspection requirement for mooring chain and fixtures.

Offshore/Onshore Harbor. An offshore/onshore harbor is offshore wave protection with part of the basin dredged from the beach berm and wetland behind the beach berm. Two alternative methods for the offshore wave protection are a rubblemound breakwater and curtain-wall wave barrier.

Nearshore marine habitat is unavoidably lost and directly impacts habitat at the head of the bay. This habitat is used by Steller's eider over-wintering in the bay. The wetland complex behind the beach berm will be impacted by inland dredging operations.

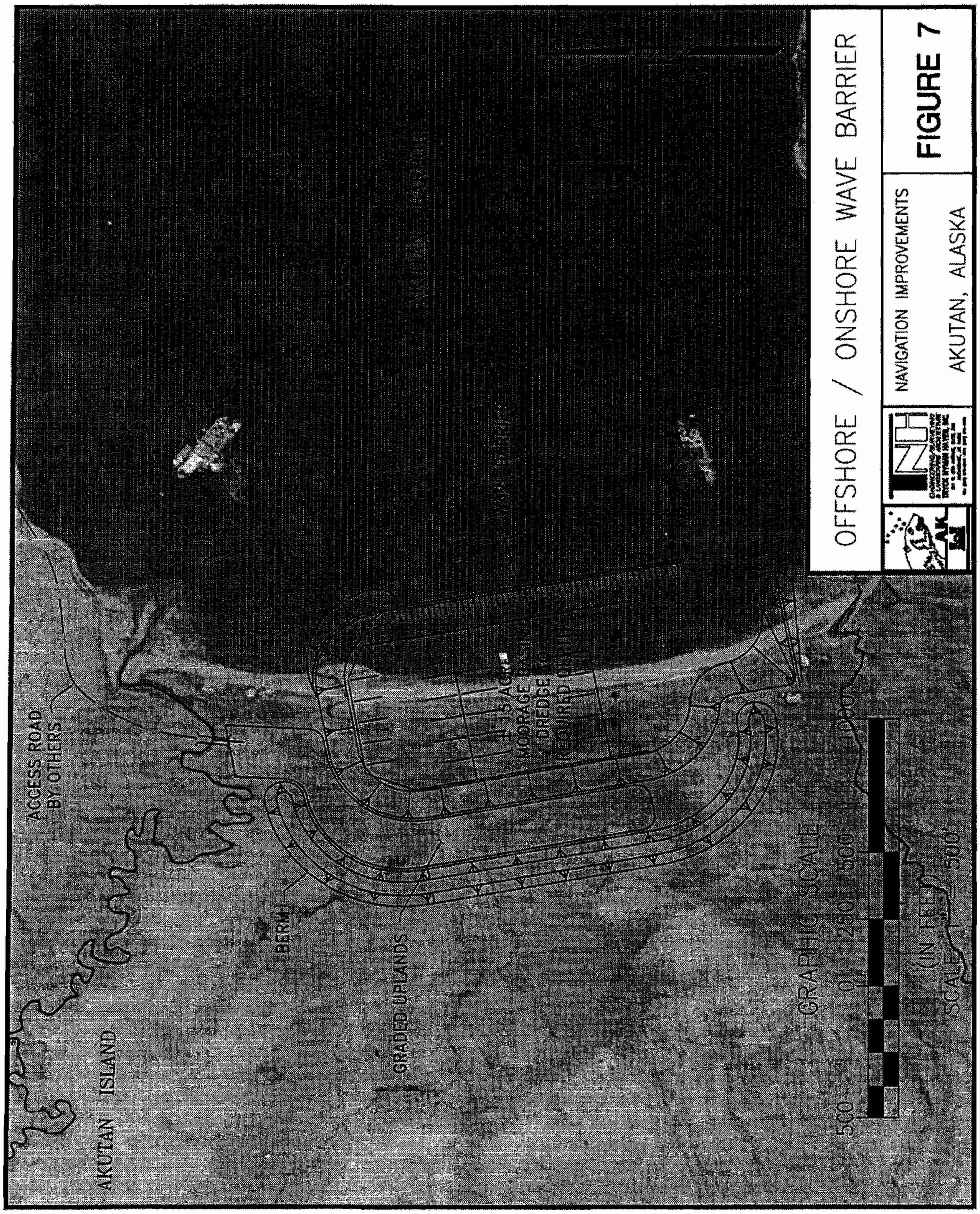
Rubblemound breakwater. The rubblemound is 1,100 feet long and in 25 feet of water. This is near the maximum economic practical depth normally associated with this type of structure. The centerline of the breakwater is 100 to 150 feet offshore from the existing beach. Ninety percent of the basin is dredged from the beach berm and wetland behind the beach berm. The initial estimated construction cost for this alternative is $17,900,000. See figure 6.

Curtain-wall wave barrier. The curtain-wall wave barrier is 1,000 feet long pile-supported structure consisting of 42,000 square feet of wave barrier panels. The wave barrier is 350 feet offshore from the existing beach and in 60 feet of water. A 450-foot rubblemound jetty traverses the breaking wave zone and connects the wave barrier to the beach. Curtain-wall wave barriers are ideally suited to shorter period, small amplitude waves similar to floating breakwaters. They work best in wave periods less then 4 seconds and in wave heights less then 4 feet. The design wave is 3.94 feet high with a 4.7 second period. Sixty five percent of the basin is dredged from the beach berm and wetland behind the beach berm. The initial estimated construction cost for this alternative is $20,300,000. See figure 7.



ISLAND
GRAPHIC SCALE
500 0 250 500 1000
(IN FEET)
OFFSHORE HARBOR
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA
FIGURE 5


ISLAND
ACCESS ROAD
BY OTHERS
BERM
GRADED UPLANDS
GRAPHIC SCALE
500 0 250 500 1000
(IN FEET)
OFFSHORE / ONSHORE RUBBLEMOUND
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA
FIGURE 6


ACCESS ROAD
BY OTHERS
AKUTAN ISLAND
BERM
GRADED UPLANDS
GRAPHIC SCALE
500 0 250 500
(IN FEET)
SCALE: 1" = 500'
OFFSHORE / ONSHORE WAVE BARRIER
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA
FIGURE 7

Inland Harbor. The inland harbor consists of an entrance channel dredged through the beach berm and the entire basin dredged out of the wetlands inland of the beach berm. The entrance channel is protected from waves by two breakwaters (one on each side) perpendicular to the existing shoreline. The wetland complex behind the beach berm is impacted by inland dredging operations. This alternative has the least impact to nearshore marine habitat as only the entrance channel and breakwaters protecting the entrance destroy any marine habitat. Moving harbor activities inland of the beach berm and moving the entrance channel to the north has the least impact to the habitat used by Steller's eider over-wintering in the bay. Dredging quantities are much larger than with the other two alternatives. The initial estimated construction cost for this alternative is $16,800,000. See figure 9.

Initial cost estimates show the inland harbor with a construction cost of $16,800,000 for a 15-acre basin as the least costly of the three head of the bay concepts. The inland harbor also has the least impact to the threatened Steller's eider intertidal and subtidal foraging habitat.

The inland harbor is carried forward for detail consideration and optimization.

3.4. National Economic Development Plan

Three inland harbor plans are evaluated for national economic development (NED) costs and benefits. See figures 8, 9, and 10. All three plans have the same entrance channel and breakwater configuration. The basic difference between the plans is basin sizes. The three basin sizes selected are 12, 15, and 20-acre basins. Dredging quantities varies with the basin size resulting in a slight difference in upland area requirements. Dredge material will be disposed of in the adjacent wetlands creating harbor uplands. Material in excess of requirements for upland construction will be stockpiled on the uplands for beneficial use such as in the construction of the planned airport and airport road. Under ideal conditions the airport and road would be constructed at the same time as the harbor reducing stockpile requirements for dredged material.

Resource agencies such as U.S. Fish and Wildlife Service (USFWS) support the selection of a plan with the least impact on marine resources. Also reducing impacts to the threatened Steller's eider habitat is an important concern. The U.S. Environmental Protection Agency (USEPA) desires the least impact to wetlands. Environmental considerations are discussed in detail in the environmental impact statement (EIS).

Comparison of the costs and benefits for the three inland plans (see tables 2 and 3) shows the 20-acre plan having the greatest net benefits and could be the NED plan based on cost/benefit considerations. However environmental considerations must also be evaluated when selecting a plan recommended for construction. Smaller plans have less impact on the anadromous fish streams along the northwest and southwest corners of the bay on both sides of the harbor site and remaining adjacent wetlands.

Mitigation measures include avoidance, minimization, rectification, reduction or elimination of impacts over time, and compensation. The 12-acre basin avoids and minimizes impacts to the wetlands through smaller basin area and less dredged material quantities. Having demonstrated that a 20-acre or larger basin would be selected as the NED plan, selecting the 12-acre harbor for environmental reasons is substantial mitigation in and of itself. The

12-acre basin inland harbor plan is selected as the environmental plan and the locally preferred plan because it has the least environmental impact and has a positive net benefit considering cost and benefits.

Engineering Regulation 1105-2-100 allows selection of a plan smaller than the NED plan. Table 2 demonstrates the net benefits increase with larger basins and indicates the NED plan, if fully developed, would be the 20-acre basin or larger plan. Table 2 also shows that a smaller plan is not likely to have greater net benefits than the 12-acre basin plan.

Reconfigured 12 Acre Basin. See figure 11, tables 2 and 3. The U.S. Environmental Protection Agency (USEPA) expressed concerns about impacts to the adjacent wetlands and the Alaska Department of Environmental Conservation (ADEC) had concerns on circulation and water quality within the harbor. The U.S. Fish and Wildlife Service (USFWS) requested benches on the breakwater at –1.0 MLLW to address their concerns regarding passage of migrating fish around the breakwater which were added to the outside of the breakwaters.

The harbor basin area was reconfigured to have rounded sides and corners. Also the entrance channel was made with parallel sides. This theoretically improves the water circulation within the basin. Rounding the sides and corners increases basin area from 12 acres to 14.9 acres to accommodate the same size fleet (58 vessels). Part of the dredge area and quantity are offset by the entrance channel change from flaring into the harbor to a narrow parallel-sided channel. Additional dredge quantity savings were achieved by making the basin side slopes steeper above the mean high water line. The net change in dredged material quantity was a reduction from 850,000 yd^3 to 843,000 yd^3.

To reduce the area impacted by dredged material disposal the top of the stockpile has been increased from 35 feet to 44 feet. The net effect of the changes from the 12 acre basin to the reconfigured 12 acre basin is an 8 acre decrease to wetlands impacts.

Table 2. NED Cost and Benefit Comparison of Inland Plans

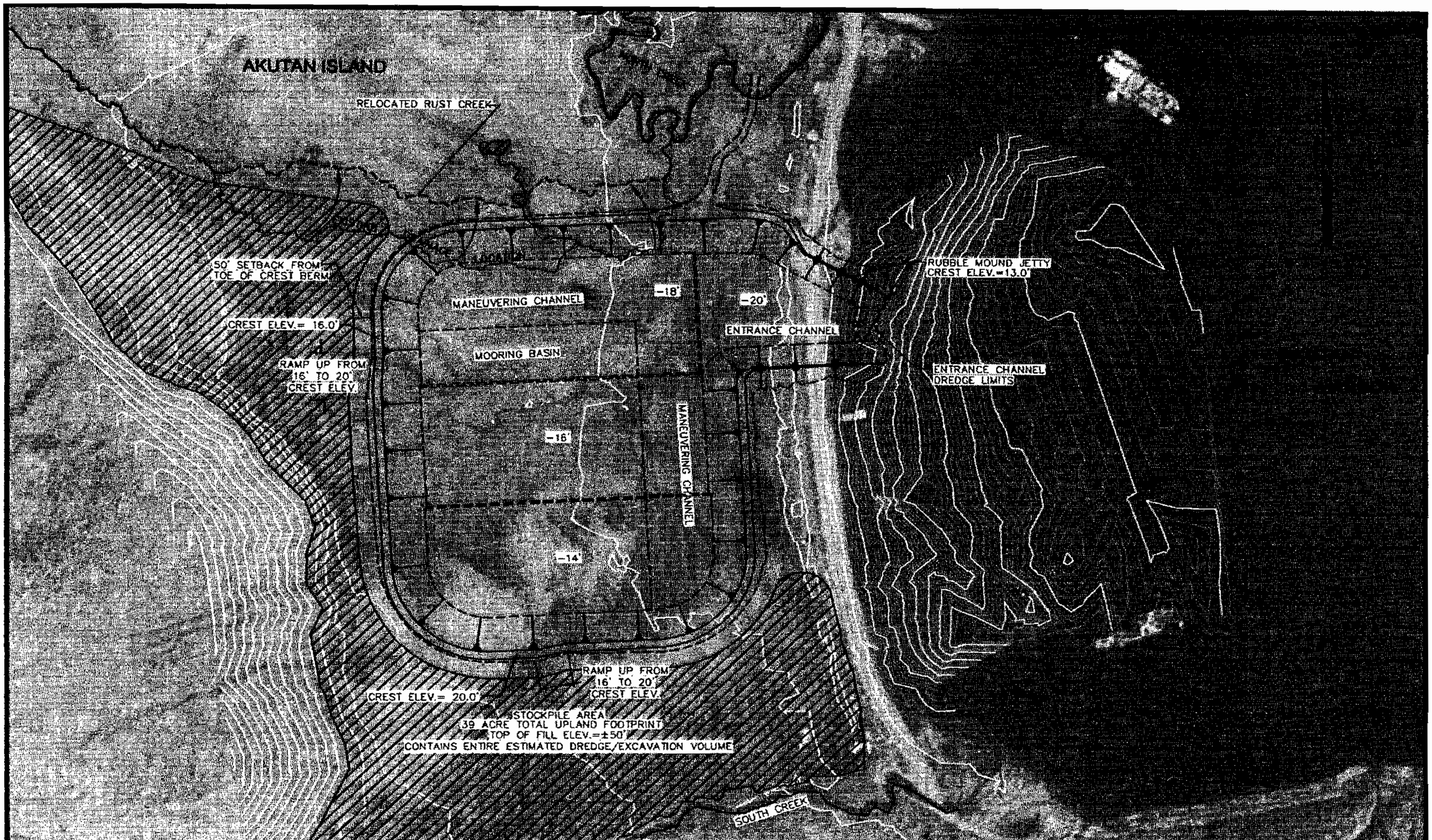
	12 Acre Basin	15 Acre Basin	20 Acre Basin	Reconfigured 12 Acre Basin
Mobilization and Demobilization	1,347,000	1,347,000	1,347,000	1,347,000
Breakwater and Seawall Construction	3,857,000	3,857,000	3,857,000	3,857,000
Dredging	8,054,000	9,183,000	10,847,000	8,264,000
Dock Facilities	2,477,000	3,121,000	3,913,000	2,477,000
Uplands Requirements[b]	404,000	484,000	581,000	404,000
Environmental Mitigation[a]	321,000	321,000	321,000	321,000
Aids to Navigation	15,000	15,000	15,000	15,000
Construction Contract Cost	16,475,000	18,328,000	20,881,000	16,685,000
Lands and Damages	535,000	550,000	614,000	378,000
Planning, Engineering, and Design	900,000	900,000	900,000	900,000
Construction Management	1,050,000	1,050,000	1,050,000	1,050,000
Subtotal	2,485,000	2,500,000	2,564,000	2,328,000
Project Cost	18,960,000	20,828,000	23,445,000	19,013,000
Interest During Construction	800,000	879,000	989,000	802,000
NED Investment Cost	19,760,000	21,707,000	24,434,000	19,815,000
Annual NED Cost (50 years at 5-5/8%)	1,189,000	1,306,000	1,470,000	1,192,000
Annual OMRRR	50,000	60,000	75,000	50,000
Total Annual NED Cost	1,239,000	1,366,000	1,545,000	1,242,000
Vessels Accommodated	58	68	80	58
Annual Benefits	$1,949,000	$2,527,000	$3,187,000	$2,267,000
Benefits to Cost Ratio	1.6	1.9	2.1	1.8
Net Annual Benefits	$710,000	$1,161,000	$1,642,000	$1,025,000

[a]Rust Creek relocation and removal of waterfall fish barrier.

[b]Access Spur road and uplands gravel surface.

Table 3. Akutan Harbor Benefit Summary ($000)

Category	12 Acre Basin	15 Acre Basin	20 Acre Basin	Reconfigured 12 Acre Basin
Use of Dredged Materials	391	520	690	709
Operating Cost Reductions				
Reduce Travel to PAC NW	701	885	1,106	701
In-season Moorage Travel Costs	761	1,014	1,268	761
Prevention of Rafting Damage	48	60	75	48
Increase to Subsistence Production	48	48	48	48
TOTAL	1,949	2,527	3,187	2,267



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'

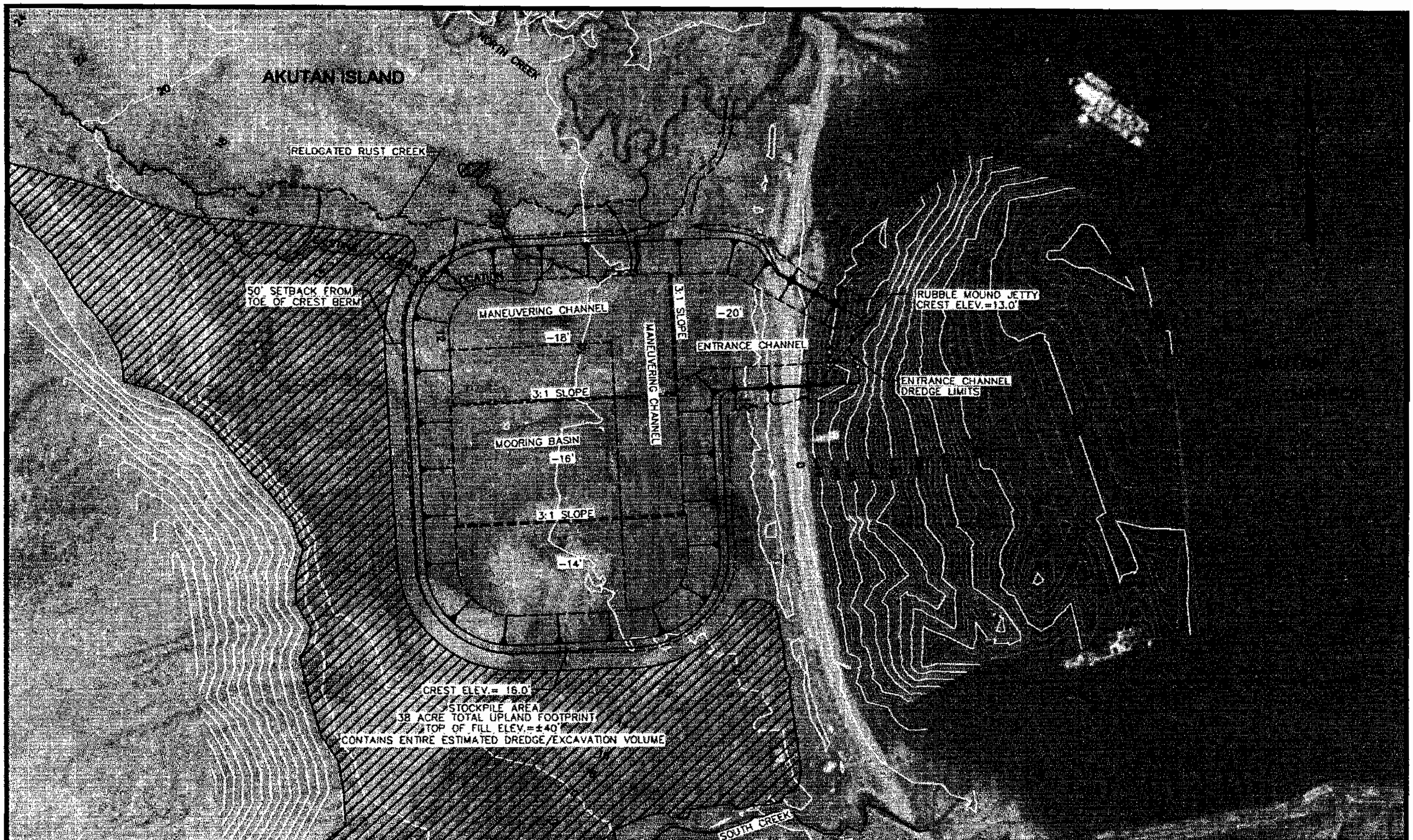
INLAND HARBOR PLAN
20-ACRE ALTERNATIVE

TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 8



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'

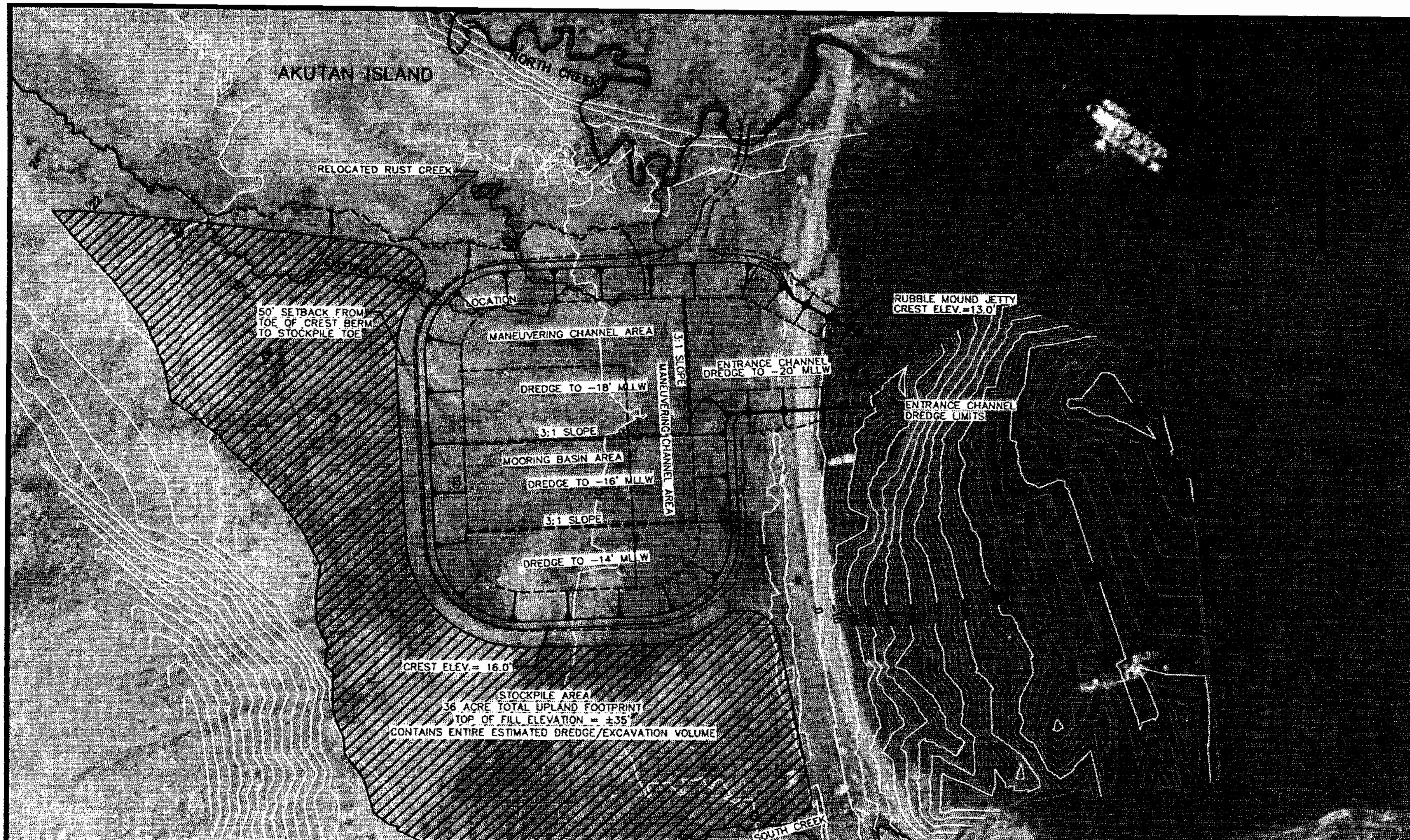
INLAND HARBOR PLAN
15-ACRE MOORING BASIN

TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 9



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'

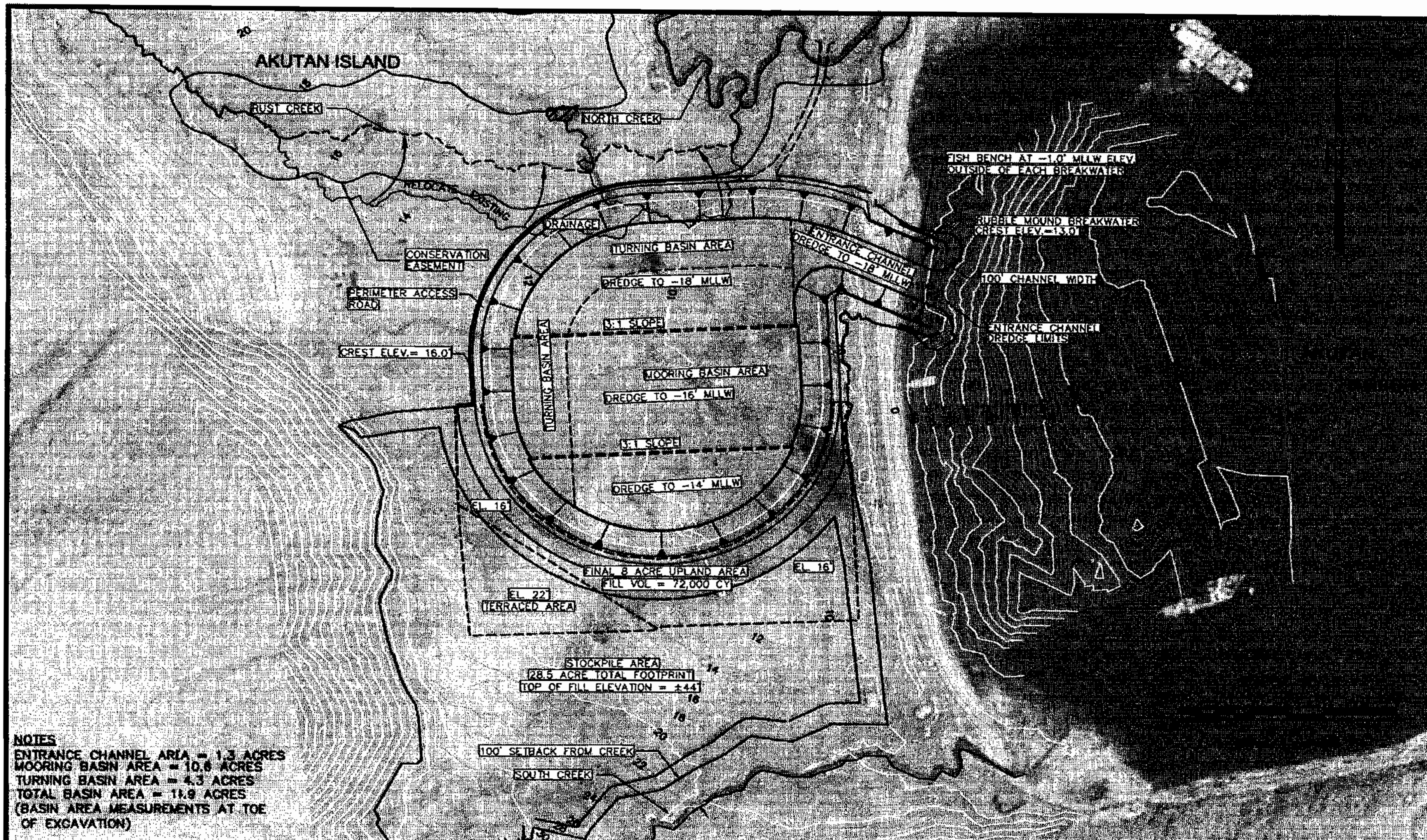
INLAND HARBOR PLAN
12-ACRE MOORING BASIN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

TRYCK NYMAN HAYES, INC

FIGURE 10



NOTES

ENTRANCE CHANNEL AREA = 1.3 ACRES
MOORING BASIN AREA = 10.6 ACRES
TURNING BASIN AREA = 4.3 ACRES
TOTAL BASIN AREA = 11.9 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

TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 11

3.5. Seismic Considerations

Akutan Island, like much of the Aleutian Islands, was formed by the convergence of the North American and Pacific plates. This convergence produces a seismically active belt where the Pacific Plate is subducted under the North American Plate. This subduction produces frequent earthquakes. The severity of the earthquakes increases with the increasing probability of not being exceeded in a 50-year period. The design earthquake has a 90% probability of not being exceeded in 50 years.

The foundation materials under the breakwater are medium dense, clean to slightly silty sands. These medium dense sands provide sufficient bearing capacity for the breakwater loads under all but severe earthquakes. In order to provide no breakwater damage at the design earthquake, a buttress under the breakwater needs to be constructed. This buttress would be constructed by over-excavating below the breakwater to 20 feet deeper than the adjacent entrance channel, or minus 40 feet MLLW, and backfilling with compacted granular material such as the breakwater core material. Also, breakwater slopes would be constructed at 3H:1V, which increases material quantities.

The geotechnical report also evaluated a breakwater design without a buttress and estimated the amount of damage expected in a design earthquake. Generally, breakwater slopes are designed at 1.5H:1V to reduce quantities of materials, reduce the footprint impacts to the sea floor and reduce costs. Because Akutan is in a seismically active location, the breakwater slopes are designed at 2H:1V to increase stability for moderate earthquakes. The non-buttress design over-excavates below existing ground level under the breakwater for a distance of 50 feet from the breakwater toe in the entrance channel. This over-excavation is set at the same elevation as the dredged entrance channel, −18 feet MLLW. The without-buttress breakwater is estimated to sustain damage in a design earthquake and require 30 percent reconstruction.

An estimate of the increased materials and cost for a breakwater design to provide for no damage at the design earthquake follows.

Cost of Buttress	yd^3	$\$/yd^3$	$
Additional Dredging	50,000	6.43	321,500
Core material backfill	50,000	41.72	2,086,000
Cost of Buttress			2,407,500
Cost of Breakwater slope 3H:1V vs 2H:1V			
Additional Armor rock	1,700	61.36	104,312
Additional "B" rock	860	49.06	42,192
Decrease in Core rock	(3,200)	41.72	(133,504)
Cost of Flatter Slope			13,000
Total Cost to add no Damage Design			**2,420,500**

The annual cost over 50 years @ 5-5/8% is $146,000.

For the purposes of economically comparing a non-buttress breakwater plan to a no-damage plan, the following conditions were assumed after a design earthquake: 30% rebuild, 50% rebuild, and 100% rebuild. It is also assumed the project benefits will be lost during reconstruction, and it will take 2 years for the harbor to become operational after a design earthquake. Two years of lost benefits averaged over the 50-year project life is $66,000 per year.

30% rebuild

	yd³	$/yd³	$
Mob/Demob			850,000
Armor rock	4,500	61.36	276,120
"B" rock	2,400	49.06	117,744
Core rock	13,500	41.73	563,355
		Total cost	1,807,219

The cost of a 30% rebuild is less than the cost of construction for a no-damage plan. For a design earthquake in project year six, the rebuild annual cost is $78,000 plus the lost benefit/cost of $66,000 equals an annual cost of $144,000, which is less than the annual cost of the no-damage plan.

50% rebuild

	yd³	$/yd³	$
Mob/Demob			850,000
Armor rock	7,500	61.36	460,200
"B" rock	4,000	49.06	196,240
Core rock	22,500	41.73	938,925
		Total cost	2,445,365

The 50% rebuild cost is slightly higher than the no-damage plan cost. For a design earthquake in project year 12, the rebuild annual cost is $76,000 plus the lost benefit/cost of $66,000 equals an annual cost of $142,000, which is less than the annual cost of the no-damage plan.

100% rebuild

	yd³	$/yd³	$
Mob/Demob			850,000
Armor rock	15,000	61.36	920,400
"B" rock	8,000	49.06	392,480
Core rock	45,000	41.73	1,877,850
		Total cost	4,040,730

The 100% rebuild cost is considerably higher than the no-damage plan cost. For a design earthquake in project year 21, the rebuild annual cost is $77,000 plus the lost benefit/cost of $66,000 equals an annual cost of $143,000, which is less than the annual cost of the no-damage plan.

This analysis assumes that under any design earthquake, the harbor will be totally unusable during a two-year breakwater reconstruction period. Smaller vessels will probably use the harbor as soon as entrance to the mooring basin is possible and not wait until completion of breakwater reconstruction. This will reduce the loss of economic benefits resulting in breakeven for earlier events under any damage estimate. Given the low probability of a design earthquake during the 50-year economic evaluation life of the project, there is no economic justification for recommending a no-damage plan for the design earthquake. Since the breakwater is expected to have people on it infrequently, there is no reason to build a no-damage plan from life safety issues.

There is not economic justification for providing no earthquake damage designed breakwaters. Therefore, breakwaters will be designed with 2H:1V slopes and insitu sands under the breakwaters excavated to channel depth for a distance of 50 feet from the toe.

3.6. Optimization of Entrance Channel

Vessel vertical motion due to wave action and vessel speed through the channel dictates additional depth over that required inside the harbor where wave action and vessel speed are reduced. The channel elevation at –20 feet MLLW, allowing unlimited access, is the maximum depth considered. The mooring basin depth of –18 feet MLLW controls the minimum channel depth considered. Mooring basin depth is controlled by the extreme low tidal elevation because vessels cannot be allowed to bottom out at low tide.

Entrance channels can be constructed, which do not allow access for all vessels at extreme low tide by constraining vessels with the deeper drafts to enter the harbor at higher tide levels. Estimating the incremental cost of construction and benefits to be gained for providing additional entrance channel depth does the optimization.

An initial optimization is done with hand calculated material quantities and using total operating cost for the vessel. Inspection of tide tables for one year shows an average of 13.7 occurrences per month when the design vessel will not be able to enter or leave the harbor at low tide. Assuming a one-hour duration for each occurrence, then a vessel could expect a 1.9 percent chance of delay during any month's operations. An estimated 19 vessels could experience delays for an annual cost of $11,700. The estimated annual cost for increasing channel depth from –18 feet to –20 feet MLLW is $13,700. Costs exceed benefits for the initial optimization.

Detailed optimization would consist of detailed material quantity calculations and detailed benefit analysis. Detailed material quantity calculations will result in higher amounts than the hand calculations, resulting in higher construction costs. Detailed benefits calculations will result in fewer benefits through elimination of vessel operating fixed costs and reduction in number of delays. Costs will still exceed benefits.

There is no economic justification for providing an entrance channel depth with no tide restrictions. Therefore an entrance channel depth at –18 MLLW, equal to mooring basin depth, will be provided.

3.7. Maintenance Dredging

There are two sources of sediments at the head of the bay, North Creek and South Creek. These sediments are dropped in deltas at the creek mouths. These sediments do not move across the bay, and the perpendicular breakwaters would trap any movement. Therefore maintenance dredging is unlikely to occur. If a minor amount of dredging is needed, barging material to at sea disposal becomes cost effective if the stockpiles are used and the area is developed. If the stockpile remains, dredged material can be added to the stockpile.

4.0 DESCRIPTION OF RECOMMENDED PLAN

4.1. Components

The inland reconfigured 12-acre basin harbor alternative is found to have the least environmental impacts and positive net economic benefits. Major construction items of the recommended plan include breakwaters, dredging, and inner harbor facilities. Disposal of dredged material will be in adjacent wetlands, creating upland space. Dredged material will be stockpiled on the created upland space and used for other projects in the Aleutian Islands. See figure 11.

Construction will occur over a two-year period. All dredging is expected to be sands with no boulders and rocks. Test pits and bore holes did not encounter boulders or bedrock. Project specifications will have construction requirements to ensure environmental protection and minimal impact to adjacent anadromous streams and wetlands.

4.1.1. Rubblemound Breakwaters

Two rubblemound breakwaters totaling 700 feet will protect the harbor entrance channel. The breakwaters will have a crest elevation of 13 feet MLLW transitioning to 16.0 feet MLLW at the inner harbor. The crest width is 5 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. The foundation materials will be excavated to entrance channel depth. Under the breakwater and 50 feet from the toe, the excavation line will slope at 3H:1V. Over-excavation will be backfilled with breakwater core material.

4.1.2. Channel and Basin

The project will accommodate 58 vessels in a 12-acre mooring basin. Vessel sizes range from under 24 feet to 180 feet in length. The entrance channel is dredged to an elevation of –18 MLLW. Turning basins and mooring basin are dredged to elevations of –18, –16, and –14 feet MLLW. The shallower depths are away from the entrance channel providing smaller boats more protection from waves coming through the entrance channel. Basin slopes will be 3H:1V and armored with rock to prevent and reduce erosion and sloughing.

4.1.3. Dredged Material Disposal

Disposal of dredged materials would occur 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, 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). 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.

Dewatering of the dredged material will occur in the stockpile areas. This will reduce the need for additional land area for dewatering operations and reduce construction impacts to adjacent wetlands. Water from the dewatering operation will be drained back into the harbor basin and not allowed to drain into Akutan Harbor. The construction contractor will design a dewatering plan based on his equipment and dredging methods. The contractor will submit his dewatering plan for approval prior to the start of dredging and dewatering operations.

4.1.4. Local Service Facilities

The local service facilities consist of the docks and floats necessary to moor the fleet and includes the necessary gangways for access from uplands to the docks. The minimum required uplands are also included in local service facilities.

4.1.5. Mitigation Measures

The head of Akutan Harbor is a biologically productive area. The area 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 eider (a threatened species).

Project-caused impacts to these resources that the Corps is mitigating for include (1) the loss of 43.7 acres of freshwater wetlands; (2) altering the project area's hydrogeology and possible repercussions on the area's anadromous fish streams and adjacent wetlands; (3) breakwater effects on near-shore coastal fishery habitat, fish movements, and the loss of intertidal and subtidal habitat; (4) the effects of project-induced activities (e.g., fuel spills, boat traffic, construction and operation of harbor-related businesses) on over-wintering Steller's eiders; and (5) degradation of water quality in Akutan Harbor and the mooring basin because of incomplete water circulation in each.

The Corps believes that incorporating mitigation measures, good engineering designs in support of environmental principles, and Endangered Species Act-related terms and conditions/conservation measures into the harbor's design and construction, operation, development, and monitoring phases avoids and minimizes adverse impacts to the maximum extent practicable, and that remaining unavoidable impacts have been compensated to the extent justified.

The following list contains items to be constructed or incorporated into the project. Operational items for the local sponsor and for the construction contractor can be found in the EIS.

a. To facilitate containing a petroleum compound spill within the harbor, the Corps will install eye-bolt anchors at the outer and inner ends of the breakwaters for attaching spill containment booms.

b. The spur access road, leading from the harbor to the airport road, will be designed to the minimum size necessary to accommodate the anticipated traffic and be constructed to avoid impacting North Creek. NOTE: The road from the City of

Akutan to the yet-to-be-constructed airport is a State of Alaska project and will be constructed around the harbor site.

c. The Corps will remove a waterfall barrier at the mouth of Rust Creek, a North Creek tributary, to allow anadromous fish access to Rust Creek's upper reaches. Rust Creek will be relocated as needed around the harbor basin.

d. The Corps will require the project sponsor to 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.

e. As dredged spoils are used for offsite projects, the former stockpile space will be used as harbor parking, staging, and equipment storage areas rather than create these areas in the future.

f. A 41.7 acre mitigation lands (wetlands conservation easement) will be established along Rust Creek and North Creek consisting of 100-foot non-development setbacks from the stream banks. The wetlands conservation easement designation will permanently prohibit any dredge and fill activities within its boundaries.

g. Harbor lighting will be shielded to minimize the hazard of disorienting flying birds and causing them to strike fixed objects.

h. 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.

i. The vegetated beach-berm at the head of Akutan Harbor will remain intact.

j. The harbor basin will be constructed and dredged while being isolated from Akutan Harbor. The entrance channel will be dredged last.

k. The toe of the dredged material stockpile will be set back 100 feet from South Creek.

4.2. Plan Benefits

4.2.1. NED Benefits

NED benefits are used for the economic justification of this project. Benefits for the recommended plan (inland reconfigured 12-acre basin, figure 11) are summarized in table 3. See the Economics Analysis appendix for details of project benefits.

4.2.2. Local and Regional Benefits

Although local and regional benefits are not part of the economic justification for the project, these benefits are important to the Aleutians East Borough (non-federal sponsor), the city of Akutan and residents. These include opportunities for residents such as developing tourism, sport fishing, and the developing small boats, inshore waters State fishery. Local and regional benefits have not been quantified, however, the Economics Appendix has more detail and descriptions. The local residents are particularly interested in the creation of year-round jobs, sheltered moorage for larger boats, better suited to the surrounding ocean, replacing skiffs and resulting increased opportunities to participate in the developing local near shore fishery.

4.3. Plan Costs

Table 2 presents the detailed estimated costs of the recommended plan for harbor improvements. This table also includes the benefit/cost analysis, including annual costs and benefits.

Interest during construction (IDC) was added to the initial cost to account for the opportunity cost incurred during the time after the funds have been spent, but before the benefits begin to accrue. IDC was calculated by matching the construction expenditure flow with the interest the funds would have accumulated had they been deposited in an interest-bearing account. Preconstruction, engineering, and design (PED) is assumed to take a minimum of nine months. Construction is expected to last for 24 months. For this analysis, midpoint of construction is assumed. M-CACES cost estimate is shown in appendix G.

4.4. HTRW Considerations

During fieldwork, abandoned barrels and old burn pits were discovered. A limited scope field investigation was done during the feasibility study for determining the potential for hazardous materials and waste within the project boundaries. Barrels and burn pits were located and found to be outside the project boundaries. Soil and water samples were taken for testing and some contamination was found, but appears to be outside dredging boundaries. Some questions were raised during quality reviews on the handling of samples from the project site to the testing laboratories and in the laboratories. In particular there appears to be PCE contaminates inland from the beach where none should be expected based on past land uses of the area. Additional fieldwork and testing will be accomplished during the PED phase of the project prior to construction. Cost sharing will be in accordance with ER 1165-2-132. Studies for recognizing existence and extent of HTRW are cost shared. Development of response plan and studies for dealing with HTRW are 100% non-federal responsibility, and response measures to relocate or treat HTRW are 100% non-federal sponsor responsibility (all response costs are excluded from the economic analysis).

4.5. Risk and Uncertainty

As in any planning process, some of the assumptions made in this report are subject to error. Elements of risk and uncertainty could affect the design and performance of the project, cost, and benefits. A risk and uncertainty analysis is included in appendix B, Economics Analysis, under sensitivity analysis.

Future use of the proposed harbor will be contingent upon continued demand for secure moorage by vessels operating in the Bering Sea fisheries adjacent to Akutan. Since 1977, the North Pacific Fishery Management Council (NPFMC) has managed these fisheries. The management regulations provided by NPFMC has been conservative and has not resulted in depleting the fishery resource stocks in the Bering Sea.

Moorage demand is subject to change; however, the project provides for a portion of the vessels seeking moorage in Akutan. There are over 200 vessels operating in the region that make at least occasional deliveries to the Trident Seafoods' Akutan plant. The design fleet is made up of the 64 vessels that constantly deliver to the plant. The recommended alternative provides moorage for 38 of the 64 vessels in the design fleet. Therefore fishery stocks and plant capacity would have to be reduced by the amount handled by 26 vessels to affect the recommended harbor project.

It would take a 45% reduction in benefits to bring the benefit cost ratio (BCR) to 1.0. This is an annual benefit reduction of $1,025,000 and could be no "use of dredged materials" and 20% of commercial fishing benefits or some other combination of benefit reduction.

Reducing the BCR to 1.0 through increased costs could be through a $16,000,000 increase in project construction costs—for example the access road to the harbor if the ADOT airport project were cancelled. BCR reductions could be through a $1,025,000 annual increase in operating costs—for example a ferry service if the ADOT airport project were cancelled. A reasonable short-term increase in costs could be a delay in the ADOT airport project and associated road around the head of the bay and resulting costs for limited ferry service to access the harbor.

While rigorous numerical calculations and detail assessments have not been done for benefit reductions or cost increases, the above discussions shows that there would have to be significant changes to impact project justification.

4.6. Plan Accomplishment

The recommended plan (inland reconfigured 12-acre basin, figure 11) meets the national and local objectives noted in section 3.1.6, Plan Objectives.

4.7. Plan Implementation

4.7.1. Construction

Federal. The Corps of Engineers would be responsible for construction of the breakwaters and entrance channel. The U.S. Coast Guard would be responsible for installing aids to navigation.

Local. The sponsor would be responsible for excavating the mooring basin, constructing the float system, and providing all lands, easements, and rights-of-way necessary for the project. The sponsor is also responsible for funding its share of the Federal general navigational features (GNF).

4.7.2. Operation, Maintenance, Repair, Replacement, and Rehabilitation

Federal. The Corps of Engineers will conduct periodic inspections of the rubblemound breakwaters and hydrographic surveys of the channels and maintain the breakwaters and channels as needed. The U.S. Coast Guard would maintain navigational aids.

Local. The local sponsor will perform maintenance dredging of the mooring basin, if necessary, maintain the floats, utilities, etc., and operate the completed project. The local sponsor may use dredged material for approved fill activities or other construction activities. The local sponsor will maintain the stockpiled dredged material and capture, contain, and treat runoff from the dredged material as necessary. When dredged material is used, the local sponsor may use the stockpile area for other upland purposes. The dredged material stockpile area will be used for disposal of dredged material during future maintenance dredging operations. Future dredged material may be used for approved fill activities.

Table 4. Estimated Average Annual OMRR&R Cost For Recommended Plan

Item	Interval (yr)	Average Annual Cost (5-5/8%)		
		Federal ($)	Non-Federal ($)	Total ($)
Navigation Aids	5	1,000		1,000
Breakwater Repairs	25	4,000		4,000
Hydrographic Surveys	5	3,000		3,000
Maintenance Dredge (Entrance & Maneuvering Channel)	25	7,000		7,000
Maintenance Dredge (Berthing Area)	25		15,000	15,000
Local Facilities Repair[a]	1		20,000	20,000
TOTAL OMRR&R COST		15,000	35,000	50,000

[a]includes minor amounts for mitigation repair/monitoring

4.7.3. Real Property Interests

The real estate requirements include lands owned by the Aleut Corporation and the city of Akutan. The Aleutians East Borough is the sponsor and will acquire all needed real estate rights. Fee simple acquisition of mitigation lands (conservation easement) has been assumed in this feasibility report and Real Estate Plan, although the final decisions on the nature and extent of the required real estate interest may change after project authorization. A summary of estimated real estate costs and a detailed description of required real estate are in appendix E. There are no known relocations of buildings, people, or public utilities at this time.

Approximately 44 acres of wetlands will be destroyed by the project, 11 acres of which will be within the dredged material stockpile footprint. Wetlands will not be restored when the stockpiled material is used for other purposes. Useable uplands will be created as the stockpiled material is used.

4.7.4. Cost Apportionment

Construction costs for the project would be apportioned in accordance with the Water Resources Development Act of 2000 (table 5).

Table 5. Apportionment Of Construction Costs

	Construction cost contribution (%)	
Portion of project	Federal	Local
General navigation features (includes entrance channel, turning basins, and breakwaters)	80	20[a]
Local features (includes floats and mooring basin)	0	100
Coast Guard navigation aids	100	0

[a]Non-federal interests must provide cash contributions toward the costs for construction of the general navigation features (GNF) of the project, paid during construction (PDC) as follows: For project depths of up to 20 ft–10%; for project depths over 20 ft and up to 45 ft–25%, and for project depths exceeding 45 ft–50%. For all depths, they must provide an additional cash contribution equal to 10% of GNF costs (which may be financed over a period not exceeding 30 years), against which the sponsor's costs for LERRD (except utilities) shall be credited. *Note:* Costs for general navigation features include associated costs, such as mobilization.

The sponsor is also responsible for 100 percent of the construction cost of the inner harbor facilities, which includes dredging the mooring area. A breakdown of the initial costs for the RECOMMENDED PLAN is shown on table 6. The fully funded cost of the RECOMMENDED PLAN (reconfigured 12-acre basin) is estimated as $20,699,000.

The Federal Government would assume 100 percent of the operation and maintenance costs for the breakwaters, turning basins, and entrance channel. The non-federal sponsor would assume all other operation and maintenance costs. The sponsor would be responsible for providing LERRD for construction and future maintenance of the inner harbor facilities and the betterments.

In addition to the sponsor's share of costs for General Navigation Features, the sponsor is responsible for costs associated with other NED and non-NED features. The pertinent data table in the front of this report provides a summary of all shared costs.

The initial construction cost of the General Navigation Features is 90 percent for the initial Federal investment and 10 percent for the initial local share because all dredging is 20 feet or less. The non-federal sponsor must also contribute an additional 10 percent (deferred amount), plus interest, during a period not to exceed 30 years after completion of the General Navigation Features. The sponsor would be credited toward this 10-percent cost with the value of LERRD necessary for construction, operation, and maintenance of the general navigation features. See additional funding requirement in table 6 for estimated deferred amount and GNF LERRD credit.

The cost of the mitigation lands (conservation easement), noted in item f. of section 4.1.5, Mitigation Measures, will be apportioned between GNF and LSF. The reconfigured 12 acre plan has 10.6 acres of LSF basin and 5.6 acres of GNF basin including the entrance channel. Mitigation costs attributed to wetlands impacts will be apportioned on a ratio of the GNF basin and LSF basin area, 35% to GNF and 65% to LSF project features. The sponsor will be allowed credit for the costs of mitigation lands apportioned to GNF as part of the 10% deferred amount. The apportioned mitigation lands estimated costs are included in Table 6 as "LERRD (GNF apportion) – Mitigation Lands" and "LERRD (LSF apportion) – Mitigation Lands."

The GNF and LSF dredged material will be co-mingled within one disposal/stockpile area. Cost apportionment for the disposal area will be prorated between GNF and LSF based on the relative quantities of GNF and LSF dredged material and the temporary easement cost for the duration of construction. The sponsor will be allowed credit for the cost apportioned to GNF.

Table 6. Federal/Non-Federal Initial Cost Apportionment for Recommended Plan

(Recommended Plan – October 2003 Price Level)

Items	Total Project Cost ($000)	Implementation Costs ($000)			
		Federal	%	Non-Federal	%
General Navigation Features (GNF):					
Mobilization/demobilization	1,347	1,212		135	
Breakwaters	3,857	3,471		386	
Entrance channel and turning basins	3,823	3,441		382	
Mitigation [a]	321	289		32	
Preconstruction, engineering, and design	900	810		90	
Construction management	1,050	945		105	
LERRD (GNF) – Federal administrative costs [c]	24	22		2	
Subtotal GNF	11,322	10,190	90	1,132	10
LERRD (GNF) – Acquisition costs	59			59	
LERRD (GNF apportion) – Mitigation Lands	35			35	
LERRD (GNF) – Non-federal administrative costs	18			18	
Additional Funding Requirement					
10% of GNF (Deferred amount)		-1,132		1,132	
GNF LERRD credit		112		-112	
Post construction contribution		-1,020		1,020	
Subtotal of GNF Related Items	11,,434	9,170		2,264	
Aids to navigation	15	15	100	0	0
Local Service Facilities (LSF)					
Mooring basin	4,441	0		4,441	
Dock Facilities	2,477			2,477	
Uplands Requirements[b]	404	0		404	
LERRD associated with LSF	177	0		177	
LERRD (LSF apportion) – Mitigation Lands	65	0		65	
TOTAL LOCAL SERVICE FACILITIES	7,564	0	0	7,564	100
INITIAL COST REQUIREMENTS	19,013	9,185		9,828	

[a]Rust Creek relocation and removal of waterfall fish barrier

[b]Access Spur road and uplands gravel surface

[c]The local sponsor pays 10% of the Federal GNF LERRD costs.

4.7.5. Financial Analysis

The Aleutians East Borough understands and undertakes the obligation of paying for the local share of the recommended plan including construction of the local service facilities. The Aleutians East Borough is planning general obligation (GO) and revenue bonds to finance part of the local share of project costs. The State of Alaska expects to request funds from the legislature for the balance of the local share of the project. This has been the state practice on harbor projects in recent years. The city of Akutan will provide the lands required for the project. The Aleutian Pribilof Islands Community Development Association (APICDA) will contribute cash in the form of a grant on behalf of its members in the village of Akutan. A letter stating the Borough's financial capability is enclosed in appendix F.

5.0 PUBLIC INVOLVEMENT

Since initiation of this feasibility study representatives from the Aleutians East Borough and City of Akutan, have worked closely with the study team, and local concerns have been addressed. Cooperation between the staffs of the Corps of Engineers and the U.S. Fish & Wildlife Service, together with input from representatives of the Aleutians East Borough and City of Akutan and public comments, resulted in the selection of the recommended plan. See section 1.4, Environmental Coordination.

6.0 CONSULTATION REQUIREMENTS

This study has been coordinated with all relevant Federal and State agencies, including the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation. Information on this coordination is provided in the EIS and is summarized in table 7.

Table 7. Environmental Compliance Checklist

Federal Statute	Status of Compliance
Clean Air Act, as amended	Full Compliance
Clean Water Act, as amended	Full Compliance
Coastal Zone Management Act	Full Compliance
Endangered Species Act of 1973, as amended	Full Compliance
Estuary Protection Act	Full Compliance
Federal Water Project Recreation Act, as amended	Not Applicable
Fish and Wildlife Coordination Act	Full Compliance
Land and Water Conservation Fund Act, as amended	Full Compliance
Magnusen – Stevens Fishery Management Act and Conservation Act	Full Compliance
Marine Mammal Protection Act	Full Compliance
Marine Protection, Research and Sanctuaries Act, as amended	Not Applicable
Migratory Bird Treaty Act	Full Compliance
National Environmental Policy Act of 1969, as amended–CEQ Regulations for Implementing the Procedural Provisions of NEPA	Full Compliance
National Historic Preservation Act of 1966, as amended	Full Compliance
Rivers and Harbors Appropriation Act of 1899	Full Compliance
Watershed Protection and Flood Prevention Act, as amended	Not Applicable
Wild and Scenic Rivers Act, as amended	Not Applicable
Wilderness Act	Full Compliance
Executive Orders, Memorandums, etc.	
Floodplain Management (E.O. 11988)	Full Compliance
Protection of Wetlands (E.O. 11990)	Full Compliance
Environmental Effects Abroad of Major Federal Action (E.O. 12114)	Not Applicable
Protection and Enhancement of Environmental Quality (E.O. 11514 and 11991)	Full Compliance
Analysis of Impact on Prime and Unique Farmlands (CEQ Memo Aug. 11, 1980)	Not Applicable
Protection and Enhancement of the Cultural Environment (E.O. 11593)	Full Compliance
Environmental Health and Safety Risks to Children, 1997 (E.O. 13045)	Full Compliance
Environmental Justice in Minority and Low-income Populations, 1994 (E.O. 12898)	Full Compliance
Environmental and Coordination with Indian Tribal Government, 2000 (E.O. 13175)	Full Compliance

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

The studies documented in this report indicate Federal construction of navigational improvements with rubblemound breakwaters, as described in the recommended plan, is technically possible, economically justified, and environmentally and socially acceptable. The reconfigured 12-acre basin inland harbor plan is selected as the recommended plan because it has the least environmental impact and has a positive net benefit, considering cost and benefits. The reconfigured 12-acre alternative does not maximize the net NED benefits, however, it does have positive net benefits. As stated in section 3.4, the 20-acre plan has the greatest net benefits and the NED plan is 20 acres or larger. Selection of the reconfigured 12-acre plan is consistent with the Federal objective of water and related land resources planning, contributing to national economic development and protecting the Nation's environment. The Aleutians East Borough is willing to act as local sponsor for the project and fulfill all the necessary local cooperation requirements. Therefore the Federal Government in cooperation with the Aleutians East Borough should pursue alternative (inland reconfigured 12-acre basin), the recommended plan.

7.2. Recommendations

I recommend navigation improvements at Akutan, Alaska, be constructed generally in accordance with the plan herein, and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable, at an estimated total Federal cost of $9,185,000 and $15,000 annually for Federal maintenance, provided that prior to construction the local sponsor agrees to the following:

a. Enter into an agreement which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

b. Provide, during construction, any additional funds needed to cover the non-federal share of design costs;

c. Provide, during the period of construction, a cash contribution equal to the following percentages of the total cost of construction of the general navigation features (which include the construction of land-based and aquatic dredged material disposal facilities that are necessary for the disposal of dredged material required for project construction, operation, or maintenance and for which a contract for the federal facility's construction or improvement was not awarded on or before October 12, 1996;): 10 percent of the costs attributable to dredging to a depth not in excess of 20 feet; plus, 25 percent of the costs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus 50 percent of the costs attributable to dredging to a depth in excess of 45 feet;

d. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the project, up to an additional 10 percent of the total cost of construction of general navigation features. The value of lands, easements, rights-of-way, and relocations provided by the non-Federal sponsor for the general navigation features, described below, may be credited toward this required payment. If the amount of credit

t. 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;

u. Maintain project mitigation lands as necessary for the lands purpose, and provide repairs as necessary to the relocated portion of Rust Creek;

The recommendations for implementation of navigation improvements at Akutan, Alaska reflect the policies governing formulation of individual projects and the information available at this time. They do not necessarily reflect the program and budgeting priorities inherent in the local and State programs or the formulation of a national civil works water resources program. Consequently, the recommendations may be changed at higher review levels of the executive branch outside Alaska before they are used to support funding.

Date: 16 June 2004

Timothy J. Gallagher
Colonel, Corps of Engineers
District Engineer

FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA

FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA

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
Policy Compliance Division
HQUSACE (CECW-PC)
7701 Telegraph Road
Alexandria, VA 22315-3860

Final
Environmental Impact Statement
for
Navigation Improvements
Akutan, Alaska

Table of Contents

Page FEIS-

Appendices

List of Tables and Figures

Tables **Page**

Figures **Page**

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

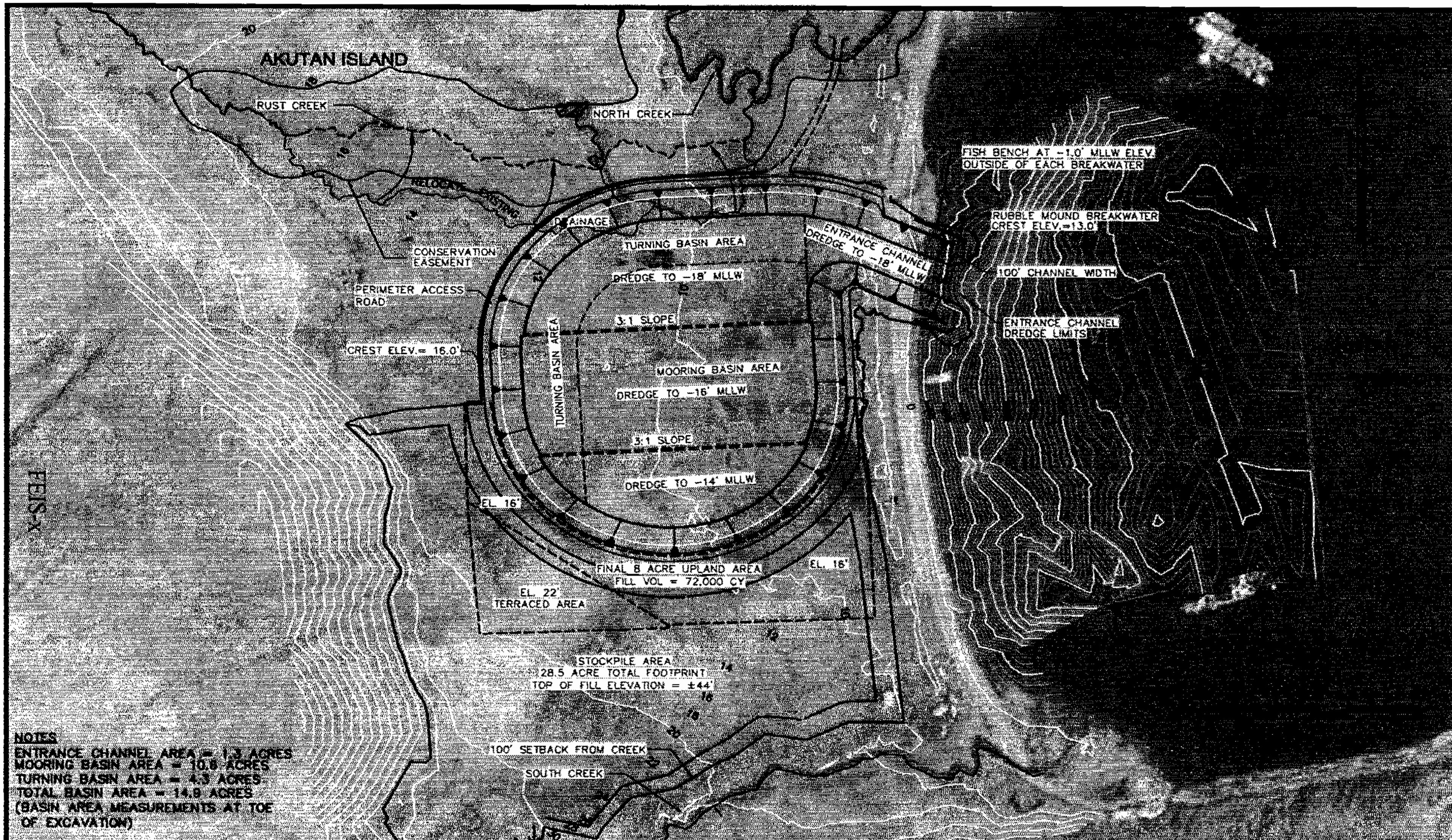
Major Engineering Findings

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

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

TRYCK NYMAN HAYES, INC

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.

Physical Environment. 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.

[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.

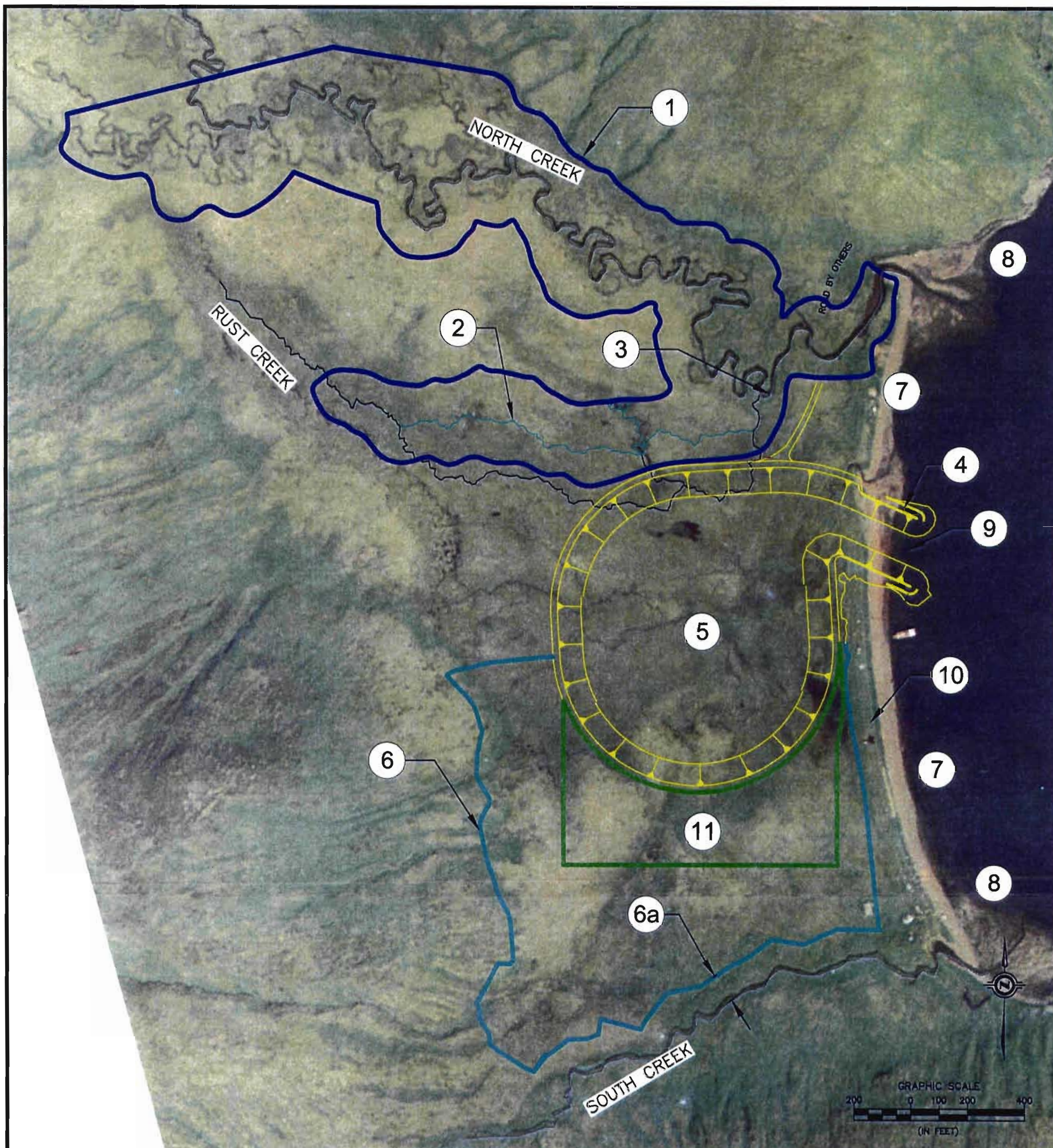
The Corps believes that construction of a 58-vessel mooring basin and entrance channel at the head of Akutan Harbor could directly and indirectly impact over-wintering Steller's eiders, the Alaska breeding population of which is a threatened species. Minimal Steller's eider habitat would be destroyed 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.



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-ii

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.

Harbor Operation

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.

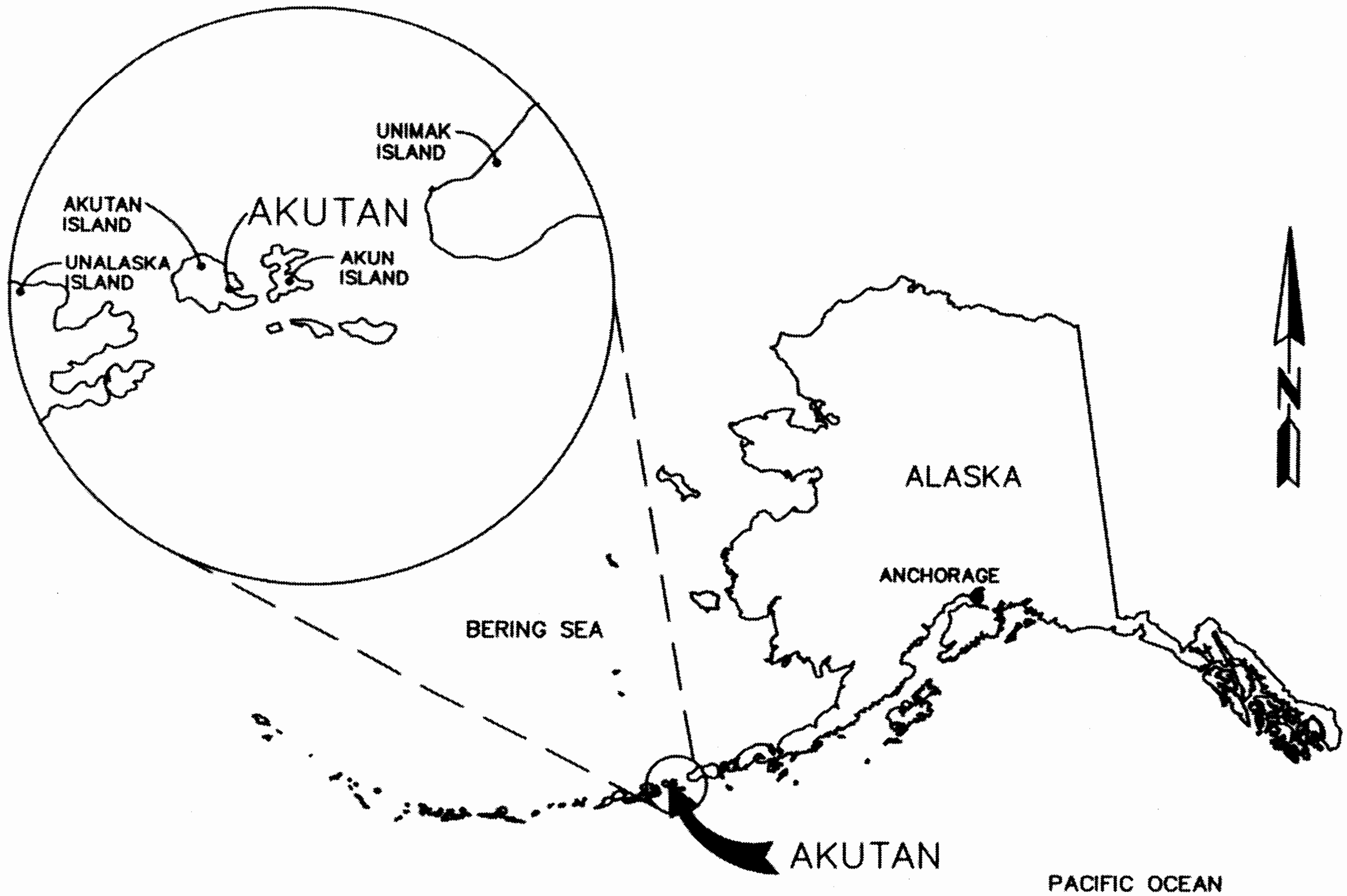
The FEIS considers and assesses the potential effects of a variety of alternatives at different project locations within Akutan Harbor, which is the geographic and oceanographic name for the body of water where the harbor site and City of Akutan are located (figure FEIS-2). In addition, the FEIS analyzes 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

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.

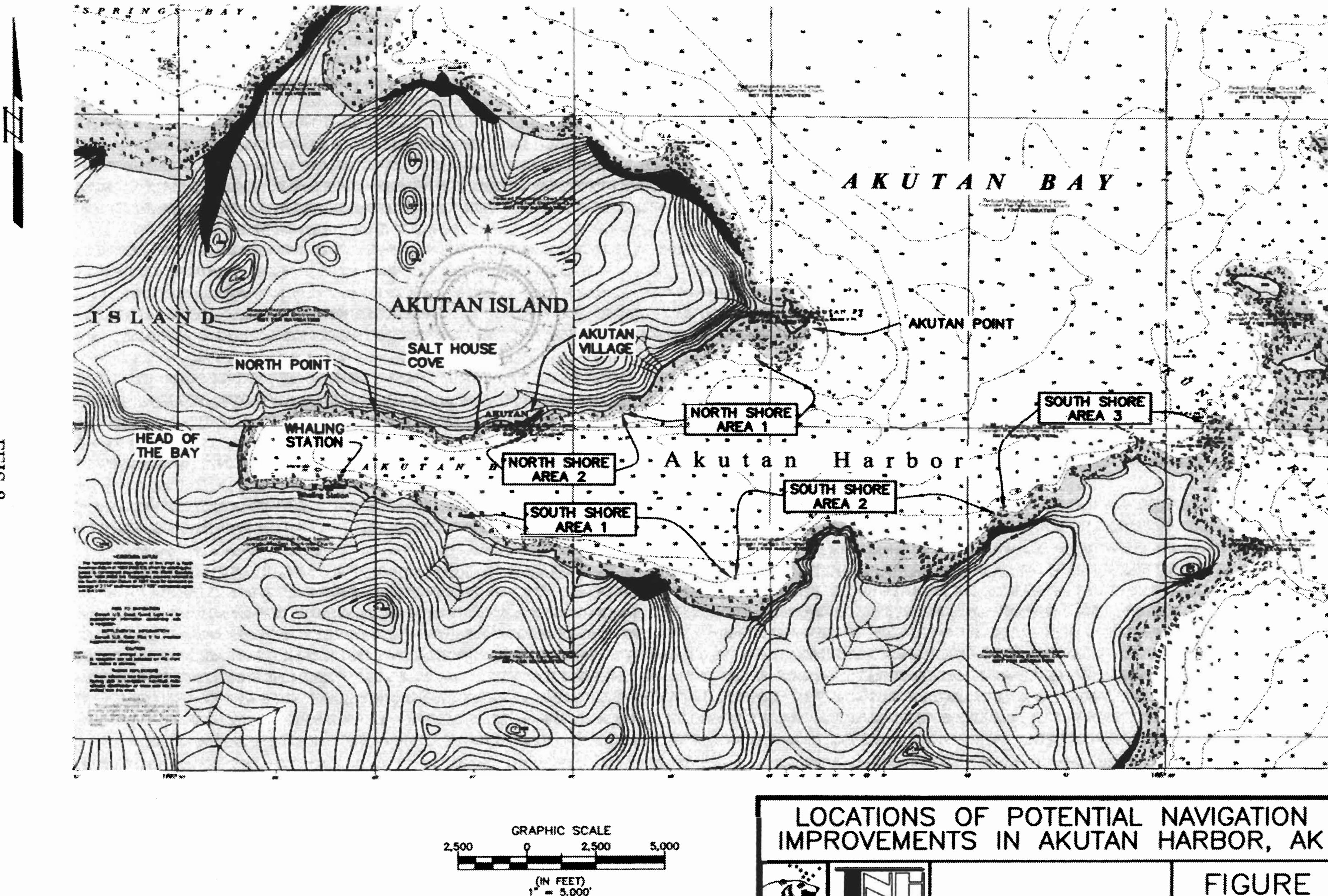
2.1 Alternatives Eliminated from Further Consideration

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.



LOCATIONS OF POTENTIAL NAVIGATION IMPROVEMENTS IN AKUTAN HARBOR, AK

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.

2.2.3.1 Offshore Harbor Basin

An offshore harbor basin concept was advanced through the use of a floating breakwater instead of a conventional fill breakwater because of deep water and the associated high cost of construction. In this design, a floating breakwater, approximately 2,000 feet long, 40 feet wide, and 15 feet deep would be anchored near the head of the bay to provide protected moorage (figure FEIS-3). Most of the moorage area of the basin would be offshore with some portion of the existing shoreline area developed for related upland facilities and access.

A number of disadvantages are associated with floating breakwaters in Akutan Harbor. Maintenance and inspection would be more frequent and involved than with other structures. This is primarily because the mooring chain and fixtures would require frequent periodic inspections. Another consideration is cost, as the total cost for a floating breakwater could exceed $20 million. Risk is also consideration because if mooring chains broke or anchors failed, emergency repairs would be difficult and costly due to the site's remoteness.

An offshore harbor basin design minimizes direct impacts to adjoining wetlands and anadromous fish streams; however, terrestrial dredged disposal alternatives and project-induced development would undoubtedly result in the future loss of wetland habitat. This design also directly and adversely impacts essential fish habitat and the intertidal and subtidal habitat that Steller's eiders, a threatened species, rely upon for foraging. These birds would be expected to reduce their use of the area for resting and refuge from bad weather due to the proximity of harbor activities.

Based on the above discussion, a floating breakwater, while technically possible, is not practical or economically feasible.

2.2.3.2 Offshore/Onshore Harbor Basin

A concept was advanced for a harbor basin dredged partially inland. Two designs were examined for the offshore breakwater portion of this concept: a rubblemound structure (figure FEIS-4) and a curtain-wall wave barrier (figure FEIS-5).

The rubblemound version would be placed in approximately 25 feet of water and be 1,100 feet long. This is near the maximum economically practical-depth normally associated with this type of structure. The centerline of the breakwater would be 100 to 150 feet offshore from the existing beach. The high seismic-induced liquefaction potential at the site would require extra geotechnical efforts to produce an adequate factor of safety. This alternative's construction costs would be very high.

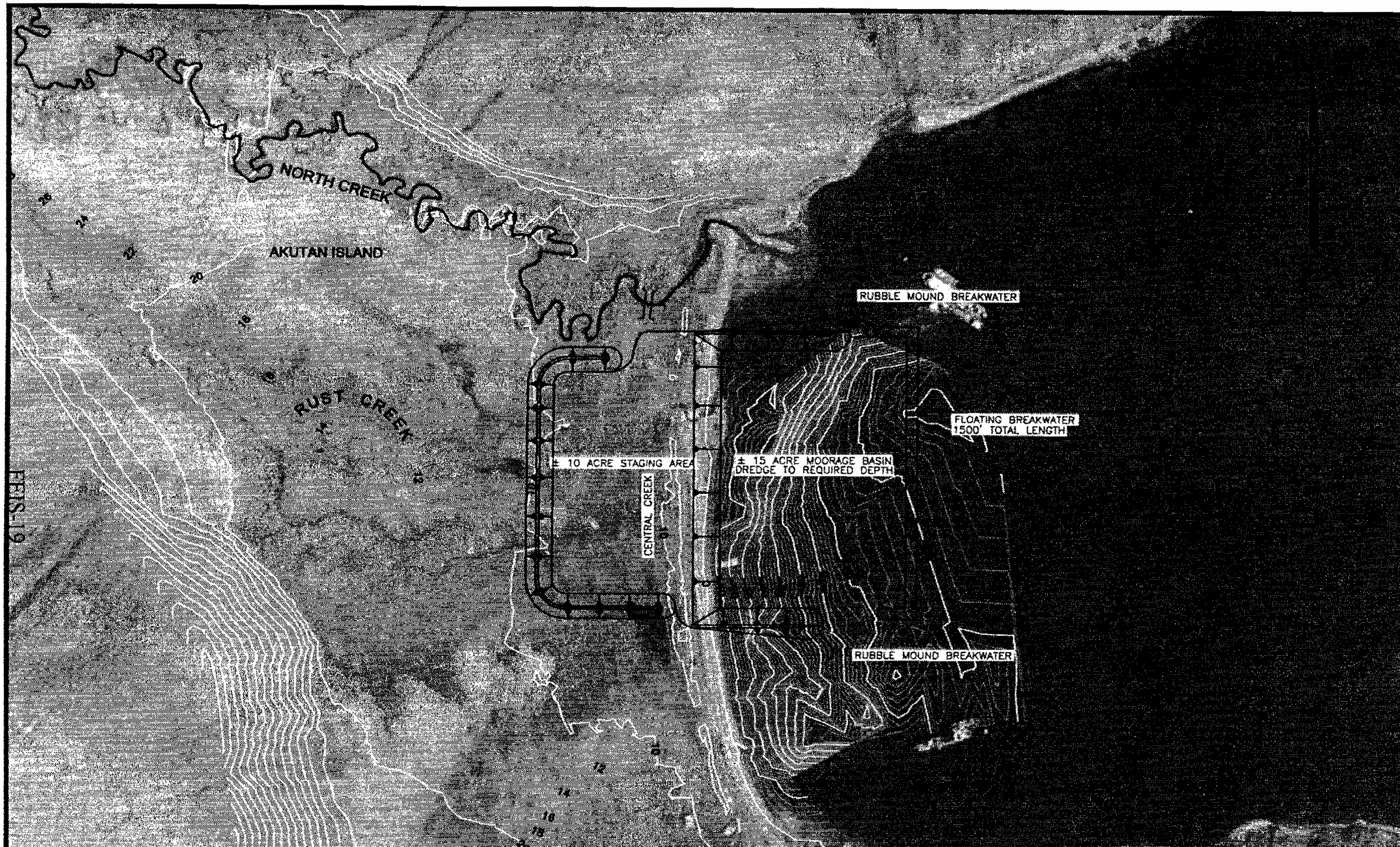
The curtain-wall wave barrier design would be placed in about 60 feet of water, would be about 1,000 feet long, and be located about 350 feet offshore from the existing beach. The pile-supported structure would consist of 42,000 square feet of wave barrier panels that would extend a distance below the water level but not

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.



GRAPHIC SCALE

250 0 125 250 500

(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL OFFSHORE HARBOR PLAN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-3

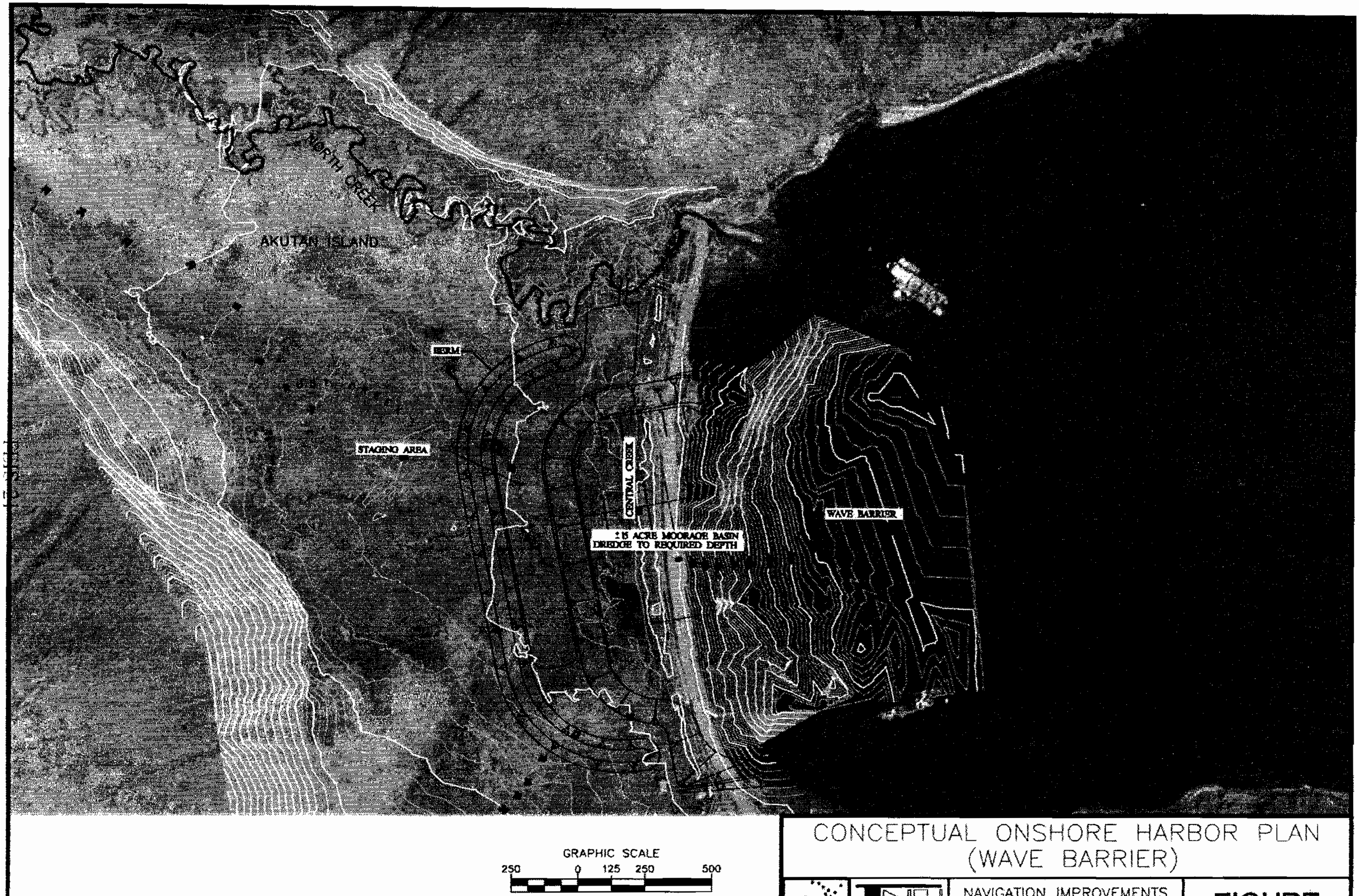
GRAPHIC SCALE
250 0 125 250 500
(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL OFFSHORE HARBOR PLAN
(RUBBLE MOUND)

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-4



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

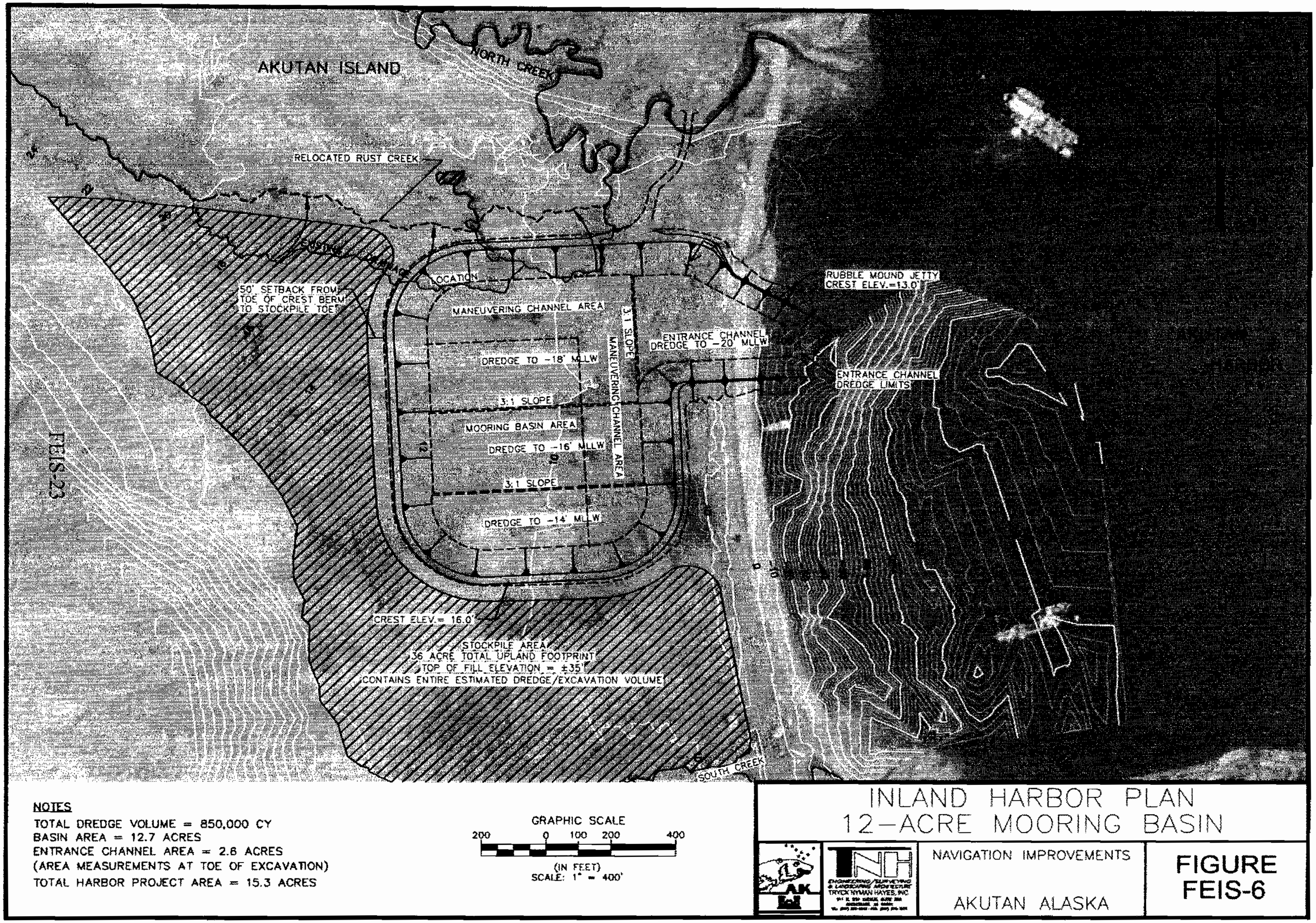
Because of known environmental concerns in the area (e.g. presence of over-wintering Steller's eider, essential fish habitat, wetlands, anadromous fish streams), several mooring basin sizes (12-, 15-, and 20-acres; figures FEIS-6, 7, and 8) were evaluated to avoid and minimize adverse environmental impacts.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

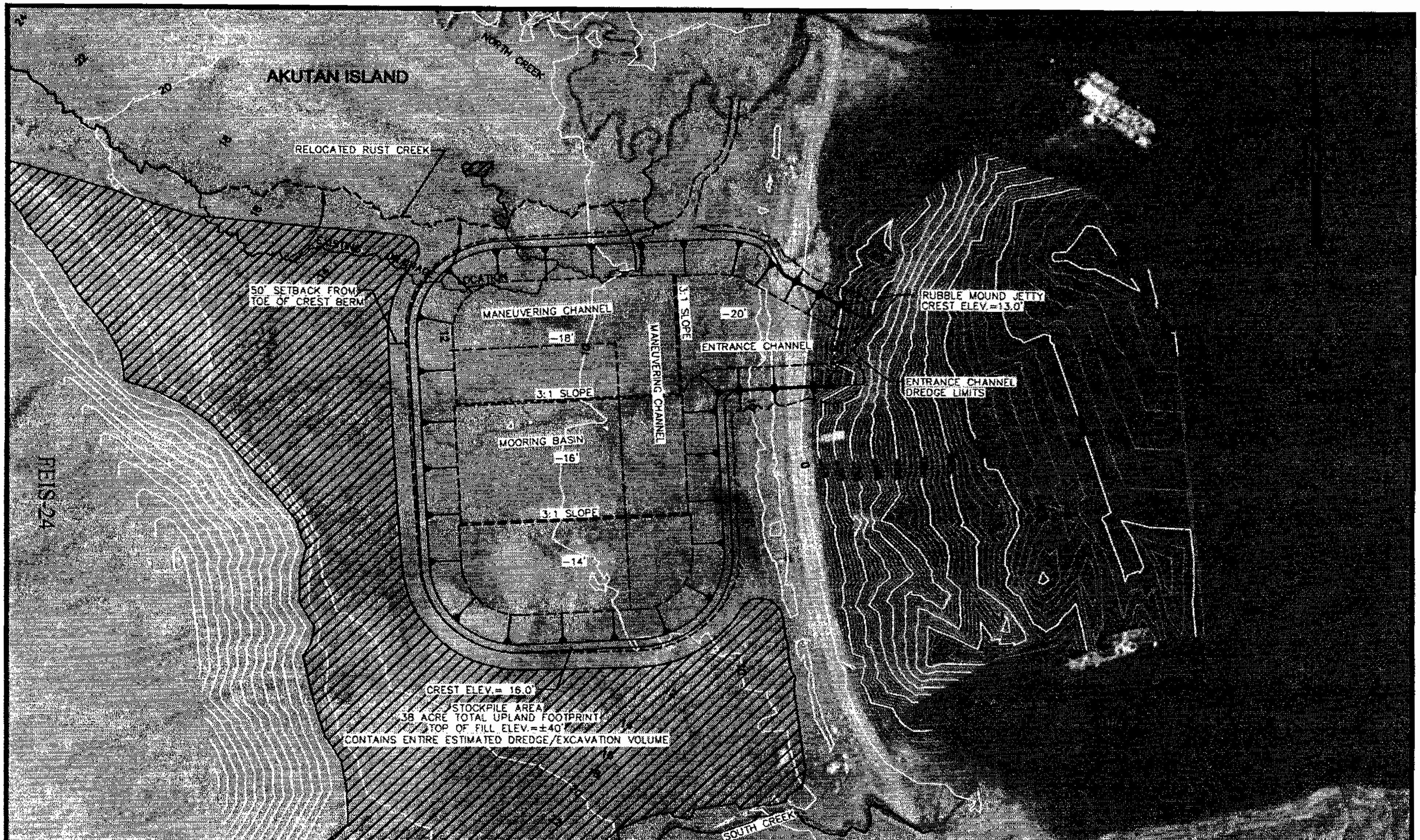
Initially, each design's entrance channel was aligned with a natural offshore channel near the south side of the head of Akutan Harbor. Subsequent environmental studies indicated that the southwest shoreline of Akutan Harbor is most frequently used by over-wintering Steller's eiders. For this reason, 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).


AKUTAN ISLAND
NORTH CREEK
RELOCATED RUST CREEK
LOCATION
50' SETBACK FROM TOE OF CREST BERM TO STOCKPILE TOE
MANEUVERING CHANNEL AREA
3:1 SLOPE
DREDGE TO -18' MLLW
3:1 SLOPE
MOORING BASIN AREA
DREDGE TO -16' MLLW
3:1 SLOPE
DREDGE TO -14' MLLW
MANEUVERING CHANNEL AREA
ENTRANCE CHANNEL DREDGE TO -20' MLLW
RUBBLE MOUND JETTY CREST ELEV.=13.0'
ENTRANCE CHANNEL DREDGE LIMITS
CREST ELEV.= 16.0'
STOCKPILE AREA
36 ACRE TOTAL UPLAND FOOTPRINT
TOP OF FILL ELEVATION = ±35'
CONTAINS ENTIRE ESTIMATED DREDGE/EXCAVATION VOLUME
SOUTH CREEK
NOTES
TOTAL DREDGE VOLUME = 850,000 CY
BASIN AREA = 12.7 ACRES
ENTRANCE CHANNEL AREA = 2.8 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
TRYCK NYMAN HAYES, INC.
FIGURE FEIS-6



FEIS-24

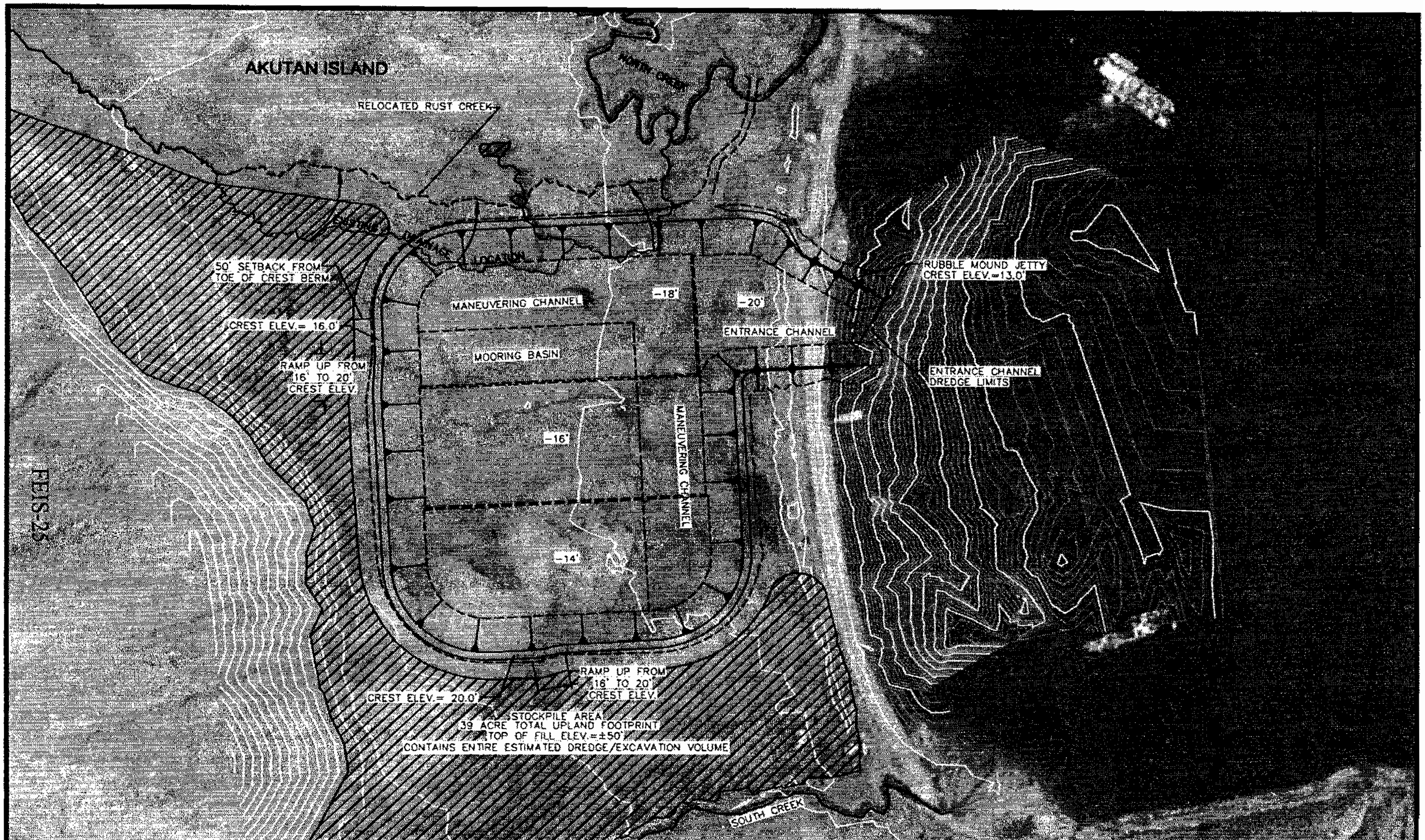
NOTES
TOTAL DREDGE VOLUME = 990,000 CY
BASIN AREA = 15 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 17.6 ACRES

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

INLAND HARBOR PLAN
15-ACRE MOORING BASIN

NAVIGATION IMPROVEMENTS
AKUTAN ALASKA

FIGURE FEIS-7



FEIS-25

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

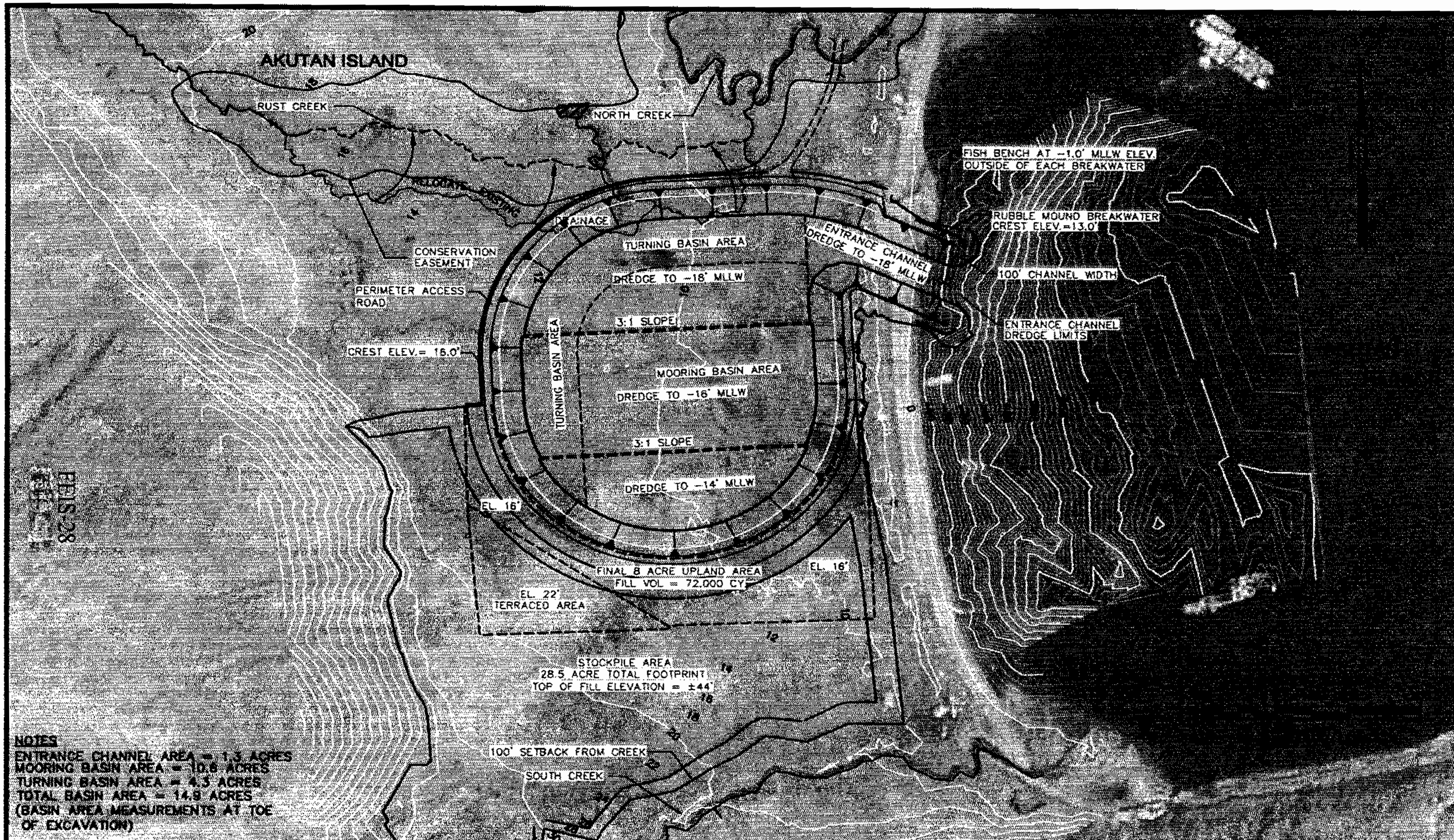
After examining the conceptual cost estimates and performing an economic evaluation of the "alternatives considered in more detail," the inland mooring basin at the head of Akutan Harbor was found to be the only economically feasible alternative and also generated the greatest net economic benefits. 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,



FEIS-28

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

TRYCK NYMAN HAYES, INC.

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).

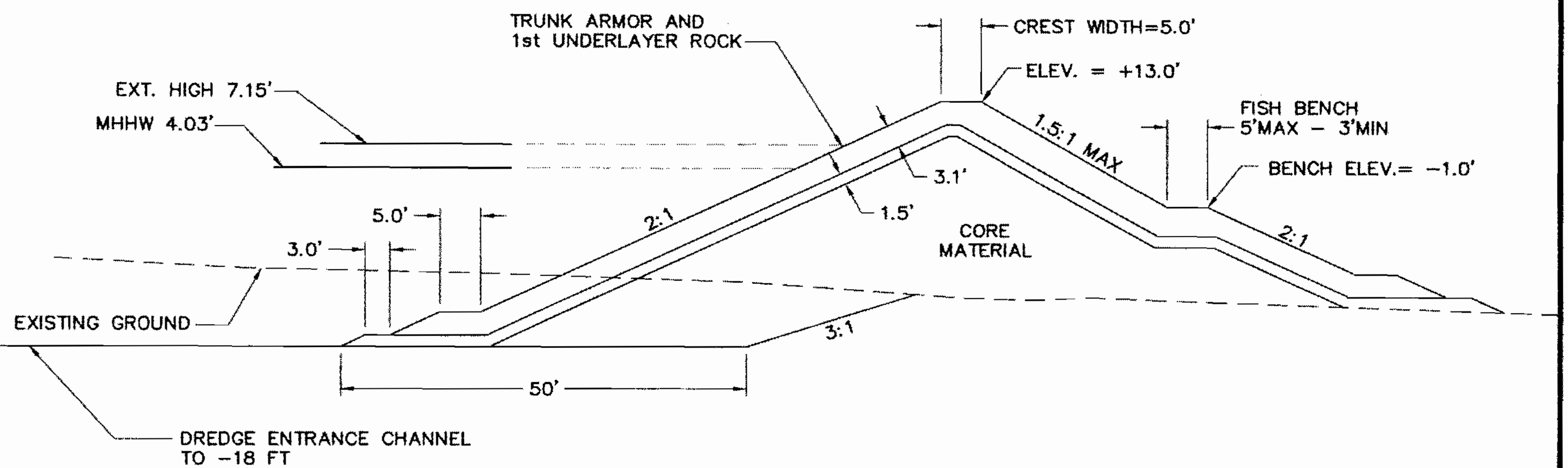
Local service facilities would consist of the docks and floats necessary to moor the fleet. Also included would be the necessary gangways for access from the 8-acre staging area and perimeter road to the docks and floats.

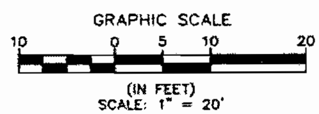
2.3.2 Dredging Activities and Disposal Alternatives

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



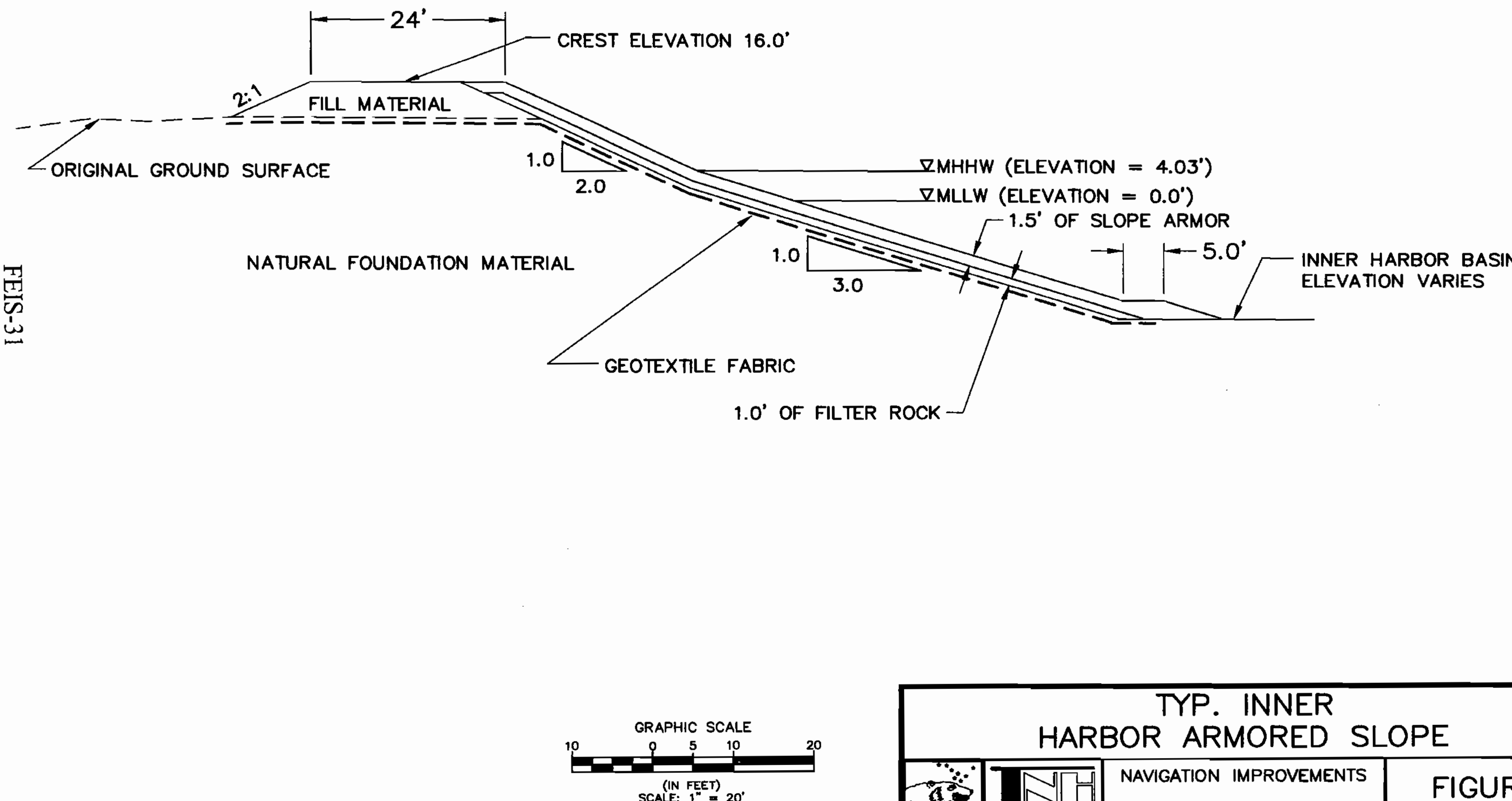


TYP. RUBBLE MOUND
BREAKWATER SECTION

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE
FEIS-10



TYP. INNER
HARBOR ARMORED SLOPE

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.

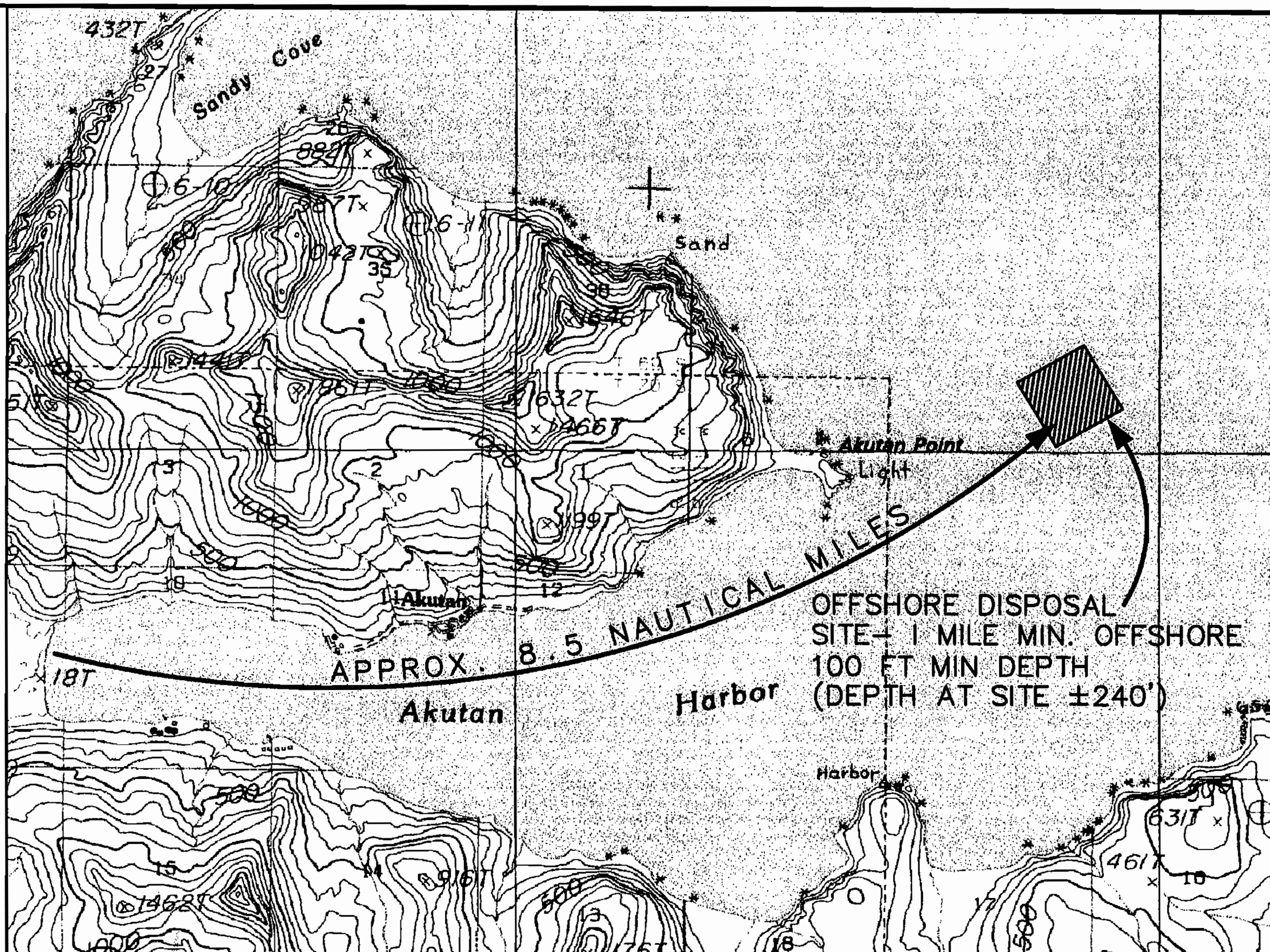
Two of the four remaining disposal alternatives would involve placing dredged material into Akutan Harbor's near-shore and offshore environment. Akutan Harbor's near-shore marine environment (i.e., the intertidal and shallow sub-tidal areas) consists of sand, gravel, and cobble beaches; rock outcroppings; 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

TRYCK NYMAN HAYES, INC.

HARBOR FEASIBLIITY STUDY

AKUTAN ALASKA

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).

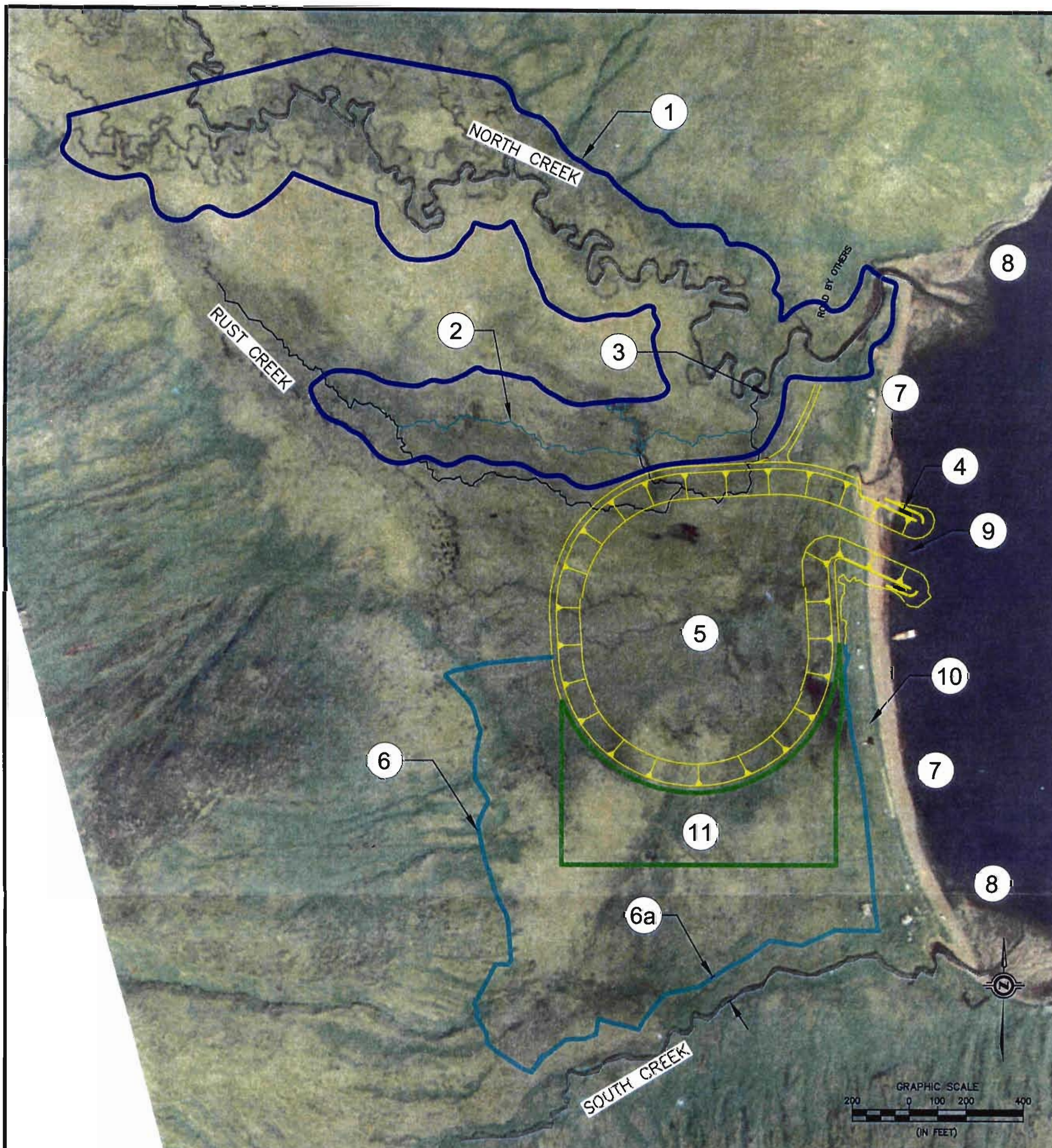
2. Prior to beginning construction, the harbor's contractor would submit a Quarry Development Plan to the Corps and interested resource agencies for their review and approval. Mitigation measures shall be incorporated in the plan to ensure that the quarrying operation will not cause any significant and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

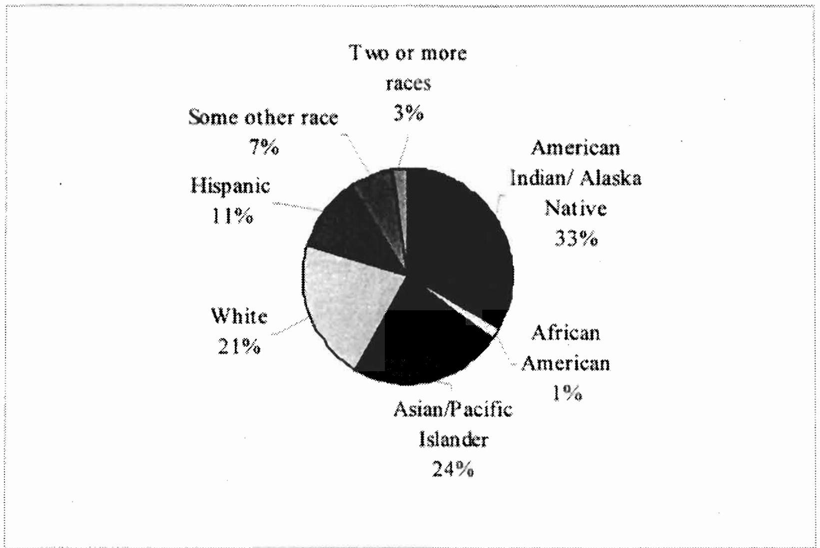


Figure FEIS-15. Racial demographics for the Aleutians West census area (source, U.S. 2000 census).

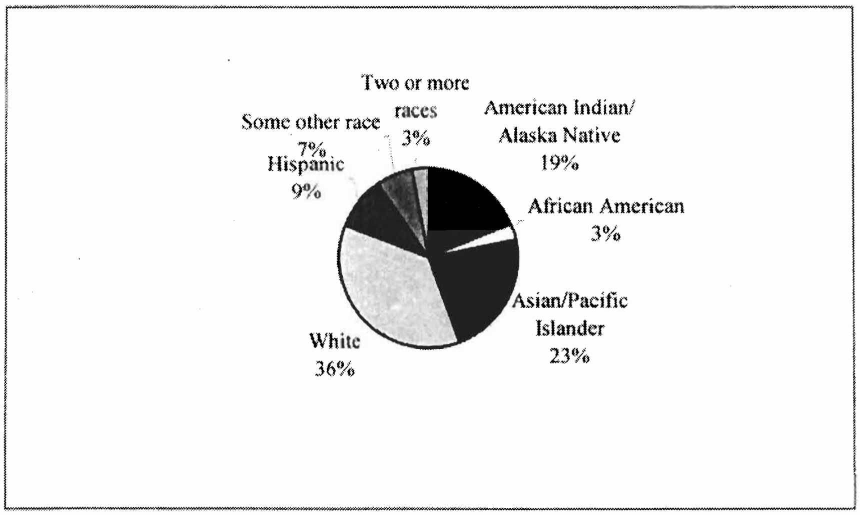


Figure FEIS-16. Racial demographics for the City of Akutan, (source, 2000 U.S. census).

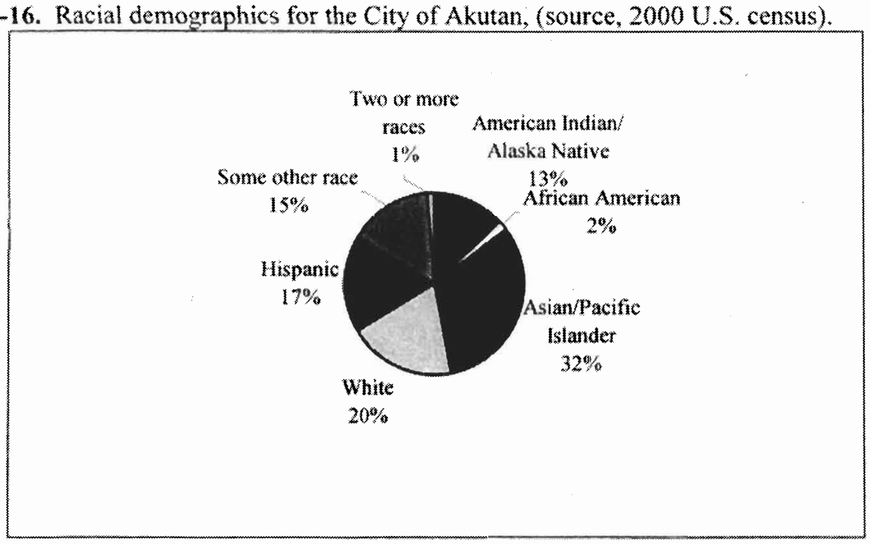


Table FEIS-6. Summary of demographic changes by race in Akutan and the Aleutians region, 1990 – 2000.

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.

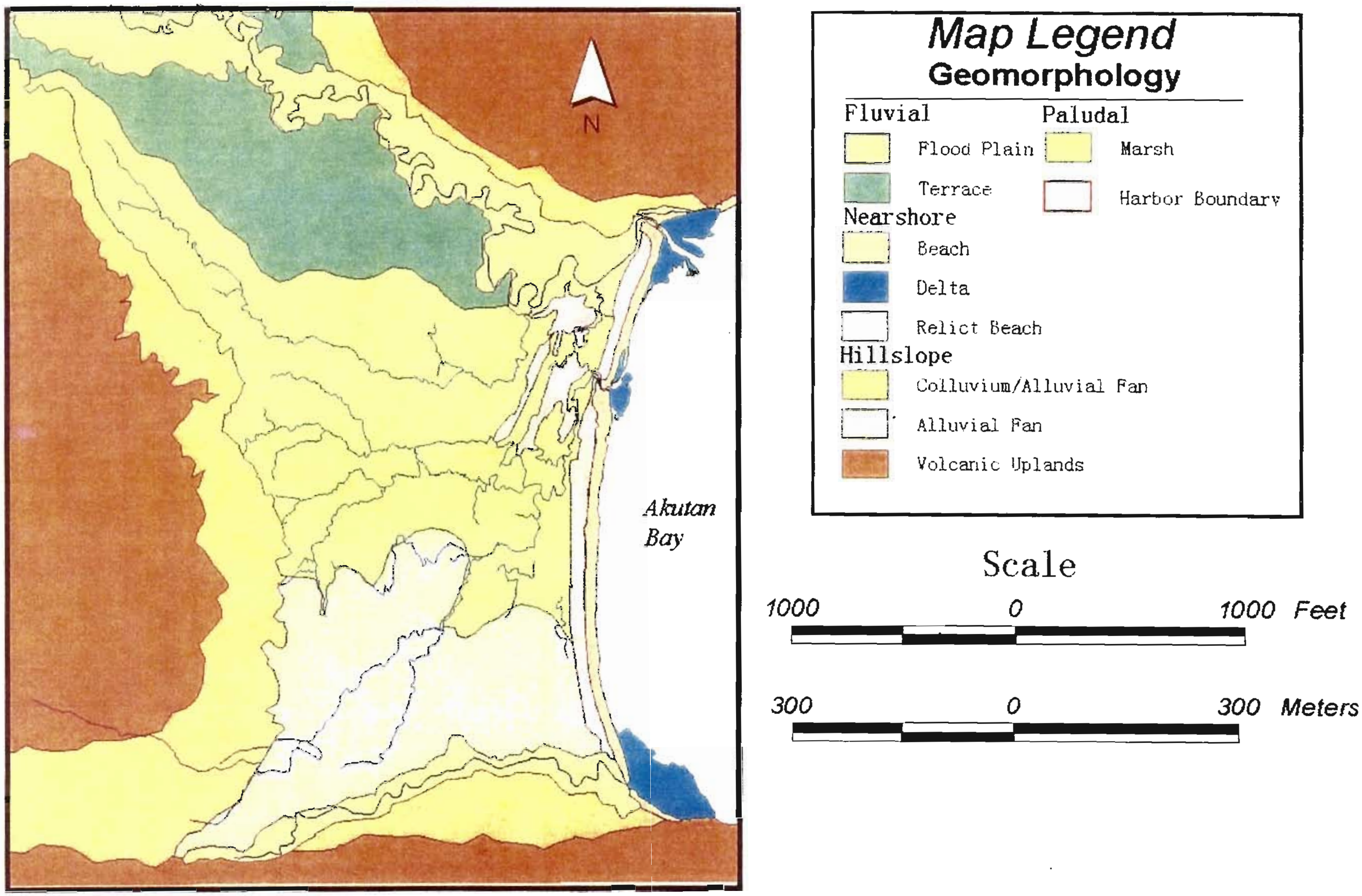


Figure FEIS-17. Primary landforms in the project area at the head of Akutan Harbor.

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

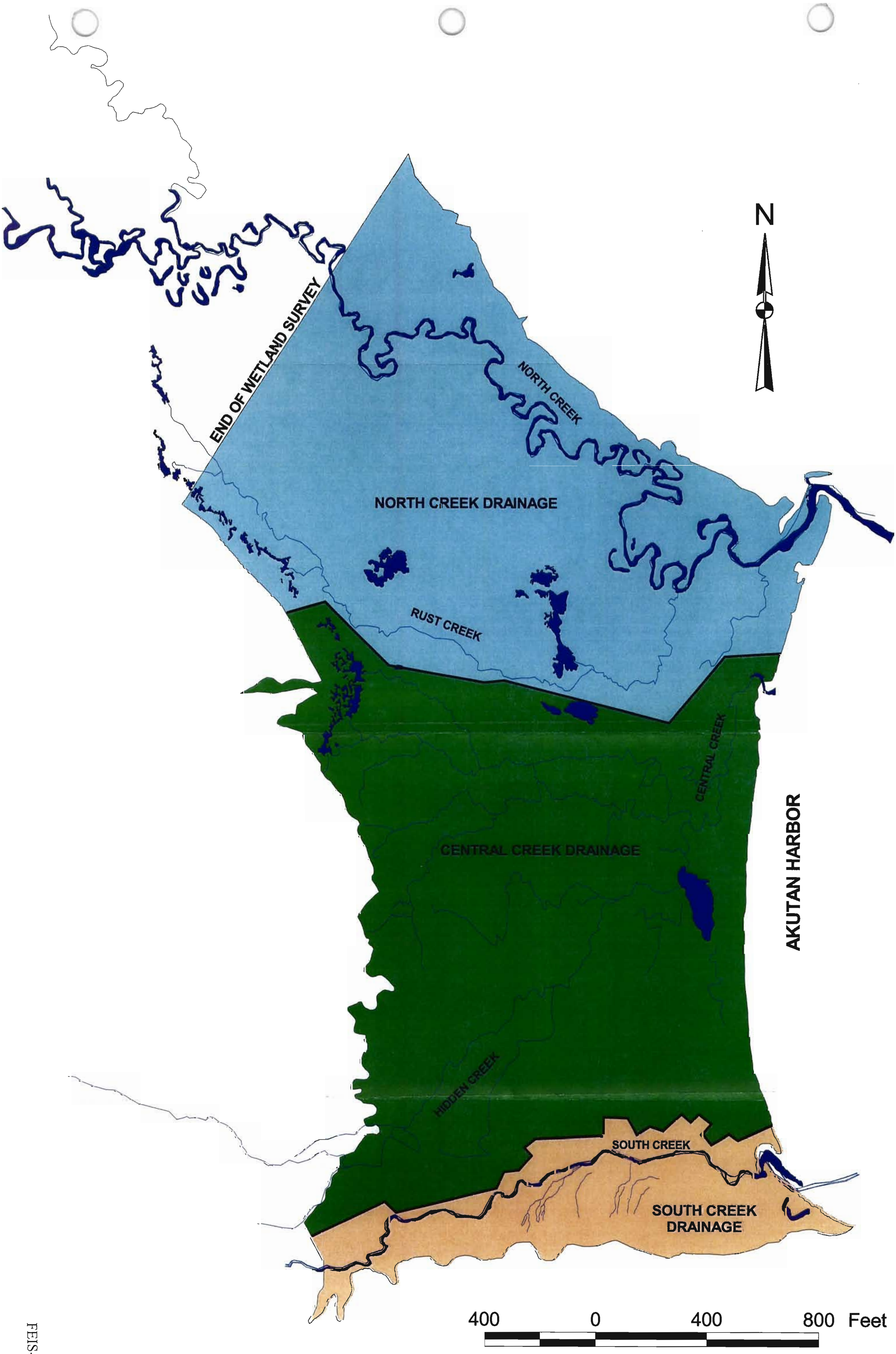


Figure FEIS-18 . Primary drainage and surface water features in the project area at the head of Akutan Harbor.

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.

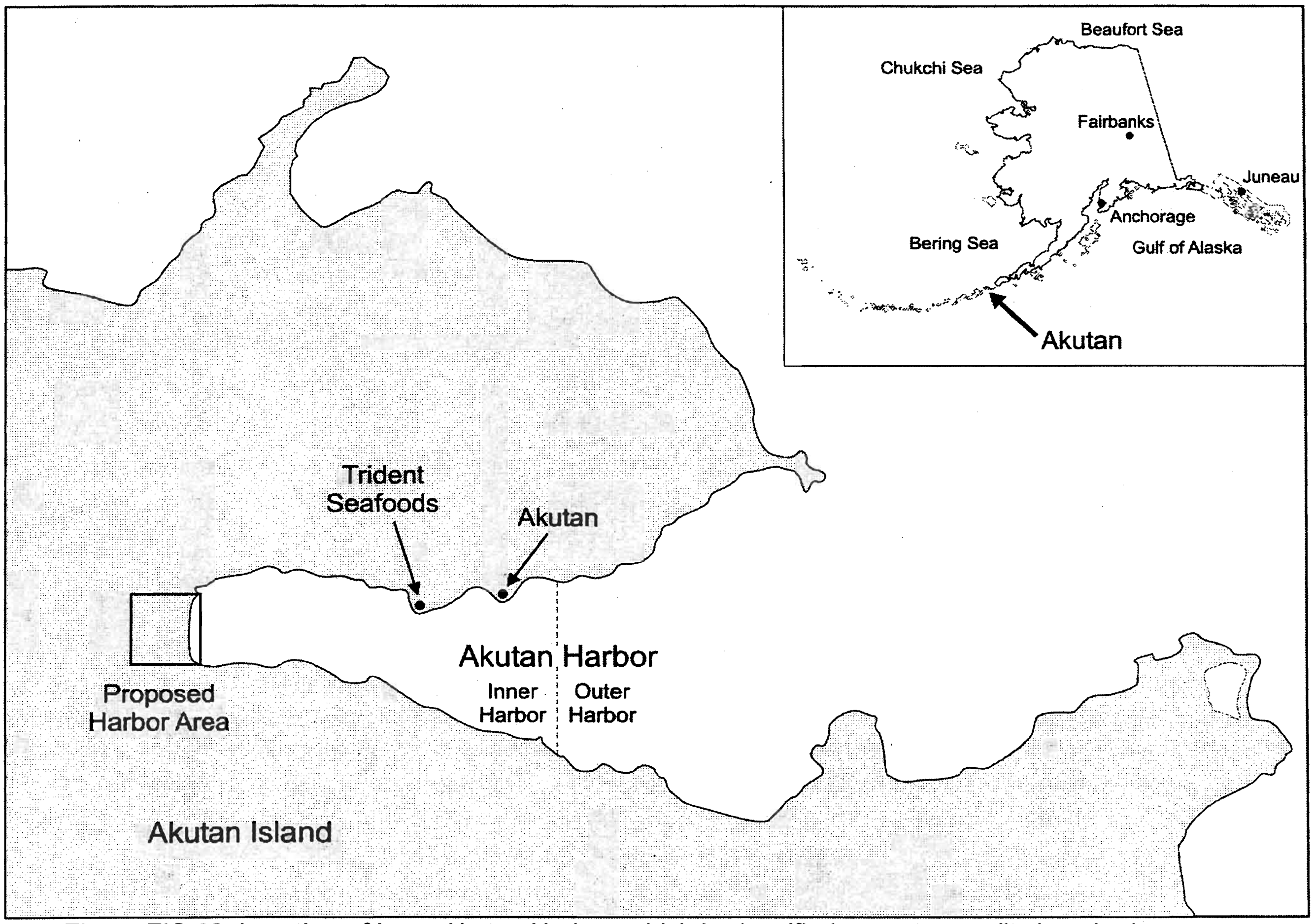


Figure EIS-22. Location of inner Akutan Harbor, which is classified as water quality impaired for dissolved oxygen.

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.)

[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).

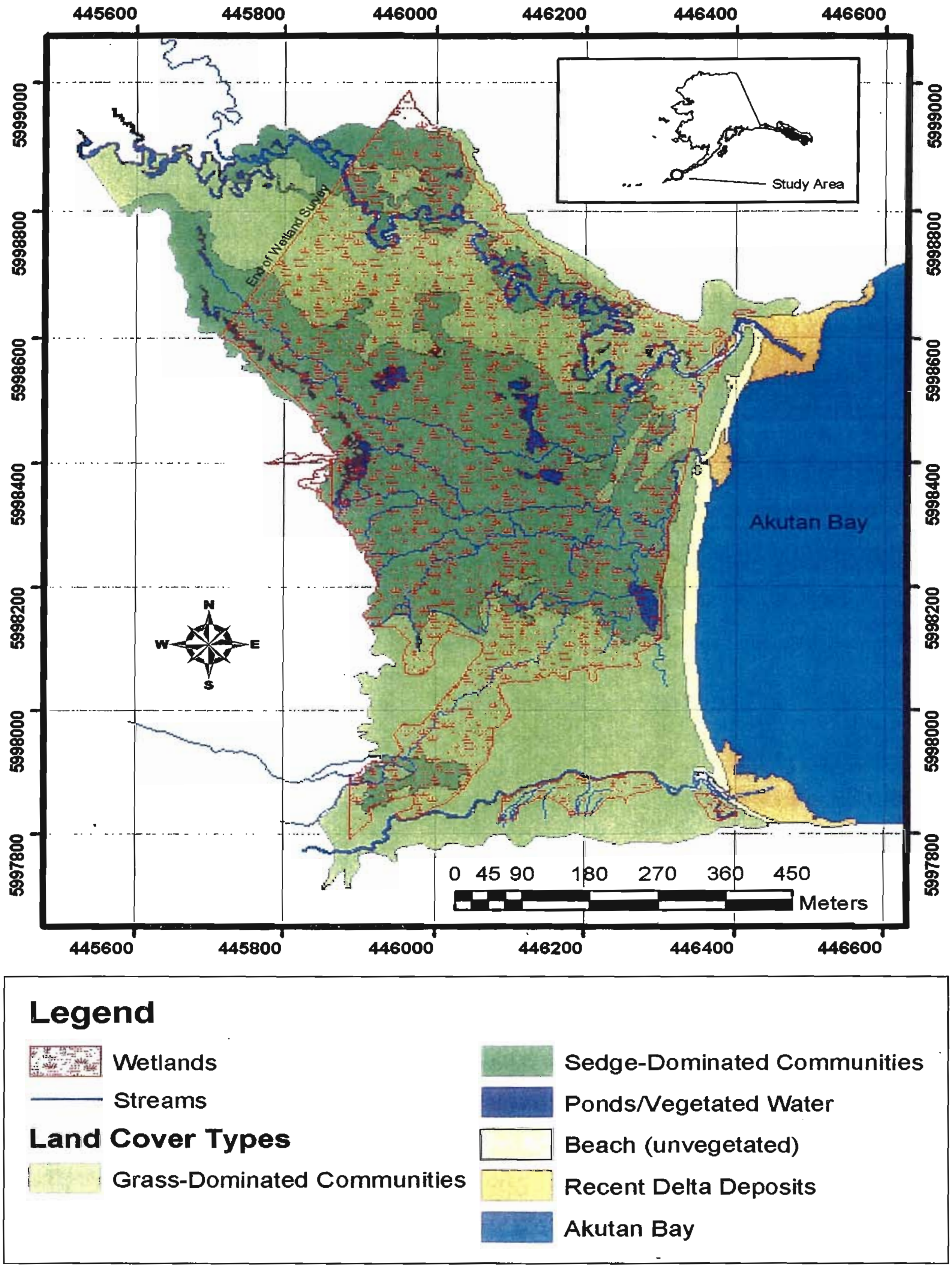


Figure FEIS-23. Plant communities in the project area at the head of Akutan Harbor (Wakeley, 2001).

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.

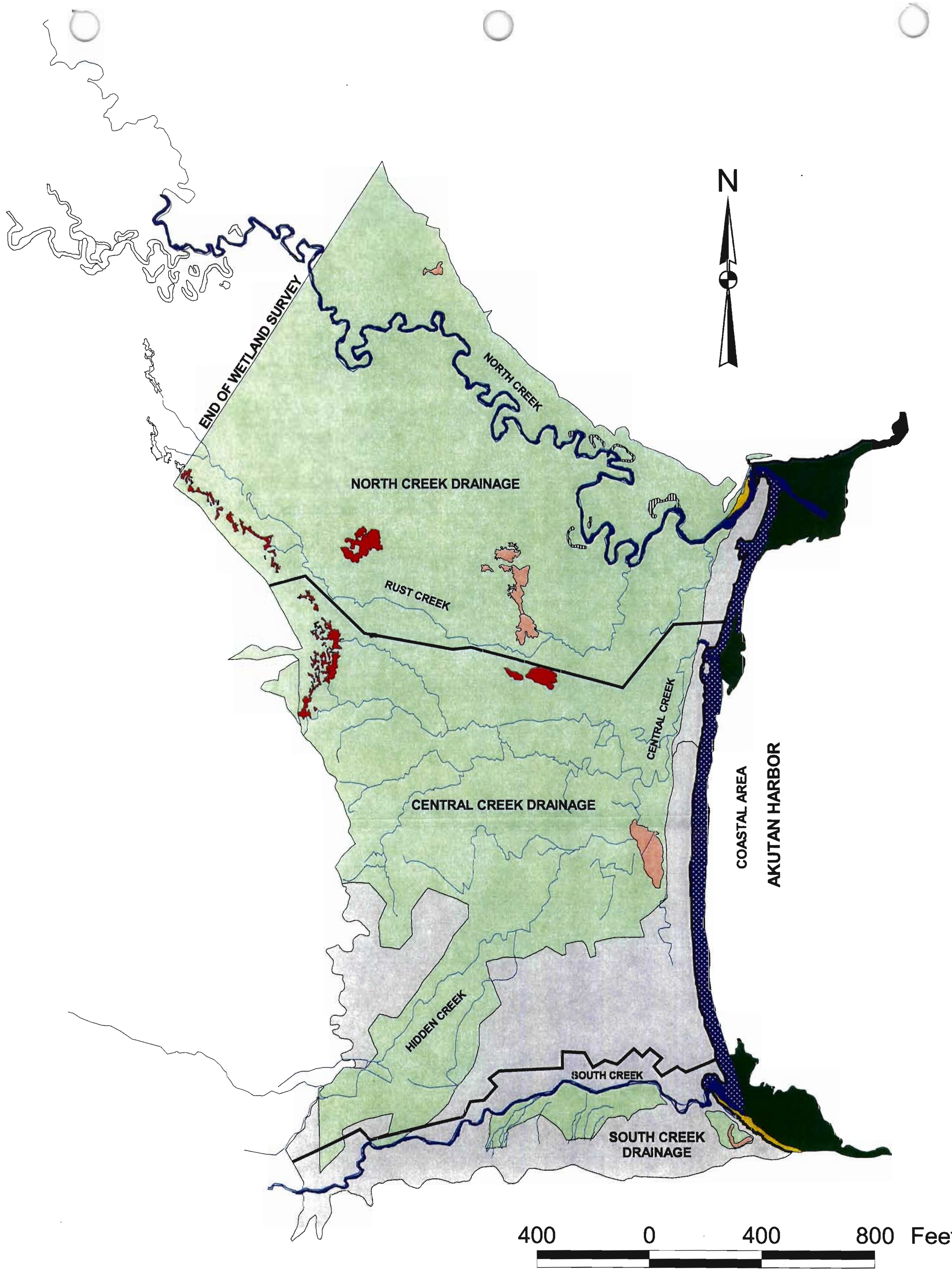
Step 3: Determine wetland values (i.e., are they essential, beneficial, or contributing) within each drainage based on their "level of functional input" for supporting resources of concern, as identified in the NEPA scoping process.

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*

- 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.

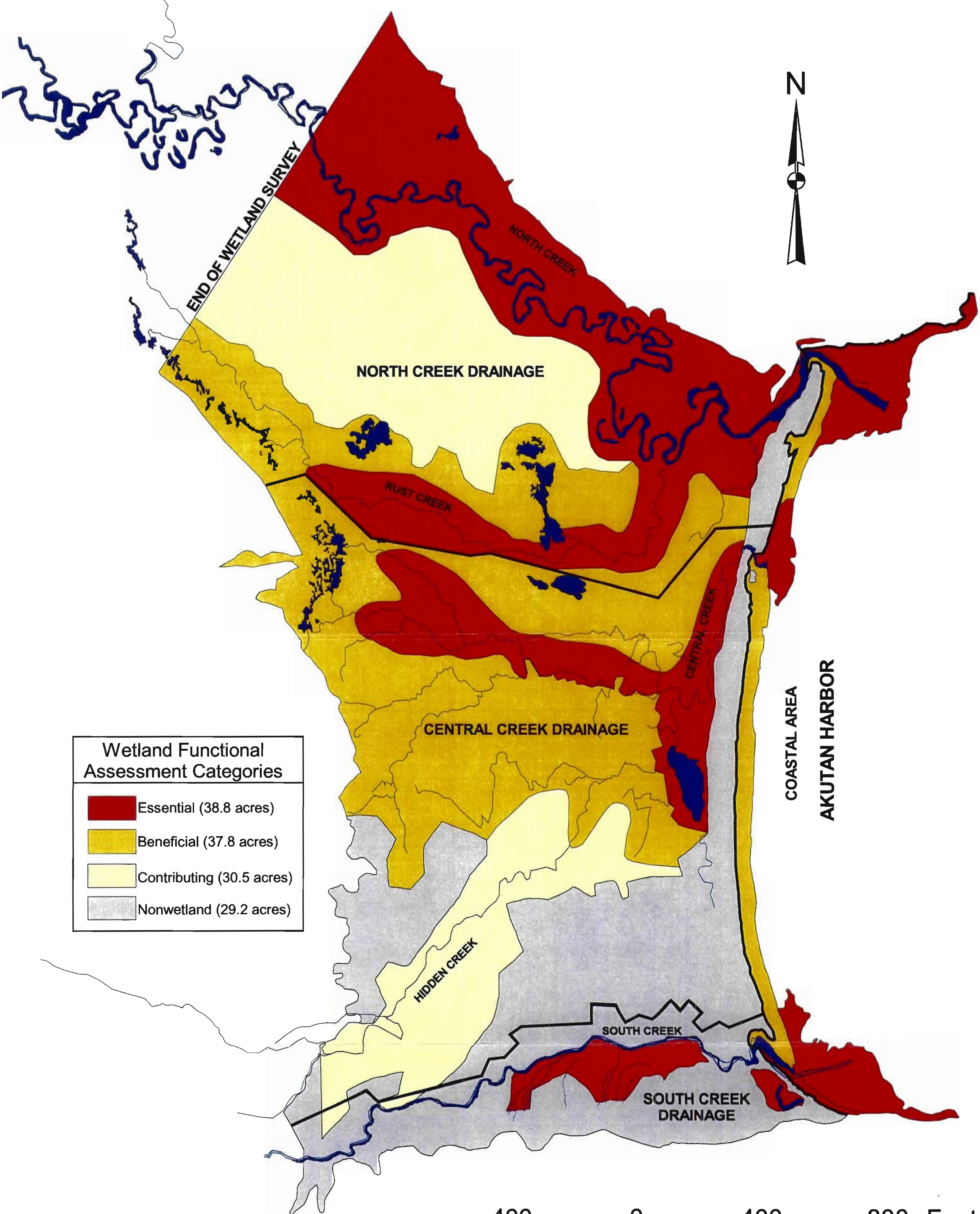


Figure FEIS-25. Wetland functional assessment categories within each drainage at the head of Akutan Harbor.

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 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.

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**

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.

<u>Biochemical oxygen demand and settleable solid residues</u>: 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-

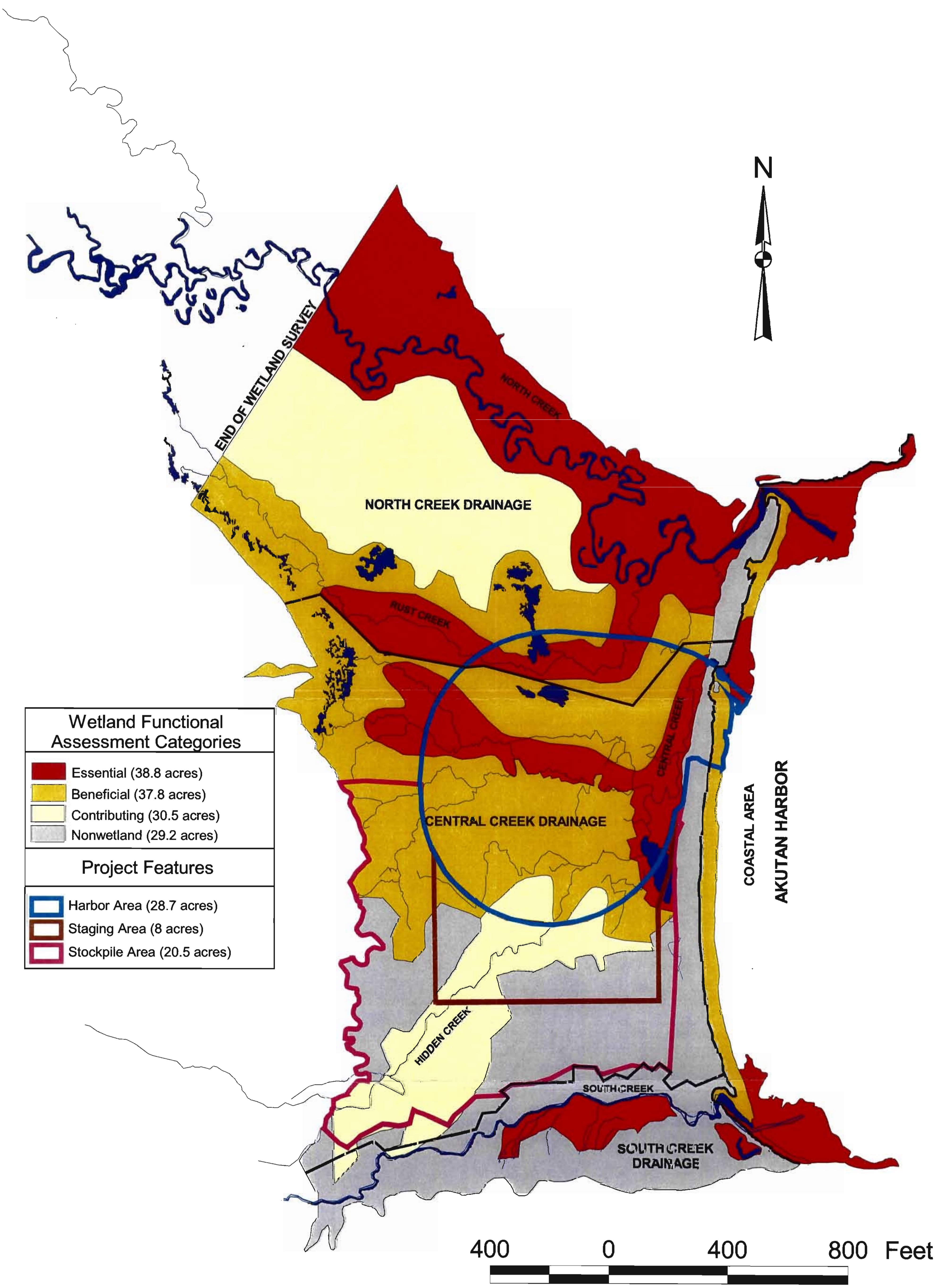


Figure FEIS-26. Wetland functional assessment categories within each drainage at the head of Akutan Harbor that are directly impacted by project featrues.

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 in-fauna 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:

Name	Discipline	Experience	Role in Preparing EIS
Wayne M. Crayton	Biologist	Corps of Engineers 8 yrs. USFWS 16 yrs. National Biological Service 2 yrs.	Principal preparer
Margan Grover	Archeologist	Corps of Engineers 3 years	Conducted Section 106 consultation with State Historic Preservation Officer
Diane Walters	Writer/Editor	Corps of Engineers 16 years	Editor.
Richard Ragel	Chemist	Corps of Engineers 10 years	Review geophysical reports and soil sample analyses
Karen Pontius	Real Estate Specialist	Corps of Engineers 16 yrs.	Prepared real estate report.
Larry Bartlett	Biologist	Corps of Engineers 5 yrs. AK Dept. of Fish & Game 27 yrs.	Endangered Species Act biological assessments
Sterlin Hill	Senior Data-entry Clerk	Data Flow Alaska 6 years	Prepared tables and graphics.
Clarke Hemphill	Civil Engineer	Corps of Engineers 22 years	Principal preparer of feasibility report.
Bo Wierzbicki	Engineer	Corps of Engineers 24 years	Project Manager of feasibility study.
James S. Wakeley	Wetlands Biologist	Corps of Engineers Engineer and Research Development Center 16 years	Principal investigator of the wetland delineation study and assisted with impact assessment.
Joseph B. Dunbar	Hydrogeologist	Corps of Engineers Waterways Experiment Center, 24 years	Principal investigator of the hydrogeological assessment of the project area.
Thomas E. Berry	Engineer	Corps of Engineers Research and Development Center 24 years	Principal investigator of the digital elevation model and topographic map of the project area.
Ashley Reed	Biologist	Corps of Engineers 2 years	Principal investigator of water quality issues
Eric Armagost	Engineering Trainee	Corps of Engineers 4 years	Provided wetlands graphic and technical support
Inocencio Roman	Civil Engineer Technician	Corps of Engineers 4 years	Provided graphic technical support
John Daley	Coastal Engineer	Tryck Nyman Hayes 20 years	Harbor design.

Jim Richardson	Economist	ResourcEcon 24 years	Economic analysis
Doug Jones	Coastal Engineer	Coastline Engineering 32 years	Wave and water quality analyses
Robert Juettner	Administrator	Aleutians East Borough, 11 years	Non-Federal project sponsor.
Erika Tritremmel	City Administrator	City of Akutan 20 years	Non-Federal project sponsor.
Mark Schroeder	Biologist	U.S. Fish and Wildlife Service, 6 years	Prepared the draft Fish and Wildlife Coordination Report.
Charla Sterne	Endangered Species Biologist	U.S. Fish and Wildlife Service, 3 years	Prepared Biological Opinions.
Matthew Eagleton	Marine Biologist	National Marine Fisheries Service, 14 years	Provided essential fish habitat information and endangered species consultation.
Wayne Dolezall	Fishery Biologist	Alaska Department of Fish and Game, 21 years	Provided anadromous fish information.
Harvey Smith	Coastal Engineer	Alaska Dept. of Transportation and Public Facilities, 21 years, Corps of Engineers 3 years, University of Washington 8 years.	Harbor basin design and wave/water quality analyses

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.

8.0 INDEX

FEIS-APPENDIX 1

FINAL ENVIRONMENTAL IMPACT STATEMENT MAILING LIST

AKUTAN
G:\EN-CW\EN-CW-ER\STERLIN\Wayne's mail lists\Akutan.doc
Modified 12 January 2004

JUDITH BITTNER
DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
550 W .7TH AVE SUITE 1310
ANCHORAGE, ALASKA 99501

Tim Rumfelt
Alaska Dept of Environ. Conservation
Division of Environmental Quality
555 Cordova Street
Anchorage, AK 99501-2617

Alaska Dept. of Fish & Game
Habitat Division
333 Raspberry Road
Anchorage, AK 99518-1599

Alaska Dept. of Natural Resources
Div. of Land and Water Mgmt.
Southcentral Region
550 W. 7th Ave., Suite 900
Anchorage, AK 99503-5937

ARLIS
3150 "C' STREET SUITE 100
ANCHORAGE, AK 99503-3916

Alaska Center for the Environment
807 "G" Street Suite 100
Anchorage, AK 99501-2343

Alaska Sierra Club
201 Barrow Street Suite 101
Anchorage, AK 99501

Honorable Frank Murkowski,
Governor of Alaska
P.O. Box 110001
Juneau, AK 99811-0001

Dept of Community & Economic Development
Community and Business Development
P.O. Box 110800
Juneau, AK 99811-0801

Ruth Carter
Alaska Dept. of Transportation and Public Facilities
Pouch 196900
Anchorage, AK 99519-6900

U.S. Environmental Protection Agency
222 W. Seventh Ave. Unit 19
Anchorage, AK 99513-7588

State Director
Bureau of Land Management
222 West Seventh Ave. Unit 13
Anchorage, AK 99513-7599

Honorable Lisa Murkowski
United States Senator
222 W. Seventh Ave., Box 1
Anchorage, AK 99513-7570

Honorable Don Young
United States Representative
222 W. Seventh Avenue, Box 3
Anchorage, AK 99513-7595

Sue McGee
Alaska Dept. of Natural Resources
Office of Project Management & Permit.
550 W .7th Ave Suite 1660
Anchorage, Alaska 99501

The Wilderness Society
430 W. Seventh Ave., #210
Anchorage, AK 99501-3550

Matt Eagleton
Nat'l. Marine Fisheries Service
222 W. Seventh Ave., Box 43
Anchorage, AK 99513-7577

Office of Environ. Proj. Rev.
Department of the Interior
1689 C Street, Room 19
Anchorage, AK 99501-5126

Alaska State Library
ATTN: Documents Section
P.O. Box 110571
Juneau, AK 99811-0571

Mark Schroeder
U.S. Fish & Wildlife Service
Western Alaska Ecological Services
605 West 4th Ave., Room 62
Anchorage, AK 99501-2249

Robert Juettner
Aleutians East Borough
3380 "C" Street Ste 205
Anchorage, AK 99503

Coastal Coordinator
Aleutians East Borough
P.O. Box 349
Sand Point, AK 99661-0349

William Lagen
PO Box 1027
Belleview, WA 98009-1027

Daryl Pelkey, President
Akutan Corporation
PO Box 8
Akutan, AK 99553-0003

Vincent Tutiakoff
Aleut Native Corp
4000 Old Seward Hwy Suite 300
Anchorage, AK 99503-6068

Joe Bereskin, Mayor
City. Akutan Office:
P.O. Box 109
Akutan, AK 99553

National Audubon Society
Alaska State Office
308 G Street Suite 217
Anchorage, AK 99501-2142

Honorable Ted Stevens
United States Senator
222 W Seventh Ave Box 2
Anchorage, AK 99513-7569

Erika Titremmel
City Administrator - Akutan
3380 "C" Street
Anchorage, AK 99503

Department of Community & Economic Development
550 W. 7th Ave Suite 1770
Anchorage, AK 99503-

Mirian Tanaka
Alaska Dept. of Transportation and Public Facilities
Pouch 196900
Anchorage, AK 99519-6900

Zenia Borenin
Akutan Traditional Council
PO Box 89
Akutan, AK 99553

Edward S. Syrjala
PO Box 149
Centerville, WA 02632

Larry Kibby, Program Director
Western Shoshone Historic Preservation Society
Elko Indian Colony
1581 Pine Circle
Elko, Nevada 89801

Marti Iouther
Parametrix Inc.
5808 Lake Washington Blvd NE, Suite 200
Kirkland, WA. 98033

Bill Wilson
LGL Alaska Research Associates Inc.
1101 E. 76th Ave. Suite B
Anchorage, AK 99518

Joe Dunbar
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

James Wakeley
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Thomas Berry
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Charla Stern
US Fish & Wildlife Service
605 West 4th Ave. Room 62
Anchorage, AK 99501

Ms Linda Cook
National Park Service
2525 Gambell Street
Anchorage AK 99503-2892

Mr. David Kuhlman
US Environmental Protection Agency
1200 Sixth Avenue
Seattle Washington 98101

Mr. John Malek
Environmental Protection Agency
1200 Sixth Avenue Eco-083
Seattle WA 98101-3188

Mr Harold Moeser
State Harbor Engineer
AK Dept Of Trans & Pub Fac
3132 Channel Dr
Juneau AK 99802-5550

Mr Scott Diener
Planning Director
Po Box 610
Unalaska, AK 99685-0610

Ms Karol Kolehmainen
Aleutians West CRSA
PO Box 1074
Palmer AK 99645-0045

Ms Janice L. Krukoff, President
Qawalangin Tribe Of Unalaska
PO Box 921234
Dutch Harbor, AK 99692

Mr Dimitri Philemonof
Aleutian-Priblof Island Association
201 East 3rd Avenue
Anchorage AK 99501-2503

Veda Webb, President
Unalaska/Dutch Harbor Chamber Of Commerce
PO Box 920833
Dutch Harbor, AK 99692

Mr Richard Davis, President
Ounalaska Corporation
PO Box 149
Unalaska, AK 99685

Dutch Harbor Fisherman
PO Box 920472
Dutch Harbor, Alaska 99692

Ms. Judith Lee
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Alaska Crab Coalition
3901 Leary Way NW Suite 6
Seattle, WA 98107

Trident Seafoods, Inc.
5303 Shilshole Ave.
Seattle, WA 98107

Bureau Of Indian Affairs
PO Box 255200
Juneau AK 99802-5520

Alaska Fisheries Conservation Group
Box 910
Woodinville, WA 98072

John Daley
Tryck Nyman Hayes, Inc.
911 W. 8th Avenue Suite 300
Anchorage, AK 99501

Doug Jones
Coastline Engineering
5900 Lynkerry Circle
Anchorage, AK 99504

Ed Weiss
Alaska Dept. of Natural Resources
Office of Habitat Management & Permit.
550 W .7th Ave Suite 1660
Anchorage, Alaska 99501

FEIS-APPENDIX 2

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT RESPONSES

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
ALASKA REGION
P.O. Box 25520
Juneau, Alaska 99802-5520

VIA FACSIMILE **7 November 2002**

Guy R. McConnell
Chief, Environmental Resources Section
Alaska District, U.S. Army Corps of Engineers
P.O. Box 6898
Anchorage, AK 99506-6898

RE: Request for Participation

Dear Mr. McConnell:

1. We received your 22 Oct 2002 Public Meeting and Project Update Notice for Navigation Improvements at Akutan, Alaska, but were unable to participate, although we did review the *Draft Feasibility Report and Draft Environmental Impact Statement for Navigation Improvements, Akutan, Alaska.*

We have concerns with the draft material, which will be submitted under separate cover, however, this letter is a request to be considered as a cooperating agency for this NEPA action. We are especially interested in being involved with Tribal consultation and public scoping. Please correspond with our Branch of Environmental Services regarding this request.

As it becomes available, please send any other pertinent material to the above address, attention Kristin Holzinger, Environmental Scientist. Thank you for your attention to this matter.

Sincerely,
Niles Cesar
Regional Director

Cc: Akutan Traditional Council, Attn : Ms. Zenia Borenin

1. Comments from the Bureau of Indian Affairs (BIA) on the draft Feasibility Report and Environmental Impact Statement were never received by the Corps. The BIA's request to be a cooperating agency was reviewed and after careful consideration and much discussion, it was decided that the scoping for the project had concluded and the report preparation phase had progressed too far for a cooperating agency to be added to the project delivery team. The Corps has and will continue to conduct government-to-government coordination with the Akutan Traditional Council on the Akutan navigation improvements project.

ALEUTIANS EAST BOROUGH

SERVING THE COMMUNITIES OF

¦KING COVE ¦SAND POINT ¦AKUTAN ¦ COLD BAY ¦FALSE PASS ¦NELSON LAGOON

November 8, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Ref: Navigation Improvements, Draft Feasibility Report And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell,

As the lead person for the Local Sponsor, I reviewed the above referenced document. The Aleutians East Borough continues to support the development of a boat harbor project in Akutan and is ready to continue into the next phase of work. The reports accurately represent the discussions with agencies, agreed to mitigation proposals and all other facets of the project. I must sound a cautionary note at this point. My comments reflect those of the Aleutians East Borough as the projects local sponsor. They should not be construed to be the comments of the Aleutians East Borough Coastal Management Program.

1. I would like to offer four comments that, I believe, would improve the documents. First, the DEIS should spend additional time explaining why the proposed alternative, the 12 acre basin, is the least environmental damaging proposal. Being aware of the potential NED project, a 20 acre mooring basin, and the unmet need for moorage by fishing vessels operating in the Bering Sea, Aleutian Islands and Gulf of Alaska, it is clear to me that the preferred 12 acre mooring basin is substantial mitigation in and of itself. However, the casual reader will not be aware of this fact. Section 3.4 of the Draft Feasibility Report, DFR, should be expanded as well as section 2.2 of the DEIS and on into section 4.2 of the DEIS.

2. Two, there is only a cursory discussion of the local impacts of this project under section 2.4 of the DFR and 3.3 of the DEIS. The new harbor will be an economic engine that will support the community for many years in the future. Jobs created as a result of the project will *offer* numerous employment opportunities to the local residents. This in turn should help to stimulate growth within the community and alleviate a pressing local problem-declining enrollment in the Akutan School. Within three years, school enrollment will drop substantially, possibly resulting

1. The Corps has expanded its discussion in Section 3.4 of the Feasibility Report and in Section 2.2 of the Final Environmental Impact Statement (FEIS) (including the addition of tables FEIS-2 and FEIS-3) to better describe the reasons why the reconfigured 12-acre basin is the least environmentally damaging proposal. The Corps agrees that the reconfigured 12-acre basin is substantial mitigation in and of itself, and it will be stated as such in FEIS Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures).

2. The information provided has been place in FEIS Section 4.4 (Socio-Economic Resources).

in the closure of the Akutan School. Economic growth following the construction of the harbor will offset this trend.

3. Three, the DEIS should reiterate all of the mitigation measures included in the choice of the 12 acre basin as the preferred alternative. In section 2.2.3.1 of the DEIS, you do not understand the scope of the mitigation because it is not contrasted with the impacts of either 15 or 20 acre mooring basin.

4. Finally, it would be best if the EIS contained a finalized Steller's Eider Biological Opinion. I believe that F&WS would be in a position to finalize this important document in the near future.

Again, the Aleutians East Borough wishes to stress its strong support for the Akutan Boat Harbor and that the DFR and DEIS accurately represent the project and mitigation.

Robert S. Juettner
Administrator

CC: AEBCMP

☐ CLERK/PLANNER	☒ BOROUGH ADMINISTRATOR	☐ FINANCE DIRECT	☐ RESOURCE DEPARTMENT
P.O. BOX 349	8380 C STREET, SUITE 205	P.O. BOX 49	211 4TH STREET, SUTIE 314
SAND POINT, AK 99661	ANCHORAGE, AK 99503-3952	KING COVE, AK 99612	JUNEAU, AK 99801
(907) 383-2699 (907) 383-3496 FAX e-mail: AEBCLERK@aol.com	(907) 274-7555 (907) 276-7569 FAX e-mail: aebanc@gci.net	907) 497-2588 (907) 497-2386 FAX e-mail: aebfinance@aol.com	(907) 586-6655 (907)586-6644 FAX e-mail gmeril@ptialaksa.net

3. The FEIS includes a more thorough discussion of the impacts associated with the 15- and 20-acre mooring basins…see FEIS Sections 2.2.3, 2.3, 2.4, and tables FEIS-2 and FEIS-3. In general, the larger basins would generate more dredged material, unavoidably impact more wetlands, generate more harbor and vessel activities, and potentially impact North Creek, a known anadromous fish stream.

4. The FEIS (Appendix 4) contains the U.S. Fish and Wildlife Service's final Steller's eider biological opinion.

CITY OF AKUTAN

Anchorage Office
3380 C Street, Suite 205
Anchorage, Alaska 99503-3952
Phone (907) 274-7555
Fax (907) 274-1813

AKUTAN

November 11, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Ref Navigation Improvements, Draft Feasibility Report
And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell,

We have reviewed the above referenced document and some of our Council members and residents attended the public hearing in Akutan on November 6, 2002. The community is in full support of this project and we look forward to its realization in the not too distant future.

1. One item we would like to that was brought up during the public hearing process. Although the need for the 20-acre basin has been proved, and the demand exists for the additional moorage, the reasons for abandoning that size project are not very clear in the document. Local residents and boat owners that use Akutan definitely prefer the 20-acre alternative. We are giving up almost half the usable moorage space as mitigation for the impact on the marine and bird life in the area and are leaving a good number of boats still searching for moorage elsewhere.
2. Akutan has been fortunate in having a fairly steady fishery in the region, from whaling to crab to pollock processing. This processing has always been at the whim of one processor or another. The boat harbor will give us stability in keeping those that participate in the fishery nearby, and it will

1. The reconfigured 12-acre mooring basin was chosen as the recommended plan because it balances the needs of the community and the Bering Sea commercial fishing fleet while protecting the environmental resources of the area to the maximum extent practicable. The Corps agrees that choosing the reconfigured 12-acre mooring basin is substantial mitigation (i.e., avoidance and minimization) in and of itself, and it has been stated as such in Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) of the Final Environmental Impact Statement (FEIS) and in Section 3.4 of the Feasibility Report.

give the community a much-welcome boost as well: There will be several year-round local jobs created with the boat harbor. It also means that local residents can better participate in the local fishery. They can finally replace same of their skiffs with boats that are a little larger and better suited for the ocean that surrounds us.

Thank you for the opportunity to comment and to extend our strong support for this project.
Sincerely,

Erika Tritremmel
City Administrator

2. The information provided has been incorporated into the Feasibility Report (Section 4.2.2) and FEIS (Section 4.4, Socio-Economic Resources).

AKUTAN CORPORATION

P.O. BOX 8 AKUTAN, ALASKA 99553 (907) 698-2206 FAX (907) 698-2207

U.S Army Engineer District, Alaska
Attn: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Akutan Corporation P.O.Box 8
Akutan Alaska 99553

Ref. Navigation Improvements, Draft Feasibility Report
And Environment Impact Statement, Akutan Alaska

Dear Mr. McConnell,

As President of the Akutan Corporation I attended the public hearing for the above referenced project in Akutan on November 6, 2002. The Akutan Corporation and it's shareholders are in full support of this project.

There is a little land in Akutan that can be developed for commercial use. The three parcels of the land that currently support Seafoods processing have always been held in private hands, with no financial benefit coming to the Akutan Corporation. The development of the boat harbor at the head of the bay will enventually bring some trade to the uplands surrounding the boat harbor and thus benefit the Corporation.

We also appreciate that there will be a cleanup of the shoreline between the whaling station and the Trident plant. Years of tidelands use by the state of Alaska have certainly left their mark.

The Corporation also has some interest in exploring tourism ventures. This would require the acquisition of a boat, and the boat harbor would provide the necessary moorage space for such a vessel.

Thank you for the opportunity to comment and extend our strong support for this project.

Sincerely,
Darryl Pelkey-President

Comments noted. The information provided has been incorporated into the Feasibility Report (Section 4.2.2) and Final Environmental Impact Statement (Section 4.4, Socio-Economic Resources).

AKUTAN TRADITIONAL COUNCIL

November 19, 2002

U. S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW F.It (McConnell PO. Box 6898
Mmendorf AFB, Alaska 99506-6898

RE: Navigation Improvements, Draft Feasibility Report And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell:

Several members of the Akutan Traditional Council attended the public hearing for the above referenced project in Akutan on November 6, 2002. The Akutan Traditional Council is in support of this project.

The most significant way the project will benefit our members is that we will be able to have moorage for larger vessels, This will enable us to have better access to subsistence hunting and fishing in the waters surrounding our village. These larger boats also mean that people will be able to participate in the fishery and not always be at the whim of the weather when they go out in skiffs. We also welcome the year-round jobs the boat harbor will provide for the community, such as harbor workers and road maintenance crews.

Thank you for the opportunity to comment. We strongly support thus project.

Sincerely,

Joe Bereskin
President

P.O. BOX 89 AKUTAX. ALASKA 99593
907-698•2300
907-698-2301

Comments noted. The information provided has been incorporated into the Feasibility Report (Section 4.2.2 and Final Environmental Impact Statement (Section 3.1 Community and People and Section 4.4 Socio-Economic Resources).

Trident TRIDENT SEAFOODS CORPORATION

5303 Shilshole Ave NW, Seattle, WA 98107-4000 • (206) 783-3818 • Fax: (206) 782-7195
Domestic Sales: (206) 783-3474 • Fax: (206) 782-7246
Export Sales: (206) 783-3818 • Fax: (206) 782-7195

November 21, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Re: Navigation Improvements Draft Feasibility Report and Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell:

1. I am writing on behalf of Trident Seafoods Corporation to endorse the inland harbor proposal as set forth in the above referenced report. Specifically, Trident Seafoods Corporation extends its support in favor of the boat harbor in Akutan because it offers substantial benefits to the Bering Sea commercial fleet and the city of Akutan.

The Bering Sea commercial fleet currently operates without protected moorage space in Akutan. The fleet is forced to travel to other locations to obtain provisions for fishing and to moor during closed fishing periods. Trident, as one of the largest shore-based fish Pollock, Pacific cod, and halibut commercial fisheries, would benefit substantially by being able to safely and efficiently harbor in Akutan. The inland harbor proposal would provide for transient and permanent moorage in Akutan where none currently exists.

The city of Akutan would also substantially benefit from protective mooring space. Several year-round jobs would be created as a result of the harbor, and

1. Comments noted. The information provided has been incorporated into the Feasibility Report (section 4.2.2) and Final Environmental Impact Statement (FEIS) (Sections 3.1 Community and People, and 4.4 Soci-Economic Resources).

the economic growth would translate into increased school enrollment. All of these factors would serve to diversify the economic base of the city and help ensure its economic stability.

The proposed harbor would also provide private mooring space for privately owned vessels, which would enable local residents to better participate in the local fishery by replacing their skiffs with larger boats. These larger boats would provide safer and easier access to subsistence areas, particularly during inclement weather.

2. It should be noted that Trident, along with the local residents, prefers the 20-acre basin alternative to the 12-acre basin recommendation. The 20-acre basin alternative provides mooring for 79 vessels whereas the 12-acre basin alternative only provides mooring for 57 vessels. Although the Environmental Impact Statement asserts that the 12-acre basin recommendation causes the least environmental damage when compared to the 15- and 20-acre proposals, the report fails to adequately support this conclusion. Moreover, the amount of mitigation required by the recommended plan, which includes sacrificing a considerable amount of moorage space, substantially outweighs the potential impact on the marine and bird life in the area.

Trident appreciates the opportunity to comment on this issue and wants to stress its strong support in favor of the inland harbor project.

Sincerely,

TRIDENT SEAFOODS CORPORATION

Joseph T Plesha
General Counsel

2. The Corps has expanded its discussion of the impacts associated with the 15- and 20-acre mooring basins, and why the reconfigured 12-acre basin is the least environmentally damaging alternative (FEIS Section 2.0 Alternatives and Recommended Plan). The Corps also agrees that the 12-acre basin is substantial mitigation in and of itself, and it is stated as such in FEIS Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) and Section 3.4 of the Feasibility Report.

Crayton, Wayne M POA02

From: Mary Walter [mary Walter@dnr.state.ak.us]

Sent: Wednesday, November 27, 2002 2:46 PM

To: Crayton, Wayne M

Subject: Akutan Harbor Harbor

1. Wayne, I have a question about the material that will be dredged from state land in Akutan Harbor. What is the beneficial use of the material? Where do you propose to stockpile this material? We have some serious concerns as the State has very limited uplands in this area if any and storing state material on private land becomes a huge problem for us. I understand that DOTPF may have an interest in this material for the airport project. This, however, doesn't solve the problem with stockpiling on private uplands. If the material has a value for commercial purposes, we are obligated to sale it but if it has a value for a public purpose, the state can give the materials to DOTPF.

2. Another concern I have is who is applying for the lease for this project? Will it be the city, borough or DOTPF? The applicant needs to apply ASAP so that the process can begin.

3. A survey will also be necessary for the state lands being used for the project. We would like to see the survey completed in the beginning of the prpoject rather than at the end. This will save a significant amount of time for the applicant if the survey is completed in the near future. Surveyors will already be on site, why not take advanage of them and get it done. I can't stress the importance this aspect of the adjudication process. I would highly recommend that you consider this now.
Thanks for the opportunity to comment.
Mary

1. The DNR material (seaward and below MHW) is dredged from the entrance channel. This material will be considered fill for the basin perimeter and the 1- acre uplands for the sponsor's operations (harbormaster office, spill response equipment, etc.). DNR dredged material will not exceed the quantity needed for these fill requirements.

2. The Aleutians East Borough (local sponsor) will apply for the State lands required for the project.

3. A survey will be done during the planning, engineering, and design phase. State lands anticipated for project use will be surveyed at the same time. However, minor alignment changes may occur as final project details are developed.

United States Department. of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services Anchorage
605 West 4th Avenue, Room 61
Anchorage, Alaska 99501-2249

WAES(TACORPS\AKUTAN\Almtan DEIS Commerts:wpd)

Guy McConnell
CEPOA-EN-ER
U.S. Army Engineer District, Alaska P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

DEC - 2 2002

Dear Mr. McConnell:

Re: Akutan Harbor Feasibility
Report and Draft EIS

We have reviewed the Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) for Navigation Improvements at Akutan, Alaska and have the following comments.

1. Page 3, Section 1.4 Environmental Coordination: We are aware of previous efforts to construct a harbor at Akutan.. We believe it would be helpful to the reader to briefly detail those efforts in this section because it would show how the siting/feasibility process has evolved over time, especially in regards to resource impacts and mitigation. Furthermore, we recommend including a table of specific mitigation measures already or to be implemented for the proposed project.

2. Page 7, Section 2.3.2. Wildlife: There are a few revisions we would suggest to the species list. From our perspective, voles are perhaps suspected, but are unconfirmed on Akutan. We have not observed arctic foxes on Akutan and believe that where sympatric, red foxes exclude arctic foxes. We suggest thrushes be replaced with sparrows as thrushes are uncommon and sparrows occur all year at Akutan.

1. Section 1.4 (Public Involvement and Issues of Concern) in the Final Environmental Impact Statement (FEIS) has been revised to include a reference about previous coordination efforts to construct a harbor at Akutan. Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) in the FEIS has been revised to include a more thorough description of mitigation measures already or to be implemented for the proposed project.

2. Section 3.3.2 (Fish and Wildlife) in the FEIS has been revised to include the submitted information.

3. Section 2.3.3. Freshwater Fish: It would be helpful to have a map that shows the locations of these streams (and other streams such as "Rust" Creek) mentioned throughout the document.	3. The subject streams have been appropriately labeled in the Feasibility Report (FR) and FEIS figures.
4. Section 2.3.4. Threatened and Endangered Species: There are occasional, but unclear references to the Steller's eider being listed as "an endangered species" when the species should be referred to as being listed as Threatened under the Endangered Species Act.	4. The FR and FEIS (Section 3.3.3 Threatened and Endanaged Species) have been corrected to reference the Steller's eider as a threatened species.
5. The Steller sea lion is listed as Endangered and is under the jurisdiction of NMFS. This needs to be addressed in several places where listed species have some significance, such as the bottom of page 31. Sea otters are occasionally described under text describing NMFS jurisdiction or conclusions. Under the Marine Mammal Protection Act, The US Fish and Wildlife Service (Service) has management responsibilities for the sea otter. The western Alaska population of sea otter is a candidate species currently being considered for listing under the Endangered Species Act by the Service.	5. FEIS Section 3.3.3 (Threatened and Endangered Species) has been revises to clearly state that sea otters are managed by the U.S. Fish and Wildlife Service. Test has also been revised to clearly identify the "status" of the species as significant.
6. There are local resident reports of humpback whales entering Akutan Harbor, presumably to forage on large schools of small fish. Huge schools of herring, for example, occur within Akutan Harbor during the summer. We do not suggest the infrequent occurrence of humpback whales would alter any of the findings of the DEIS, but do recommend they be included in the general discussion of threatened and endangered species for completeness.	6. Comments noted. Section 2.3.4 of the Feasibility Report and sections 3.3.2.2 (Terrestrial and Marine Mammals) and 3.3.3 (Threatened and Endangered Species) of the FEIS have been revised to incorporate the provided information.
7. Page 15, Section 3.2.4. Whaling Station: This section includes the first references of the dependence of the harbor project on a future road to be a "pre-existing" condition of the proposed harbor project. We believe it would be important to note that the feasibility of an airport on Akutan is in the preliminary stages of evaluation by the state and that another EIS will be required for that project. We are unaware of an established time-frame for the airport project. The two projects are somewhat inter-dependent, but the extent of the inter-dependence is unclear when it comes to cumulative impacts on physical and natural resources.	7. Comments noted. The Corps is aware that the feasibility of an airport on Akutan is in the preliminary stages of evaluation by the State of Alaska, and that a road to the airport may pass through the Corps' project area at the head of Akutan Harbor. Assuming the road is a "pre-existing condition," the Corps has evaluated in the FEIS what harbor-induced traffic-related impacts might occur.

Comment	Response
8. Pages 25-27. Figures 8-10 show the difference in mooring basin size and corresponding dredge spoil piles. From our perspective there needs to be a clear emphasis and intent to minimize encroachment on the North and South Creek watersheds, yet there appears to be little noticeable difference in the footprint of the projects compared to significant differences in their basin sizes. We also propose that the basin could start out smaller and be expanded in the future if necessary and appropriate.	8. The primary differences between the dredged material stockpiles' footprints are their acreage (between 20 and 29 acres) and top of fill elevation (between ±35 and ±50 feet); see table FEIS-4. The recommended plan minimizes encroachment on the North and South Creeks' watersheds to the maximum extent practicable.
9. Figures 8 (20-acre basin), 9 (15-acre basin), and 10 (12-acre basin) all indicate the relocation of what we believe is Rust Creek. We reiterate that we recommended the reconstruction of this creek be avoided if at all possible and the sections to be reconstructed have the same dimension, pattern, and profile as the section to be impacted.	9. The recommended plan (reconfigured 12-acre basin) incorporates a plan to reconstruct Rust Creek to the same dimension, pattern, and profile as the section to be impacted.
10. Furthermore, these figures show the airport access road traveling up the North Creek valley in close proximity to Rust Creek. As detailed in the Coordination Act Report, reconstruction of Rust Creek, removal of an existing fish migration barrier, and the establishment of 100-foot stream protection setbacks were mitigative measures recommended as partial mitigation for the 12-acre harbor project design. Larger basin sizes would require large spoil pile storage sites, more conceivable encroachment upon North (and possible South) Creek(s). These potential additional impacts would be very difficult and/or expensive to mitigate.	10. The subject figures have been revised to exclude any alignment of the airport access road traveling up the North Creek valley. The State of Alaska will determine the road alignment should it be determined that such a road is necessary for the Akutan airport development project.
11. Page 31, 4.0 Description of Tentatively Recommended Plan. We acknowledge that the spoil pile for any of the inland harbor alternatives is of sufficient size to result in wetland impacts. We recommend the Corps emphasize that filling of wetlands, even low-value wetlands, is a secondary alternative to filling existing uplands at the project site. In other words, we would expect that all available upland areas would be covered with spoils first, unless the full extent of the dredge spoil footprint needed is clearly known before any fill is deposited. As presently written the document implies that wetlands would be filled with the dredge spoil while adjacent uplands would not be preferentially used for dredge spoil storage, which would be inconsistent with the Section 404 (b)(1) guidelines.	11. Comments noted. The text (Sections 2.3.2, Dredging Activities and Disposal Alternatives; Section 2.4, Recommended Mitigation Plan and Environmental Protection Measures) has been revised to more clearly state that available upland areas would be covered with spoils first and wetlands second, unless the full extent of the dredged spoil footprint is clearly known before any fill is deposited.

12. DEIS Page 73: We recommend that all waters from the uplands constructed around the harbor be directed into the harbor instead of the adjacent freshwater stream systems. We have no objection to decant water from the spoil piles being directed into the freshwater stream systems provided state water quality standards for turbidity, suspended sediments, and other parameters are met. We continue to recommend that waters normally collected within the Central Creek watershed be redirected as appropriate into the North or South creeks to augment their flows. There is some possibility that these slightly-increased flows would aid in deterring saltwater intrusion into these watersheds. Water quality issues are complicated and we request the Corps coordinate a meeting with the Service/resource agencies to specifically discuss water quality issues.

12. Comments noted. The suggested subject meeting occurred on January 22, 2002, and proved very useful in identifying water quality concerns associated with the project. Best management harbor plans will be incorporated to control surface water runoff into the mooring basin, and waters normally collected within the Centeral Creek watershed would be diverted as appropriate into the North and/or South creeks to augment their flows (see section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

13. DEIS Page 77, Figure 16. We recommend against the settling basin concept as it would take up areas needed for dredge spoil storage and (as shown) discharge treated water into the harbor. Additional dredge spoil space would likely increase wetland impacts. Freshwater discharged into the harbor could lead to periodic icing problems and create a freshwater lens on the marine waters affecting mixing and other dispersal properties.

13. An individual settling basin concept is no longer being considered. However, during the mooring basin dredging operation, the basin itself would act as a settling basin for dredged material runoff (see section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

14. Page DEIS 82. End of first paragraph. Our recommendation for a stream-protection easement was for a minimum 100 feet of contiguous wetlands measured from both outer banks of the streams. This easement would ensure that important functions and values of contiguous wetlands critical to the integrity of stream resources are maintained. As such, many of the project drawings show the hypothetical airport access road within this easement. This easement would be in place along the re-constructed reach of "Rust Creek" except for a clear-span crossing. At present, there are no anadromous fish resources in Rust Creek, however a migration barrier would be removed as a recommended mitigation project and salmon adults and/or juveniles would be expected to occur in Rust Creek. For clarity, we recommend this easement be shown in a figure where it is first introduced. This figure should be referenced when describing anticipated developments after the harbor is constructed (as mentioned on page DEIS-85).

14. Figure FEIS-13 has been added that illustrates the location of the conservation easement along North and Rust creeks and the 100-foot setback along South creek.

15. Page DEIS 87, Section 4.3.3.3. Marine Mammals. Jurisdictional issues between NMFS and USFWS for endangered species are unclear.

16. Page DEIS 94, Section 4.7, Cumulative Impacts: We agree there will likely be future development pressure on the head of Akutan Harbor once a harbor is constructed. We have tried to reiterate to the Corps and others that the siting of this future development should first focus on the footprints of the dredge spoil piles. The Service has no objections to the use of dredge spoil for construction of a future airport access road, provided adequate planning and mitigation are a part of the NEPA/Section 404 process. As dredge spoils are used for the road, suitable harbor uplands will be made available. The Service would, however, likely object to the use of any dredge spoil material being used for the further destruction of freshwater wetlands or tidelands at the head of Akutan Harbor. The Service recommends a special condition in the eventual Section 404 authorization for the project that dredge spoils cannot be used for non-airport-related projects below the 200-foot contour west of the North Creek delta.

Thank you for the opportunity to comment on the DEIS. We look forward to our continued involvement in the harbor and related projects. Please contact Mark Schroeder, Fish and Wildlife Biologist, at 271-2797 if you have any questions, require additional information, or want to schedule a coordination meeting.

Sincerely,

Ann G. Rappoport
Field Supervisor

cc: ADFG, Wayne Dolezal
EPA, Region 10
NMFS, Brad Smith

15. Sections 3.3.2.2 (Terrestrial and Marine Mammals) and 3.3.3 (Threatened and Endangered Species) of the FEIS have been revised to clarify jurisdictional issues between the USFWS and NMFS.

16. A conservation easement has been proposed within the North Creek drainage, which protects valuable wetlands that support anadromous fish and other fish and wildlife resources. The Corps' Regulatory Branch has the responsibility to issue Section 404 permits for the placement of fill material within the waters (i.e. wetlands) of the United States. The information contained in the Feasibility Report and FEIS would be valuable in their assessment of potential impacts resulting from any proposed fill in and around Akutan Harbor. The USFWS's recommendation will be forwarded to Alaska Districts's Regulatory Branch for their consideration in issuing Section 404 permits (if any) in the project area.

Subject: RE: **Akutan Harbor,** AK0209-09AA, ACMP **Additional Information Reque st Date:** Thu, 5 Dec 2002 14:47:30 -0900
From: "Rumfelt, Tim" <tim Rmfelt@envircon.state. ak.us>
To: "'Crayton, Wayne M POA02'" Wayne.M.Crayton@poa02.usace.army.mil> CC: "Rumfelt, Tim" <tim Rmfelt@envircon.state. ak.us>,
"ADOT/PF-Smith Harvey (E-mail)" <Harvey Smith@dot. state. ak.us>, 'Susan Magee' <susan magee@gov.state. ak.us>, "Slemons, Jonne" <Jonne Slemons@envircon.state. ak.us>, 'Wayne Dolezal' <WayneDZ@FishGame.state. ak.us>

Wayne,

1. This department is very concerned with the proposed harbor's effects upon water quality. As stated in the DEIS, Akutan Harbor is already impaired and is presently on the State of Alaska's Impaired Waterbody List. Due to the present biochemical oxygen demand (BOD) placed upon the waterbody, dissolved oxygen levels (DO) are low, causing EPA to implement a Total Maximum Daily Load (TMDL) allocation to the present waterbody users. Because of the waterbody's environment and the proposed harbor location, circulation within the proposed harbor will be minimal. This will cause the BOD load within the harbor to lower the harbor DO and as water from the harbor and adjacent lands is discharged into the bay, it will also effect the bay DO. Both actions will effect biota utilizing that end of the bay. Thus, we need answers to the following, prior to being able to process the State's 401 Certification of Reasonable Assurance or find the project consistent with the Alaska Coastal Management Program (ACMP).

2. 1. Activities within and adjacent to the harbor will discharge BOD into the marine waters. EPA has determined the BOD carrying capacity of Akutan Harbor and through their TMDL process has allocated the allowable BOD discharges to the present users of the waterbody. Thus, either the Corps must show that this harbor (both during the construction and operational phases) will not increase the existing BOD load or must seek an EPA TMDL reallocation which would include this facility. Please contact Christine Psyk, EPA Region 10

1. Comments noted and addressed below.

2. Soon after receiving the Alaska Department of Environmental Conservation's (ADEC) comments, the Corps held an interagency (January 22, 2002) meeting to discuss in more detail the agency's concerns about the project's impacts on water quality, including BOD. The Corps researched the issue (see appendix FEIS-5) and estimated future BOD loads from the harbor to be about 24 and 499 lbs/day for the normal and extreme operating conditions. This equiates to 0.02 % to 0.34% of the TMDL of 149,000 lbs/day. Given the Corps' finding, the Corps requested the USEPA Region X , to reallocate Akutan Harbor's BOD and SSR waste loads established in 1995, taking into account the future construction and operation of the new harbor at the head of Akutan Harbor.

TMDL Unit Manager, (206) 553-0253, to discuss this matter. ADEC can not proceed with the certification process for the subject project until the above has been addressed.

3. 2. The DEIS states that the configuration of the proposed harbor can be adjusted to provide maximum circulation. Determining the best design can be accomplished through a modeling process. Prior to certification, ADEC needs to see the results of said modeling. We would also like to see this modeling done for the other proposed harbor sites which are located farther down the bay where the natural circulation is better and for the offshore and offshore/onshore alternatives. We believe that water quality was not a high priority during the site selection process. However, the water quality effects of this harbor will be felt for the life of the harbor.

3. As a result of the January 22, 2002, interagency meeting, water circulation and flushing models were run by Coastline Engineering in an effort to design a mooring basin that would facilitate improved water quality. The recommended plan (reconfigured 12-acre basin, figure FEIS-9) is the product of the modeling study and coordination with the ADEC and Alaska Department of Transportation and Public Facilities.

4. 3. The DEIS does not discuss the construction and operation of onshore facilities for the receiving and treatment of bilge water and domestic wastes. We understand that the Corps may wish to have these facilities considered under the Akutan Harbor Management Plan, but DEC must be assured that such facilities will be present and operable. Due to the amount of surrounding wetlands at the preferred site, construction and operation maybe a problem, thus we need up front assurance. Please describe your proposed type, location, and operation of said facilities.

4. The Corps recognizes ADEC's concerns about having onshore facilities for receiving and treating bilge water and domestic wastes The to-be-developed Akutan Harbor Management Plan will addresss ADEC concerns, the specifics of which (proposed type, location, and operation) will be developed in concert between the Corps, project sponsor, and ADEC during the preconstruction engineering and design phase of the project. See section 2.4 Recommended Mitigation Plan and Environmental Protection Measures.

We cannot process this application without the above information. By copy of this letter, we ask the Division of Governmental Coordination [DGC] to extend the coastal zone consistency determination comment period deadline, if we have not received the information by December 20, 2002. Please send DGC, 550 W. 7th, Suite 1660, Anchorage, Alaska 99501, a copy of your response.

STATE OF ALASKA *FRANK MURKOWSKI, GOVERNOR*

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET

DIVISION OF GOVERNMENTAL COORDINATION

SOUTHCENTRAL REGIONAL OFFICE
550 W. 7TH AVENUE, SUITE 1660
ANCHORAGE, ALASKA 99501
PH: (907) 269-7470 / FAX: (907) 269-3981 3829

CENTRAL OFFICE
P.O. BOX 110030
JUNEAU, ALASKA 99811-0030
PH: (907) 465-3562 / FAX: (907) 465-3075

PIPELINE COORDINATOR'S OFFICE
411 WEST 4TH AVENUE, SUITE 2C
ANCHORAGE, ALASKA 99501-2343
PH: (907) 257-1351 / FAX: (907) 272-

December 12, 2002

Mr. Guy R. McConnel
Environmental Resources Section
U.S. Army Corps of Engineers PO Box 6898
Anchorage, AK 99506-6898

Dear Mr. McConnell:

SUBJECT: AKUTAN HARBOR
STATE I.D. NO. AK 0209-09AA
REQUEST FOR ADDITIONAL INFORMATION/EXTENSION

1. Pursuant to the State of Alaska's review of your proposed project for consistency with the Alaska Coastal Management Program (ACMP), the Alaska Department of Environmental Conservation (ADEC) sent you a request for additional information (RFAI) on December 5, 2002 (see enclosure). The ADEC requires the requested information to determine if the proposed project is consistent with the ACMP and to process your application for a 401 Certification of Reasonable Assurance.

You have indicated that you will not be able to provide the requested information by the RFAI deadline of December 23, 2002, Day 25. Per 6AAC 50.070(g) and 6AAC 50.110(b)(6), I will suspend the review on that date until you are able to provide the information. The requesting review participant has seven calendar days to review your response for adequacy. Once ADEC notifies me that the information is adequate I will restart the review at Day 25 (per 6AAC 50.110(d)).

If you have questions regarding the request for additional information, please contact me at (907) 269-7472 or email Susan Magee@gov.state.ak.us.

Sincerely,
Susan E. Magee
Project Review Coordinator

1. Comments noted: The subject requested information has been provided to ADEC and incorporated into the final feasibility report and environmental impact statement. The Corps will request a restart of the coastal consistency process under separate cover.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

Reply To
Attn of: ECO-088 DEC 1 6 2002 99-059-COE

Colonel Steven T. Perrenot, District Engineer
Department of the Army
U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Dear Colonel Perrenot:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for the proposed *Akutan Harbor Navigation Improvements Project* pursuant to Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA) as amended. Section 309, independent of NEPA, directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions.

The proposed inland harbor would consist of an entrance channel dredged through the beach berm with the entire basin dredged out of the wetlands inland of the beach bean, producing 850,000 cubic yards of dredged material. Dredged material would be disposed of in adjacent wetlands to create upland areas associated with the proposed harbor. Dredged material in excess of requirements for upland construction would be stockpiled on adjacent wetlands for future uses, including the filling of other wetlands and intertidal areas for the construction of the planned airport and airport road as well as for future, yet-to-be identified, construction projects. The proposed mooring basin at Akutan would be designed to accommodate the larger Bering Sea commercial fishing vessels.

EPA, has rated this draft EIS, EO-2 (Environmental Objections-Insufficient Information).
This rating and a summary of our comments will be published in the Federal Register.
EPA has environmental objections because:

- the proposed project would directly impact 60 acres of wetlands and indirectly impact the remaining 35 acres of wetlands at Akutan Head;
- the proposed project would likely result in exceedances of fully allocated Total Maximum Daily Loads (TMDLs) for Biochemical Oxygen Demand (BOD) and Settleable Solid Residues (SSR) which will likely violate State Water Quality Standards (WQSs) for these two parameters.

EPA has determined that the draft EIS contains insufficient information because:

- the draft EIS does not evaluate the full range of reasonable alternatives and mitigation measures required by NEPA and Clean Water Act Section 404(b)(1) guidelines to avoid and minimize impacts to aquatic resources;
- the draft EIS does not describe in sufficient detail reasons for eliminating other alternatives from detailed analyses; and

1. • the EIS should more fully describe the sensitivity analyses which concludes that the need for the project remains largely unaffected despite significant decreases in harvesting in the fisheries described in Appendix B.

2. The EIS essentially presents only two alternatives, the action and no-action alternatives. Our analysis of information in the draft EIS indicates that there is little to no difference between the three inland moorage alternatives concerning impacts to wetlands and water quality. Although the 12-acre mooring basin alternative limits the direct impacts of the proposed project to wetlands compared to the 15- and 20-acre alternatives, consideration of the indirect and cumulative effects indicate that the entire 95 acre complex would be eliminated or functionally impaired with adoption of any of the three action alternatives and adoption of any of these alternatives would likely exceed the TMDLs for BOD and SSR and result in violations of WQSs. We recommend that the Corps defer its project decision until it addresses impacts to wetlands and water quality in a more substantive way.

Enclosed please find our detailed comments which elaborate on these issues. I encourage you to contact Chris Gebhardt of my staff at (206) 553-0253 to discuss our comments and how they might best be addressed. Thank you for the opportunity to comment.

Sincerely,

L. John Iani
Regional Administrator

Enclosures

1. The final Feasibility Report and Environmental Impact Statement has expanded its discussion and increased the level of detail on the subject issues raised by the USEPA. See Appendix FEIS-6, Section 404(b)(1) Evaluation; Sections 2.1 (Alternatives Eliminated from Further Consideration) and 2.2 (Alternatives Considered in More Detail); and in the Feasibilty Report, Appendix B, table A2-11 shows a demand of 158 vessels. This project accomodates less than 1/3 of the demand due to the selection of the smaller harbor for environmental reasons. Therefore, the fishery would have to completely stop, which is unlikely, to eliminate the need for this harbor.

2. The USEPA and Alaska Department of Environmental Conservation assisted the Corps at a January 22, 2002, meeting with identifying the necessary studies needed to address the potential impacts to wetlands and water quality. Since the subject meeeting, water circulation and harabor flushing modeling studies have been performed by Coastline Engineering, as well as a more detailed analysis of the affected wetland's functions and values. The appropriate sections of the feasibility report and EIS have been expanded to include the new data and impacts analysis. See FEIS sections 3.3.5 (Wetlands) and 4.3.5 (Wetlands). Via an email from USEPA-Region X (dated December 23, 2003), the USEPA stated that the Corps has satisfied their concerns regarding the potential impacts of the project on Akutan Harbor's TMDLs for BOD and SSR.

EPA Detailed Comments on the Draft Environmental Impact Statement (EIS) for the Proposed Akutan Harbor Navigation Improvements Project

Loss of Wetland Habitat

1. EPA has environmental objections concerning the impacts of proposed construction of moorage, stockpiling, and road construction to wetlands and the lack of sufficient proposed mitigation measures to compensate for these effects. The draft EIS states that the tentatively selected proposal for a 12-acre inland mooring basin would eliminate 60 acres of palustrine emergent wetlands together with the associated streams and small ponds in the Central Creek Basin through dredging, filling, and stockpiling. These 60 acres of wetlands are a majority of the 95-acre biologically rich aquatic complex which comprises wetlands, streams, and ponds at the head of Akutan Harbor that contains pink and coho salmon, Dolly Varden, and threespine stickleback habitat. In addition to the 60 acres of direct impacts, the draft EIS states that the remaining ridge and adjacent wetlands extending between the harbor basin and the bay are very likely to be lost or functionally impaired due to indirect impacts from lowering of the water table and future development. Therefore, the proposed action would result in the effective loss of the entire wetland complex: a total of 95 acres of freshwater wetlands and associated ecological functions. This biologically rich area is the only wetland complex on this part of Akutan Island. The complex also supports passerine birds, waterfowl, sea otters, and two species listed under the Endangered Species Act (ESA), the endangered Steller sea lion and threatened Steller's eider.

1. Comments noted. The recommended plan (reconfigured 12-acre moring basin) directly impacts approximately 43.7 acres of wetlands and 13.5 acres of upland. Harbor associated development would likely be associated to the storage area and dredged material disposal area. No development is expected to occur on the beach berm between the eastern side of the harbor basin and Akutan Harbor.

2. The draft EIS characterizes building the 12-acre inland mooring basin with the associated dredging and filling of wetlands, streams, and ponds in the Central Creek Basin as acceptable and environmentally preferable even though this proposed action would eliminate habitat for numerous species (including ESA listed species) and likely change surface and subsurface flows and lower the watertable (we acknowledge that the Corps is conducting an ESA Section 7 consultation with the US Fish and Wildlife Service regarding impacts to endangered species and their habitats). The draft EIS bases the conclusion of environmental preferability on a) the selection of the lowest quality wetlands in the Central Creek Basin versus the North Creek and South Creek Basins; b) the selection of the smallest inland mooring basin; and c) adoption of a series of Best Management Practices (BMPs), and several compensation measures to help mitigate impacts to aquatic resources.

2. Comments noted.

3. Regardless of the efforts made to minimize and mitigate direct impacts to wetlands, the entire 95-acre wetland complex would still be lost. This includes the 60 acres of wetlands directly impacted and the remaining 35 acres of surrounding wetlands south between the harbor basin and the bay and in the North Creek and South Creek

3. The project's mitigation plan (which includes impact avoidance, minimization, rectification and compensatory measures) was developed in concert with the U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, Alaska Division of Governmental Coordination (now the Office of Permitting and Project Management), National Marine Fisheries Service, USEPA (Anchorage Office), and project sponsors.

Basins, which would be lost or functionally impaired as the saltwater interface moves inland and as reasonably foreseeable future development occurs as described in the draft EIS occurs. The mitigation measures discussed in the EIS are for the most part avoidance measures that attempt to reduce impacts (e.g., standard construction BMPs). These measures, however, are too limited in scope to compensate for the permanent elimination or functional impairment of the wetland complex.

4. Two wetland compensation measures mentioned in the document, reconstruction of a pocket of wetlands within the footprint of the stockpile area and establishment of a 100-foot wide conservation easement along North Creek, lack detail concerning size, location, and responsible parties. We recommend that the Corps provide additional detail regarding these measures to allow reviewers to evaluate the amount of compensation they provide.

Proposed Project Would Likely Result in Violations in Water Quality Standards (WQSs)

5. EPA has environmental objections to the proposed inland mooring basins because proposed action alternatives would likely exceed Total Maximum Daily Loads (TMDLs) for Biochemical Oxygen Demand (BOD) and Settleable Solid Residues (SSR). The draft EIS describes how poor circulation in Akutan Harbor and the disposal of large quantities of processed fish waste result in low levels of dissolved oxygen (i.e., high BOD) and high levels of SSR. The State of Alaska consequently identified Akutan Harbor as water quality impaired on its Clean Water Act (CWA) Section 303(d) list and EPA later developed TMDLs to limit BOD and SSR to help ensure that dischargers meet Water Quality Standards (WQSs) for these two parameters.[1] The TMDLs for BOD and SSR show that these pollutants are fully allocated indicating that Akutan Harbor appears unable to receive any additional load of these pollutants without violating State WQSs. The draft EIS states that dredging activities would increase suspended solids, decrease oxygen concentrations, and increase dissolved nutrients concentration in receiving waters, thereby adding to the already full load allocations for BOD and SSR and resulting in likely violations of WQSs.

Section 31: of the CWA requires that federal agencies comply with standards and frameworks established under the CWA. Therefore, the project should be modified so as to demonstrate that action alternatives would not result in any additional BOD and SSR in Akutan Harbor, thereby preventing likely violations of WQSs. Water quality analyses

---

[1] Please contact Jayne Carlin in our TMDL Unit at (206) 553-4762 to discuss the Akutan Harbor TMDLs.

3.Cont. No additional mitigation measures have been identified other than those listed in the feasibility report (FR) and EIS (see FEIS Section 2.4 Recommended Mitigation Plan and Environmental Protection Measures). Also, see FEIS tables 3, 5, 8, 9, and 11; and figures 13, 24, 25, and 26 which more accurately enumerate and describe the wetlands and uplands impacted by the recommended plan (reconfigured 12-acre mooring basin).

4. Discussions on the topic (reconstruction of Rust Creek, North and Rust creeks conservation easement, 100-foot setback on South Creek, etc.) within the feasibility report and EIS have been expanded to address this concern. The design of Rust Creek's reconstruction will be developed with the assistance of the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game during the Preconstruction Engineering Design phase of the project.

5. Since receiving USEPA's comments on this matter, the Corps has worked with selected USEPA and ADEC staff to address water quality concerns. The Corps submitted to USEPA Region X under separate cover, a report identifying potential BOC sources related to the harbor and enumerating their contributions. Potential sources included storm water runoff, dredging, petroelum spills, sewage, graywater, wastewater from fish holds, bilge water, ballast water, wastewater from deck washing, algal blooms, debris, and fish waste. The Corps estimated future BOD loads from the harbor to be about 24 and 499 lbs/day for the normal and extreme operating condistions. This equates to 0.02% to 0.34% of the TMDL of 149,000 lbs/day. Given the Corps' findings, the Corps requests a reallocation of Akutan Harbor's BOD and SSR wasteloads that were established in 1995, taking into account the future construction and operation of the new harbor at the head of Akutan Harbor. The Corps also believes that the changes in mooring basin design to facilitate water circulation and flushing will help to prevent violations of State water quality standards. Via a December 23, 2003, email, EPA stated that their concerns pertaining to TMDLs and water quality expressed in their DEIS comment letter dated December 16, 2002, are resolved.

should incorporate: 1) proposed dredge and construction activities, 2) residue and waste discharge from the concentrations of boats that would be found in the proposed mooring basin, 3) how changing the geometry at the head of bay and harbor/moorage design would affect circulation, 4) runoff from stockpiled dredged material, and 5) how project induced changes in surface and subsurface flow at Akutan Head would affect levels of dissolved oxygen delivered to the marine environment.

In addition, we are concerned that the construction and use of the inland mooring basin would result in more numerous and extensive oil spills based on information in the draft EIS that 1) diesel is considered to be one of the most acutely toxic oil types to fish, invertebrates, and algae and 2) spill reporting in Alaska between 1990 and 1999 shows that Akutan was one of the top three harbors for the number of petroleum spills and the amount of material spilled. The EIS should predict the number and size of oil spills using historical accounts at similar harbors, predict the effectiveness of BMPs, and describe how project proponents would ensure implementation of BMPs, the resulting success rate, and whether the WQSs for petroleum would be met.

The FEIS adequately discusses the potential impacts of oil spills within Akutan Harbor and the ultimate fate of the oil spilled. BMP's will be established with the to-be-developed Akutan Harbor Management Plan. The project sponsor and Corps have agreed to participate in the development of a geographic oil spill response strategy for Akutan Harbor, the purpose of which is to identify environmentally sensitive areas within Akutan Harbor and develop methods/procedures to protect them from the effects of oil spills.

Analysis of Alternatives

6. The draft EIS identifies potential impacts to wetlands and degraded water quality issues that were identified as significant during scoping, however, the tentatively recommended alternative proposed in the draft EIS is not effective at avoiding, minimizing, or mitigating impacts to the environmental impacts, other than those to Steller's eider. While the EIS does provide a limited discussion of why several other locations for a harbor site within Akutan Harbor were considered but eliminated from further consideration, we suggest that additional information be provided to support the elimination of these alternative sites. Moreover, we suggest that additional information be provided as to why harbor sites outside the Akutan Harbor area, including existing harbors within the moorage market area in the Aleutian Islands, were eliminated from consideration. The document contains three onsite project designs examined in detail at the selected alternative site, all of which entail constructing inland mooring basins at
7. Akutan Head. While the selected design minimizes impacts to Stellar's eider, it does not otherwise avoid, minimize or mitigate impacts to aquatic resources.

6. Discussions in Section 3.4.1 have been added to the FR and Sections 2.1 (Alternatives Eliminated from Further Consideration) and 2.2 (Alternatives Considered in More Detail) have been expanded to address the "elimination of alternatives" issues raised by USEPA.

7. See Corps response #3.

8. Purpose and Need: The Purpose and Need section (Section 1-3) states that the proposed action is to "provide a safe and efficient harbor for the Bering Sea commercial fleet and the City of Akutan". The underlying need appears to be providing permanent and temporary safe moorage for commercial and local subsistence fishing. A complete statement of present moorage problems in the project region is found in Appendix B to the draft EIS. A very brief summary of this material should be included in Section 1-3 to make the purpose and need clear. The complete action, as described in Section 2.2.2.3,

8. A brief summary of present moorage problems in the project area has been added to Section 1.3 (Purpose amd Need) of the FEIS.

also includes a spur access road to connect to an eventual airport road, and permanent disposal or indefinite stockpiling of dredged material. Thus, the EIS states that the project has two additional related purposes or elements: road construction and construction of a wetland disposal site to stockpile dredged material. These project elements will be discussed below (in sections entitled Road Spur and Alternatives to Dredging and Disposal at the Selected Project Site).

9. There are constant fluctuations in available moorage in different locations in the region that includes Akutan Harbor depending on the weather, season, and the types of vessels that are used in the five major fisheries in the Bering Sea, Aleutian Islands area (BSAI). The present conditions in Akutan Harbor for the commercial fleet and those of the local subsistence fishers are distinct, and the needs for permanent moorage and temporary shelter from storms, both of which are part of the purpose and need, might be met by multiple, separate and different types of moorage facilities in Akutan Harbor or elsewhere (such as pilings or dolphins added for temporary moorage). The EIS should explore whether there might be different alternative means of meeting these distinct purposes.

9. Pilings and dolphins without wave protection will not be used in inclement weather. In calm weather and seas, anchoring is sufficient temporary moorage. Multiple protected moorage sites cannot be economically developed.

10. The Sensitivity Analysis in the draft EIS (Appendix B) concludes that regardless of reductions in the demand for moorage (a reduced demand of 25% was assumed), the project is still fulfilling a compelling need. However, the Appendix contains some information that does not appear to corroborate this conclusion. For example, the critical groundfish fishery tonnage has been in decline, dropping from 390,790.35 Metric tons to 236,734.75 Metric tons between 1994 and 1999, decline of 46% (EIS Appendix B, Page B-13). While the region produced large harvests of king and tanner crab through the 1960s and 1970s, these species are at historically very low densities. Implementation of provisions of the American Fisheries Act are also beginning to bring about dramatic reductions in the numbers of fishing vessels operating in the area. Associated limitations in vessel licensing instituted by North Pacific Fisheries Management Council are having the same effect. Appendix B acknowledges that vessel reductions both in the groundfish and crab fisheries are expected to continue in the future. Additionally, the Trident Seafoods processing plant is proposing an expansion of its docking facility, which might conceivably further reduce any seasonal or temporary moorage scarcity in Akutan Harbor and the surrounding area. The EIS should explain in additional detail the estimated demand for moorage in Akutan Harbor. This will assist us in understanding design requirements for moorage and help in the additional analysis of alternative sites and design options for the project.

10. FR Appendix B, table A2-11 shows a demand for 158 vessels. Note: this is a current demand and not a past demand when historical catches were higher. The project accommodates less than 1/3 of the demand due to the selection of the smaller harbor for environmental reasons. The Trident expansion is working-dock expansion and will not have any protection from incoming waves. It will not provide protected moorage.

11. Alaska Wetlands Intiative: The Alaska Wetlands Initiative of May 1994 (a joint document by the EPA, the Corps, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service) discusses Mitigation Requirements of the Army Corps of Engineers Regulatory Program, and Applying Flexibility in Alaska. While this document does not apply specifically to the Corps' Civil Works program, the guidance it offers should be considered. In view of the guidance presented in the initiative, we do not believe that the present design measures aimed at minimizing project impacts are sufficient to offset the losses to aquatic resources. EPA concludes that based on available information in the DEIS, the impacts in this case are not small, there appear to be opportunities to avoid wetlands that have not been explored, and that the document does not demonstrate a scarcity of potential wetland mitigation sites. Therefore, additional compensatory mitigation for wetlands impacts should be developed if the inland harbor alternative is selected as the recommended plan.

Evaluation of Altenatives and Mitigation Measures Required by NEPA and the Substantive Requirements of the Clean Water Act Section 404(b)(1) guidelines: The draft EIS does not demonstrate that the proposed project would meet the substantive requirements of the Section 404(b)(1) Guidelines, at 40 CFR Part 230, nor that the project would be consistent with the EPA/ Department of Army Memorandum of Agreement Concerning the Determination of Mitigation Under the Clean Water Act 404(b)(1) Guidelines.

Under the Section 404(b)(1) Guidelines, it is first necessary to define the proposal's basic project purpose. For this project, the basic project purpose is moorage. For non-water dependent actions, the Guidelines, at 40 CFR Section 230.10(a)(3), state that practicable alternatives that do not involve special aquatic sites are presumed to be available (and to have less adverse impact) unless clearly demonstrated otherwise. For water dependent actions, it is still necessary to seek the least damaging alternative.

The Mitigation MOA, while designed primarily for compliance with Section 404 of the Clean Water Act through the Corps' Regulatory program, interprets the requirements of the Section 404(b)(1) Guidelines as first avoiding potential impacts to the maximum extent practicable, then requiring steps to minimize impacts, and finally requiring compensation for the loss of aquatic resource functions, known as `sequencing'. The EIS and Section 404(b)(1) Guidelines Evaluation do not describe how the project meets these sequencing requirements. In order for a determination to be made that these requirements are met, the EIS should include information that describes the search for alternative sites and why they were rejected, as discussed previously in this letter.

11. The Corps agrees with the USEPA that the impacts associated with the recommended plan are not small. However, the Corps has directly coordinated the development of a mitigation plan with numerous State and Federal agencies...see Corps comment #3. In addition, Appendix FEIS-6 (Evaluation Under Section 404(b)(1)) has been expanded to more thoroughly address the impacts of the recommended plan on area wetlands and fish and wildlife resources.

12. Offsite Alternatives The EIS does not analyze offsite alternatives in a comprehensive way, as required by the 404(b)(1) guidelines, in order to demonstrate that the proposal is the least damaging practicable alternative. EPA is concerned that there maybe a number of practicable alternatives, potentially including off-site alternatives, that might meet the basic project purpose but were not examined or were prematurely eliminated from further consideration. Additional information is needed to better explain the alternatives analysis, and a more systematic presentation of the analysis would be helpful.

The EIS discusses reasons for selecting or eliminating alternatives on the basis of one or more advantages or disadvantages, as listed in Table DEIS-1. This table and the accompanying text do not appear to consider all of these listed advantages or disadvantages equally and consistently or select the site that necessarily best fits them. A set list of criteria should be developed using some of these factors, and others as appropriate, to evaluate each alternative equally and consistently. Where appropriate, the criteria should be expressed quantitatively and selected criteria from the list be weighted by importance.

We have developed for your consideration the following criteria based on our review of the proposed project:

1. Shelter and wave protection from north and west storms
2. Shelter from Bering Sea long period waves
3. Shelter from large southerly ocean swells or reflected swells
4. Sufficient size to be safe for navigation and provide sufficient capacity to meet present demand (or future demand - the analysis should specify)
5. Presence or absence of deep water
6 Good water quality and mixing zone
7. Amount of upland area potentially developable
8. Presence or absence of shallow bedrock
9. Presence or absence of environmentally sensitive areas
10. Degree of local preference, or local rejection
11. Proximity to the local community and / or Trident facility, ferry dock or seaplane ramp
12 Possibility of stimulating local development (possibly same as previous)
13. Presence of contaminated soil requiring cleanup
14. Consideration of current and potential future land use

Applying the same set of criteria to all sites would ensure their equal and consistent consideration as alternatives. Following are examples where it is not clear that this occurred. The Corps notes in Table DEIS-1 that several sites are eliminated on the basis of excessive wave energy, distance from the Akutan village, or lack of local sponsor preference for these sites, although there are important advantages to each

12. The Corps incorporated many of USEPA's recommended criteria into a revised table (FEIS-1, Comparative criteria used to equally screen the feasibility of constructing navigation improvements in Akutan Harbor). The revised table more comprehensively and equally compares the project's alternatives. Accompanying text has been expanded to more thoroughly address USEPA's concerns.

	Comment	Response
	(Table DEIS-1). The document does not define or quantify what constitutes excessive wave energy. The Salthouse Cove site was rejected because Trident Seafoods is planning to expand there. It might be possible to combine the Trident expansion with the harbor improvements so that both projects may be designed and function together, while avoiding some wetland impacts. The text also states that the Salthouse Cove site is not large enough, without specifying how large a site has to be to become a practicable alternative.	The term "excessive wave energy" is no longer used. More descriptive terms/language has been added
13.	<u>Spur Road</u>: The proposed action discusses construction of a spur road. The document does not clarify whether the road is a required project element since road construction is proposed for placement in a special aquatic site and is not a water dependent use, it would be necessary to demonstrate that no upland sites are available. The EIS states however, that construction of the road is contingent on future joint action by the Federal Aviation Administration (Airport Master Planning) and Alaska Department of Transportation and Public Facilities (Road design) for construction together with an airport. It is not clear whether these actions are necessary parts of the moorage basin project, or whether the moorage basin is a viable project without them. Since the road and the airport are reasonably foreseeable future actions, the EIS and 404(b)(1) Guidelines analysis should consider the cumulative impacts of these projects along with the moorage basin. **Alternatives to Dredging and Disposal at the Selected Project Site** The proposed action includes dredging and disposal of dredged material in a special aquatic site (i.e, wetlands). In order to do so in a manner consistent with the 404(b)(1) guidelines, the EIS must demonstrate that there are no less environmentally damaging practicable alternatives. In considering options for the disposal of dredged material, the DEIS briefly discussed open water, intertidal and land disposal sites (including upland and wetland sites), but rejected the first two because of environmental impacts, cost, and the "suitability of the material for stockpiling and use in the construction of upland areas around the harbor and as sub-base material for the access road or airstrip." Suitability of the dredge material for construction of other projects is not related to the stated purpose and need for the project, which is to provide a safe and efficient harbor for the Bering Sea commercial fishing fleet and the City of Akutan.	13. The recommended plan identifies where a spur road from the harbor <u>might</u> connect with the road linking the city of Akutan to an airport. The road to the head of the harbor will either be constructed by the city of Akutan and/or Aleutians East Borough or by the Alaska Department of Transportation and Public Facilities as part of their future action with the Federal Aviation Administration to construct an airport on Akutan Island. The Corps' impact analyses of the road from the city of Akutan to the head of the bay is restricted to the likely increase in foot and vehicle traffic generated by harbor-related activities.
14.	The EIS must first consider upland disposal, rather than filling wetlands, as the presumptive least damaging alternative for the disposal of dredged material, if sites are available and practicable. There presently is no direct discussion of upland sites. The EIS should also analyze the practicability of deep water disposal of the dredged material. The draft EIS states that stockpiling dredged material in a wetland would avoid the environmental impacts of ocean disposal. While the draft EIS discusses how stockpiled fill material might be used for future development, it lacks sufficient analyses	14. Discussions in the final FR and EIS have been expanded to address alternatives to dredging and disposal at the selected project site. See sections 2.3.2 (Dredging Activities and Disposal Alternatives), 2.4 (Recommended Plan Mitigation and Environmental Protection Measures), and 4.0 (Environmental Consequences of the Recommended Plan).

and discussion of the comparative environmental impacts of filling wetlands at Akutan Head versus ocean disposal and does not attempt to determine which is least environmentally damaging.

EPA's experience with administering the Ocean Dumping or Marine Protection, Research, and Sanctuaries Act of 1973 has shown that ocean disposal can be environmentally benign, and in some cases, environmentally beneficial. The EPA believes that inherent flexibility in the location and design method (confined versus dispersed sites) and the selection of possible multiple disposal sites of clean sediments strongly indicates that ocean disposal of dredged material is very likely to be less environmentally damaging than the proposed use of dredged material to fill many acres of highly valuable wetlands. In addition, EPA believes that the beneficial use of dredged material in a manner or location that provides ecological benefits, such as creation of intertidal habitat at a subtidal site, is less damaging to the aquatic environment and more consistent with the goals of the Clean Water Act than stockpiling fill in wetlands and later using this material for further fill in wetlands. Consequently, the alternatives section should examine different methods to dispose of dredged material (including ocean disposal) and the environmental consequences section should fully disclose the impacts of adopting different disposal methods.

Consistent with the 404(b)(1) guidelines, the EIS should be able to demonstrate that disposal of the dredged material in wetlands is less damaging than ocean disposal before considering suitability of the dredged material for disposal in the intertidal or wetland environment until such a demonstration is made.

<u>On-Site Minimization Through Design Alternatives</u>:

15. *Offshore Harbor Basin:* This section cites a high frequency of maintenance and inspection, the high cost of a floating breakwater, and the risk of failure of the structure as a reason to reject this design. Cost and failure risk make this design of questionable practicability. It appears that the total cost of this alternative would be $33.8 million because the $17 million cost of the floating breakwater must be added to the rest of the costs of constructing the mooring basin, but this is not clear in the EIS or the feasibility study. The Corps rejects this alternative on the basis that terrestrial dredge disposal and project-induced development would result in the loss of wetland habitat. However, it may be possible to build the offshore harbor basin using aquatic dredge disposal to reduce wetland impacts. EPA therefore disagrees with the Corps' conclusion that the project should be rejected on this basis. The inland harbor basin design would result in greater direct impacts to wetlands (although we acknowledge that it would reduce impacts to the marine environment), and yet this design was selected for the project. Again, if the costs for this design are not excessive, the Corps has not yet shown that the

15. The Corps believes the offshore and offshore/onshore alternatives are not feasible for engineering and environmental reasons. Environmental impacts to overwintering Steller's eiders and their habitat would be significant, in addition to the adverse impacts to the nearshore movement of fish, especially anadromous fish that use North and South creeks. Both alternatives would directly and indirectly affect the same wetlands that the inland alternative would affect directly.

offshore harbor basin is more damaging than the inland basin. As we have discussed above, under the 404(b)(1) guidelines, it can be assumed until demonstrated otherwise that 1) discharges of dredge material could take place outside the wetlands environment, and 2) those discharges would be less damaging unless the proponent demonstrates otherwise. The alternative, in our view cannot be rejected until the alternatives analysis is complete, avoidance and minimization measures are incorporated as appropriate, and. the extent of aquatic resource impacts from each alternative are known and can be compared.

16. ***Offshore /Onshore Harbor Basin:*** The EIS states that the required curtain-wall wave barrier and rubblemound jetty make this alternative too costly. However, the costs are not quantified or compared to the other two alternatives, and it cannot be determined if this alternative is practicable. This information should be presented in the EIS.

16. FR Section 3.3.4 shows the screening costs for the various head of the bay concepts. This shows the inland as being least expensive and thus was chosen for more detailed development. Also, the conflicting envirioinmental issues of marine habitat, Steller's eider habitat, and wetland habitat went into the selection of the inland harbor.

Environmental Justice

17. Additional analyses and conclusions are needed to understand whether disproportionately adverse effects to Alaskan Natives (a recognized minority) would occur with the implementation of the proposed project (individually or cumulatively). This analysis is an important element of the Federal decision making process. The intent of Executive Order (EO) 12898 *(Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)* and accompanying memorandum is to "promote fair treatment of people of all races, so no person or group of people shoulders a disproportionate share of the negative environmental effects from this country's domestic and foreign programs." We recognize that the EIS's economic analysis provides excerpts from interviews with subsistence harvesters in Akutan who support the proposed project. We also recognize that the proposed project is supported by the city of Akutan, the Aleutians East Borough, and the Aleutian Pribilof Community Development Association. However, the EIS should conduct a full Environmental Justice analysis to provide more detailed information regarding impacts to Alaskan Natives.

The key objectives of evaluating effects to minority and low-income populations pursuant to EO 12898 are to 1) identify if any potentially affected minority or low-income populations exist, 2) reach a conclusion as to whether any effects associated with a known course of action would be disproportionately adverse to those affected populations, 3) effectively communicate with and involve minority or low-income populations in project development, and 4) identify an appropriate course of action that would avoid or otherwise minimize or offset such effects. EPA Region 10 can provide you with assistance and guidance on how to best prepare this analysis; please contact Chris Gebhardt at (206) 553-0266 for additional information.

17. Discussions in the FEIS have been expanded to cover the Environmental Justice issues raised by the USEPA…see Sections 3.1 (Community and People), 4.4.1 (Protection of Children), and 4.4.2 (Environmental Justice).

U.S. Environmental Protection Agency Rating System for

Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective. measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1- - Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce he environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Crayton, Wayne M POA02

From: Matthew Eagleton [matthew.eagleton@noaa.gov]

Sent: Wednesday, January 15, 2003 4:03 PM

To: Crayton, Wayne M POA02

Cc: Brad Smith

Subject: Akutan Harbor Mtg and EIS Comment

1. I have reviewed the Akutan Navigational Improvements EIS. EFH, ESA, and mitigation rec's all seemed good and provide some good practices to avoid/minimize impacts. I liked the commitment to the beach clean-up - maybe it will happen yearly by volunteers if this one is done positively. After the review of our resources, I would only suggest a precautionary statement to protect Steller sea lions such as: Should SSL's be within the project site, then we ask you to cease any in-water activities until they are no longer present and, if needed, give our office a call at (907) 271-5006 for further guidance (also see below).

Also, fyi, we have divers in our office now and, with some heads-up, they may be able to assist in gathering baseline info and things. Let me know if you need this support sometime and if you want them to go out to Akutan this summer or whenever.

Again, sorry for the late review. If you need more formal comments please let me know. Here are informal comments:

After review, NMFS offers the described action will not result in any adverse effect to EFH. NMFS does not offer any EFH Conservation Recommendations, and no further EFH consultation is necessary. Additionally we offer NMFS ESA trust resources, specifically Steller sea lions (SSL), are unlikely to occur within the footprint of the project site and therefore no effect to SSL populations is anticipated. Should SSL's be come within the project site, then we ask you to cease any in-water activities and give our office a call at (907) 271-5006 for further guidance.

1. The precautionary statement to protect Steller sea lions has been incorporated into the final Feasibility Report (Section 4.15 by referencing the EIS for operaitonal items for construction)and final environmental impact statement (Section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

FEIS-APPENDIX 3

U.S. FISH AND WILDLIFE SERVICE
FINAL COORDINATION ACT REPORT
AKUTAN NAVIGATION IMPROVEMENTS

U.S. Fish & Wildlife

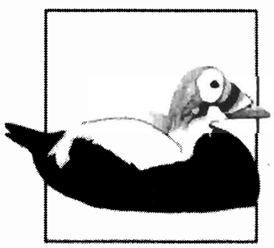
Anchorage Fish & Wildlife Field Office

AKUTAN
NAVIGATION IMPROVEMENTS

Project
Planning

Final
Fish and Wildlife Coordination Act
Report

(AFWFO-CAR-04-02)



Endangered
Species

Prepared by:

Mark T. Schroeder

Environmental
Contaminants

December 2003

AKUTAN
NAVIGATION IMPROVEMENTS

Fish and Wildlife Coordination Act Report
(with December 2003 Addendum)

Submitted to Alaska District
U.S. Army Corps of Engineers
Anchorage, Alaska

Prepared by: Mark T. Schroeder, Fish and Wildlife Biologist
Approved by: Ann G. Rappoport, Field Supervisor

Ecological Services Anchorage Field Office
U.S. Fish and Wildlife Service
Anchorage, Alaska

December 2001

TABLE OF CONTENTS

LIST OF FIGURES

Figure

INTRODUCTION

This report constitutes the U. S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act Report (report) on the U.S. Army Corps of Engineers' (Corps) construction of a boat harbor at the community of Akutan, Alaska (Figure 1). The purpose of this report is to provide the Corps with planning information to discuss the presence of significant fish and wildlife resources likely to be affected by construction of the boat harbor; define the fish and wildlife resource problems and opportunities that should be addressed by the study; define the potentially significant impacts that could result from meeting other study purposes and objectives; highlight potentially significant fish and wildlife issues or concerns; and provide preliminary recommendations on measures for mitigating those impacts and concerns.

This report is prepared in accordance with the Fiscal Year 1999-2001 Scopes of Work and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.). This document constitutes the draft report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

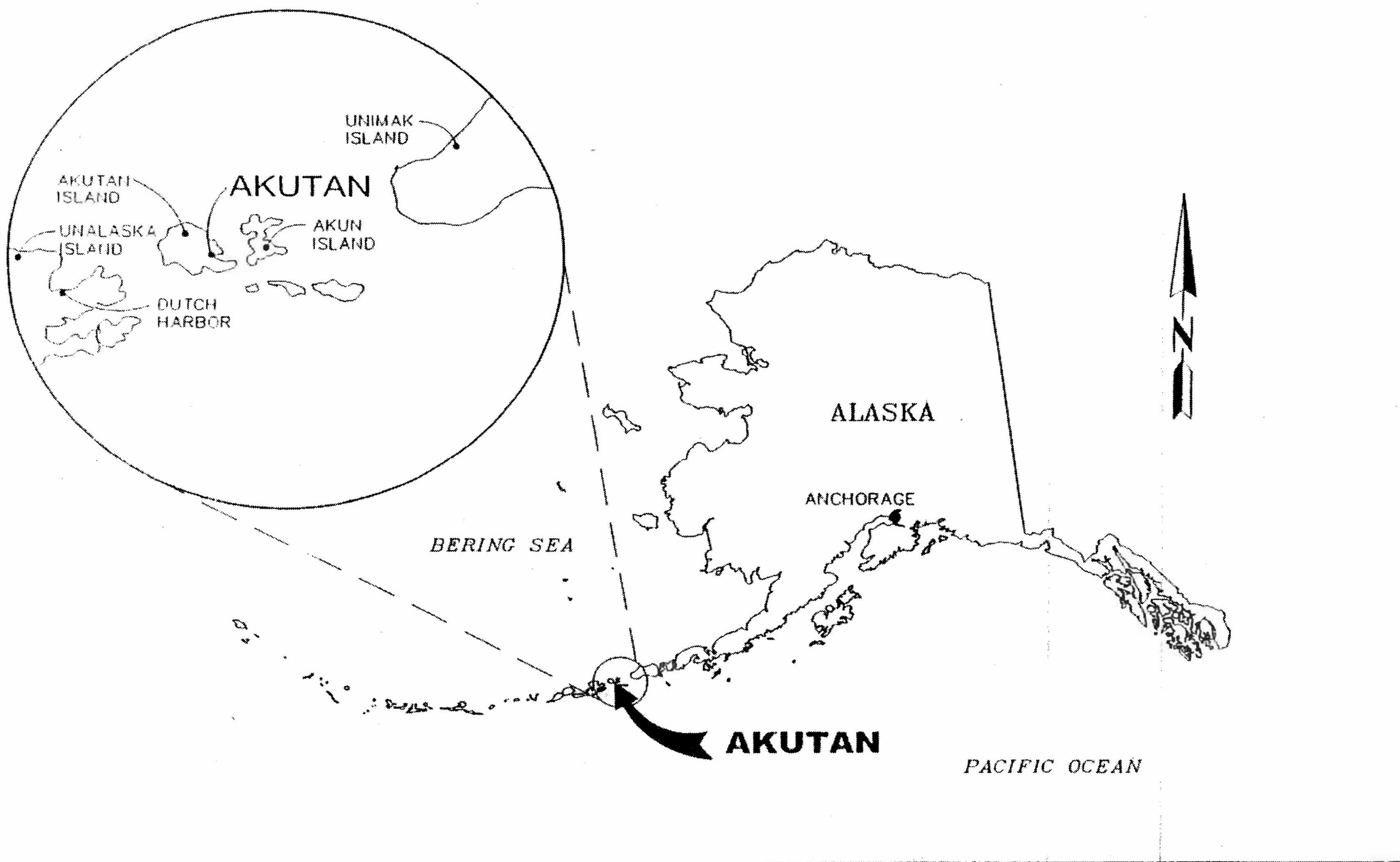
The report also contains information on threatened and endangered species, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act). The Corps requested initiation of formal consultation under the Act in a June 15, 2001, letter. Our July 23, 2001, response to that request described additional information required to complete the initiation package and we received a response to that request in a letter dated September 19, 2001.

We agreed with the Corps' biological assessment of "No Effect" for the short-tailed albatross and no "reasonable and prudent alternatives" or "reasonable and prudent measures" were recommended. The formal consultation process for the Steller's eider will conclude with the Service's Biological Opinion which will include nondiscretionary terms and conditions additional to the recommendations contained in this report.

The following report is based on information provided by Corps' project biologists Wayne Crayton and John Burns; a review of pertinent literature; discussions with local resource agency staff and residents; and several on-site evaluations.

STUDY AREA

The eastern Aleutian Islands are characterized by a maritime climate of high humidity, frequent precipitation and strong surface winds. The nearest weather station to Akutan is at Unalaska, 40 miles west of Akutan. The mean annual temperature in the region is 4.8 degrees C (41 F) with mean monthly temperatures ranging from about 0 degrees C (32 F) in February to 11.9 C (53 F) in August. Total mean precipitation is 1475 mm (58 in). Low-lying fog occurs about 30 days per year and is more frequent in the summer than in the winter. Winds average 18 kph (11 mph) and extreme winds may reach 130 kph (80 mph). Tides in the area are not great, having a maximum amplitude of near 10 ft.



LOCATION MAP

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 1

The mean tidal amplitude (mean high water to mean low water) in the area is about 4 ft (Stewart and Tangarone 1977) and consequently the intertidal zone is typically between mean higher water (MHHW:+3.9 ft) and extreme low water (ELW:-2.5 ft) (Crayton 1983). In steep areas the intertidal zone is relatively narrow; however, the intertidal zone can be extensive in gradually sloping areas, such as near the head of the bay.

Akutan is in the Aleutian Island physiographic section of the Alaska-Aleutian province. Similar to other Aleutian islands, Akutan resulted from the ongoing convergence of tectonic plates and is mostly volcanic in origin. Akutan Volcano dominates the western part of the island. The steep volcano slopes are drained by swift streams, some of which run over porous rock and flow only during heavy rains. Lakes and other poorly-drained wetlands are found in nearshore basins that were carved by glacial activity.

Akutan Harbor is a glacially-formed fjord approximately 6.3 km (3.9 mi) long. The Harbor is approximately 3 km (1.8 mi) wide at its mouth and narrows to about 1 km (0.6 mi) at its head. The northern and southern shorelines are rocky and steep. The head of the bay is a flat valley with a gradually increasing slope as it curves around to a ridge to the northeast. A large, vegetated berm behind the beach, separates a wetland complex from the sea waters of Akutan Harbor.

The bathymetry of Akutan Harbor has submarine slopes along the sides of the fjord that are steep with water depths of 18 m (60 ft) within 146 m (480 ft) from shore, an 8:1 slope. The fjord bottom is relatively flat and gradually deepens from 27 m (88 ft) at the head of the bay to 61 m (200 ft) at the mouth of the harbor. The harbor does not have a large outer barrier sill that acts to inhibit the exchange of deeper waters between the fjord and the Bering Sea.

The vegetation of Akutan Island is characterized as either alpine tundra or moist tundra. The moist tundra occupies low elevation areas and consists of tall grass meadows, low heath shrubs, mosses, lichens, and tufted hair grass. Commonly occurring plants include lupine, cow parsnip, monks hood, orchids, Indian paint brush, chocolate lily, wild geraniums, ferns, and a variety of aster and grass species (M. Schroeder, pers. comm.; Crayton 1983). Tree species are limited to a few low-growing willows near water courses. Wetlands are primarily limited to an estimated 50-acre complex at the head of the bay.

FISH AND WILDLIFE RESOURCES

A wide variety of harbor locations were evaluated during the past 16 years. Several of these have been eliminated for a number of reasons and are not evaluated in this document. A brief description of the sites and the reason they are no longer under consideration is contained under the Project Alternatives section. This report focuses on three alternatives: North Point, Head of the Bay – Offshore Basin, and Head of the Bay – Inland Basin.

Endangered and Threatened Species

The project is within the range of the Steller's eider (threatened), Steller sea lion (endangered), fin whale (endangered), and humpback whale (endangered). The status of the short-tailed albatross, American peregrine falcon, and Aleutian Canada goose are also addressed below.

Steller's Eider

The Alaska breeding population of Steller's eiders was listed as a threatened species on 11 July 1997. The project site does not contain designated critical habitat for the Steller's eider. Steller's eiders are sea ducks that spend the majority of the year in shallow, near-shore marine waters where they feed on mollusks, polychaete worms, and crustaceans. The breeding distribution of the north Pacific population of Steller's eider encompasses the arctic coastal regions of northern Alaska and parts of eastern Russia. Most of the north Pacific population of Steller's eiders winters along the Alaska Peninsula from the eastern Aleutian Islands to southern Cook Inlet.

Additional systematic surveys and occasional surveys have been completed around Akutan. The Service completed an opportunistic winter waterfowl survey of Akutan Harbor in March 1998 (USFWS 1998, unpub. files). These data were used to justify the more systematic and extensive surveys that followed.

Larned (2000) completed aerial surveys of the region in February and March 2000 and indicated that Steller's eiders concentrated in certain protected bays during the winter. Surveys including Amaknak, Unalaska, and Akutan islands, for example, documented that most Steller's eiders were located in Akutan Harbor, Captains Bay, Iliuliuk Bay, and Unalaska Bay. Eiders were observed feeding and loafing at these sites both on shore and in nearshore (<100m) waters.

Steller Sea Lion

The Steller sea lion (northern) was upgraded to endangered status in April 1997 due to recent declines in populations in the western Gulf of Alaska. The 1997 population in the area from Prince William Sound to the Aleutian Islands was estimated to be around 44,300. Recent declines are believed to be primarily the result of juvenile mortality. The northern sea lion is distinctive in its use of a few specific locations along the coast as rookeries and haulouts. Sea lion haul-out sites are designated critical habitat because of their limited numbers and high density use. Known sea lion haul-outs associated with Akutan Island are located between Lava and Reef points and near Cape Morgan (Nysewander et al. 1982).

Alteration of these haul-out sites through disturbance or habitat destruction could have a significant impact on use of these areas by sea lions. Steller sea lions make frequent use of Akutan Harbor, especially during the winter, including observations of 32 near the Trident seafood waste outfall plume on January 22, 2001 (Schroeder 2001).

Fin Whale

Eastern North Pacific fin whales may occur infrequently near Akutan Island in spring when en route to northern feeding grounds in the Chukchi Sea. They feed on a wide variety of species including squid, krill, and other zooplankton and schooling fishes such as capelin, sand lance, and herring. The eastern North Pacific population of fin whales was estimated between 8,500 and 16,000 animals (Zimmerman 1996).

Humpback Whale

Humpback whales occur infrequently inside Akutan Harbor, especially when large schools of baitfish (e.g., herring) are present. Large schools of baitfish are present in Akutan Harbor during the summer when they are preying on sandlance (Byrd 2001). During the summer, they inhabit coastal waters from southern California through the Gulf of Alaska to the Southern Chukchi Sea. In Alaska, they feed primarily on krill and small fish. The North Pacific population is estimated to be between 1,000 and 1,200 (Faris 1996).

Short-tailed albatross

The short-tailed albatross (*Phoebastria albatrus*) is endangered throughout its range except in the United States. It is a very large seabird with long, narrow wings adapted for soaring low over the ocean. Historically, millions of short-tailed albatrosses bred in the western North Pacific on several islands south of the main islands of Japan. During the late 1800s and 1900s, feather hunters killed an estimated five million short-tailed albatrosses, stopping only when the birds were nearly extinct. Only two breeding colonies remain active today. The world population is currently estimated to be about 1,200 birds. Contemporary threats include entanglement in fishing gear, ingestion of plastic debris, and contamination from oil spills.

American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) was delisted from endangered status on 25 August 1999. American peregrine falcon populations are being monitored for 5 years following de-listing in accord with the Endangered Species Act. It may be present in the project vicinity during migration; however, their occurrence in the area is probably irregular and transitory.

Aleutian Canada Goose

The introduction of foxes on nesting islands of the Aleutian Canada goose (*Branta canadensis leucopareia*) led to the species being reduced to nesting on two islands in the Aleutian Islands. Due to years of effort devoted to removing arctic foxes from former nesting islands and reintroducing the geese, the formerly endangered species was delisted in March 2001.

The Aleutian Canada goose may pass through Akutan during migrations to and from wintering areas in California and Oregon. Hunting of Canada geese west of Unimak Pass has been closed since 1973. Use of the Akutan vicinity by Canada geese is unknown. No Canada geese were observed during bird surveys conducted between 1998-2001 (USFWS files), however Herter (1990) conducted limited bird surveys and reported that emperor geese use nearshore habitats of the Krenitzin Island group in the non-breeding season.

Fish and Invertebrate Resources

Methods

We attempted to describe the marine resources of three proposed alternative sites (Fig. 2) by completing a variety of surveys including dive surveys, pot-trapping, and beach seining. We supplemented our direct observations with scientific literature, reports, files, and reliable local informants, where appropriate.

The Service completed dive surveys at potential harbor sites in June 2000. Two transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S,1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+). Scientific and common names to marine organisms are included in the appendices for each set of dive transects. Common names are often used in the report for clarity.

Biotic data was also recorded along the transect using a camcorder in an underwater housing. The data sheets were supplemented by replaying the videotape and noting the occurrence of plants/animals the observer may not have detected. The same observer was used to record data for the alternative harbor sites.

We also attempted to capture benthic invertebrates using "hair-crab" pots placed in water about 50-feet deep for two days during the dive surveys. The pot mesh was approximately 3-inch (stretched). We baited the pots with three herring and soaked them near where the dive transects were to be completed. Representative specimens captured were photographed.

Fish were surveyed using a 30 meter-long beach seine with a fine mesh net at the cod-end. This net was deployed from shore using a small inflatable skiff and retrieved by two people on shore, with the cod end coming ashore last. Fish were counted according to species and returned. Sub-samples of the catches were measured. A full description of these activities is described in Robards and Schroeder (2000).

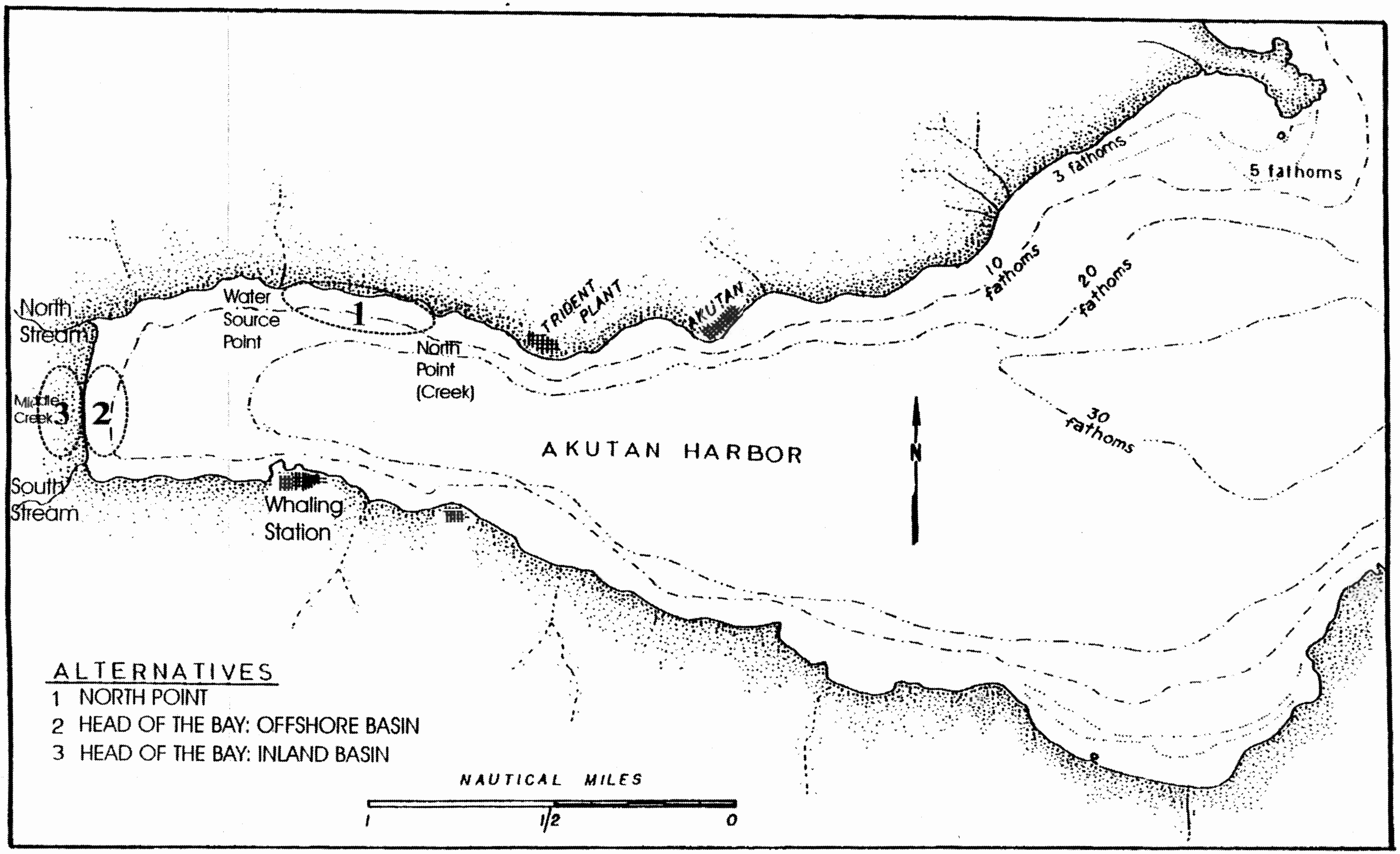


Figure 2: Alternative locations for a mooring basin within Akutan Harbor, Akutan Island, Alaska (adapted from Crayton 1983).

Alternative Site 1: North Point

Akutan Harbor was formed by glacial scouring, creating a U-shaped valley that was later flooded by the sea. There are a few minor promontories jutting out from the shoreline, one we refer to as North Point (Figures 2 and 3).

Dive Surveys

North Point: One marine transect was completed from North Point in June 2000 (Fig. 3). The divers ventured to approximately 19 m (60ft) in depth before losing natural light. The intertidal substrate was characterized by cobble and pebbles, changing to granule and sand sized particles further from shore (Appendix 1). The slope was gradual until about 60 m from shore then it dropped off rapidly.

Ulva and *Alaria* dominate the algae community in the intertidal and subtidal zones, with lesser amounts of *Palmeria* and *Laminaria*. Filamentous green algae (*Enteromorpha intestinalis*) was conspicuously abundant in the subtidal zone, down to about 20ft deep. Intertidal and subtidal animals included blue mussels, limpets, barnacles, periwinkles, with hermit crabs and other snails more common in deeper areas. Butter clams were abundant along the transect between 30m and 90m from shore; other clam species were also observed. An abundance of predatory starfish (*Pycnopodia* and *Evasterias*) were also found associated with the clam bed. Adult and juvenile rock sole were the most abundant fish species observed along the entire transect.

Anecdotal observations made from an elevated point above the North Point site noted two sea otters feeding on clams at the site. The otters had no difficulty locating clams, returning to the surface to eat the clam before diving to find another. This behavior was observed for over 20 minutes before the biologist had to leave the overlook. These observations indicated that shellfish are abundant at the site.

Water Source Point Transect: Water Source Point is approximately midway between North Point and the north stream at the head of the bay (Figure 3). The intertidal substrates are cobble and boulders, but change to a combination of sand and boulders further offshore (Appendix 1). At 50 m from shore, the boulders become fewer and are replaced with a substrate of sand and large granules. The bathymetry of the site was shallower than the North Point site, reaching a maximum depth of about 11 ft at 100 m from shore.

Ulva and *Alaria* dominated the algal community, with lesser amounts of *Desmarestia*, *Costaria*, and *Porphyra* in deeper areas. Patches of *Lamanaria* were attached to some larger boulders at stations 6,7, and 9. As with the North Point site, intertidal animals included blue mussels, barnacles, and periwinkle snails. Hermit crabs and other snails were also recorded. Occasional boulders provided protection for some large anemones, such as *Telia* and provided anchor sites for *Metridium*.

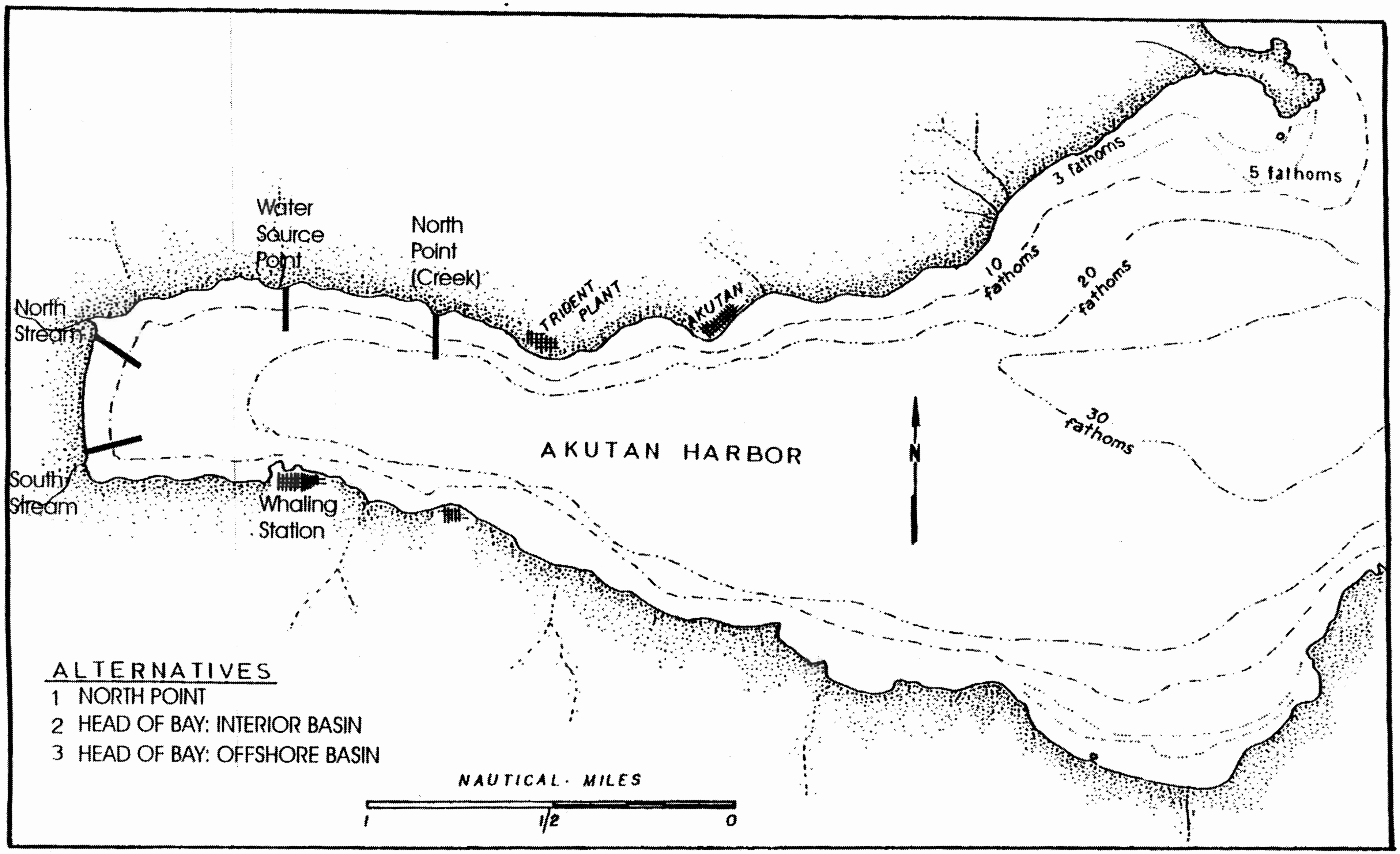


Figure 3: Dive survey transect locations within Akutan Harbor, Akutan Island, Alaska, June 2000 (adapted from Crayton 1983).

A substantial clam bed, consisting primarily of *Saxidomus giganteus* and *Clinocardium nutalli*, was found between 40 m and 90 m from shore in waters 6-9 ft deep. *Pycnopodia* and *Evasterias* seastars were common in and around the clam bed. Rock sole and various sculpins were common along the transect, with many juvenile rock sole found in the upper subtidal zone.

Crab Pot Surveys

Two "hair-crab" pots were placed offshore of the North Point site in June 2000. One pot was lost. Another pot set 0.3 km further west in similar habitat captured a large sunstar (*Pycnopodia helianthoides*).

The site is within the distribution of red king crab and dungeness crab (Resource Analysts 1990, ADFG 1985). Tanner crab (*Chionoecetes bairdi*) are reported to occur in nearby Akutan Bay. All of these crabs are within a reported commercial harvest area (Resource Analysts 1990, ADFG 1985).

Fish Surveys

We attempted to use beach seines to determine the composition of the nearshore fish community at this site. The shoreline is studded with large bounders that snagged and tore the net. One person constantly freed the net from these boulders and it is believed that captured fish had ample opportunity to escape. One haul was made at this site. A total of 53 fish was captured: 29 Dolly Varden, 3 juvenile (pink?) salmon, 4 greenlings, 1 sculpin, 14 rock sole, and 6 starry flounder. One unidentified juvenile non-salmonid fish and two saffron cod were also captured. Saffron cod were unexpected, but two others were captured in similar habitat approximately 0.3 km west of North Point at a site called Water Source Point. Silver-spotted sculpins and sandlance were also captured at Water Source Point. Although the catch-per-unit-effort was not large, a large number of species was captured in this type of habitat. We believed more fish would have been captured, had the net not continually snagged on rocks and boulders.

One juvenile pink salmon was captured near this site in March 2000, one of few fish captured during beach seining in the late winter.

The site is within a known herring feeding area (Resource Analysts 1990) and huge schools of herring have been observed in Akutan Harbor in mid-summer (Schroeder, USFWS files). ADFG (1984) reported that herring spawn along the entire shoreline of Akutan Harbor.

Alternative Site 2: Head of the Bay – Offshore Basin

Dive Surveys

Two marine transects (Fig. 3) were completed in June 2000 off the freshwater streams at the north and south sides of the head of the bay (Fig. 2). The substrates from the beach edge and seaward 100 meters for both transects were classified during dive surveys. Descriptions for the

June 2000 transects were combined into Appendix 2. The substrates for the two transects were primarily sand and larger granules (Appendix 2).

The intertidal zone occupied a narrow band along the steep-sloped profile; however, unlike the other dive sites, there is a relatively flat sublittoral bench located between 6 and 12 ft in depth. The intertidal zone, extending seaward up to 30 meters, was dominated by sea lettuce (*Ulva*) and *Alaria* with smaller patches of filamentous green algae (*Enteromorpha intestinalis*), red laver (*Porphyra pseudolinearis*) and other brown and red algae. Small clumps of rockweed (*Fucus gardneri*) attached to occasional rocks or debris. Small snails and barnacles were attached to occasional rocks. Blue mussels also used their byssal threads to attach to a cluster of small rocks to anchor themselves in the substrate. Hermit crabs, amphipods, and some sea stars were also common. Past the subtidal zone and down to about minus 10 ft, the algae community did not change appreciably, but there were noticeable concentrations of butter clams and their primary predator, sunstars. The number of rock sole and sculpins along this transect was impressive, but not all of the sculpins could be identified without collecting them.

The south creek dive had a different profile in that it encountered the shelf break approximately 55 m from shore. *Metridium* and a few other anemone species were encountered past the shelf break in deeper water where they attached to the occasional large butter clam shell or piece of debris. The silts were encountered mid-slope (at about 55 ft) on the south creek dive, approximately 85 m from shore. (Soft black silts were not encountered on the north creek dive as the transect never went below minus 8 ft.) Although organisms were observed beyond this point, there was a noticeable change in their abundance. Dense concentrations of the spinoid polychaete worm (*Boccardia spp.*) became more common.

Crayton (1983) describes the marine environment at the head of the bay. He described the beach environment in the early 1980s as being extremely polluted, being heavily laden with oil or diesel fuel. This contamination was imbedded in the sands along the beach. Dive surveys and beach seines were used to assess the biotic community, especially fish. Crayton states, "At depths greater than 10 feet, the substrate become(s) extremely silty. Very few organisms were seen below 30 feet."

Large quantities of seafood waste discharges and petroleum product spills appear to have impacted Akutan Harbor, especially the head of the bay where there is poor circulation. The impacts to water quality likely impacted the head of the bay and lowered its biological productivity, especially in the vicinity of the seafood waste discharge sites. These were the conditions that Crayton described in his previous survey reports.

The general biological productivity and diversity of the head of the bay now appears to have improved significantly since the early 1980s. The black silty substrates described by Crayton have migrated further offshore into deeper water. Marine organisms are abundant up to and briefly past the new boundary with what appear to be anoxic seafood waste deposits. The dense concentrations of the spinoid polychaete worm (*Boccardia spp*) indicated that the site remains disturbed, but that new organic material (their preferred food source) is readily available. We surmise that continual organic input from the Trident seafood plant likely keeps this system at *status quo*, the available biological oxygen being used to decompose the continual waste input rather than being available to aid in the decomposition of historic waste piles that remain on the Akutan Harbor seafloor.

Comparisons between dive sites: The marine topography was different between the two sites based on dive profiles (Fig. 4). This may account for some of the differences in species found between the sites. Similarly, the substrates of the two sites were not the same and would have influenced the distribution and abundance of certain organisms, especially those requiring firm attachment surfaces. Some differences in species abundance between the two sites appeared to be related to local circulation patterns and water quality.

Despite having generally poor large-scale circulation patterns, the marine habitats of the two alternative sites appeared to be biologically productive and the intertidal and nearshore subtidal zones have a greater marine species diversity than similar sites surveyed in industrial portions of nearby Dutch Harbor. Habitats at the head of the bay appear to have improved somewhat from their seriously degraded state observed in the mid-1980s.

Crab Pot Surveys

Two "hair-crab" pots were placed offshore of the northern and southern freshwater streams. The northern pot captured a large sunstar (*Pycnopodia helianthoides*) and the southern pot captured 3 sunstars and a large helmet crab (*Telmessus cheiragonus*).

The site is within the distribution of red king crab and dungeness crab (Resource Analysts 1990, ADFG 1985). Tanner crab (*Chionoecetes bairdi*) area reported to occur in nearby Akutan Bay. All of these crabs are within a reported commercial harvest area (Resource Analysts 1990, ADFG 1985).

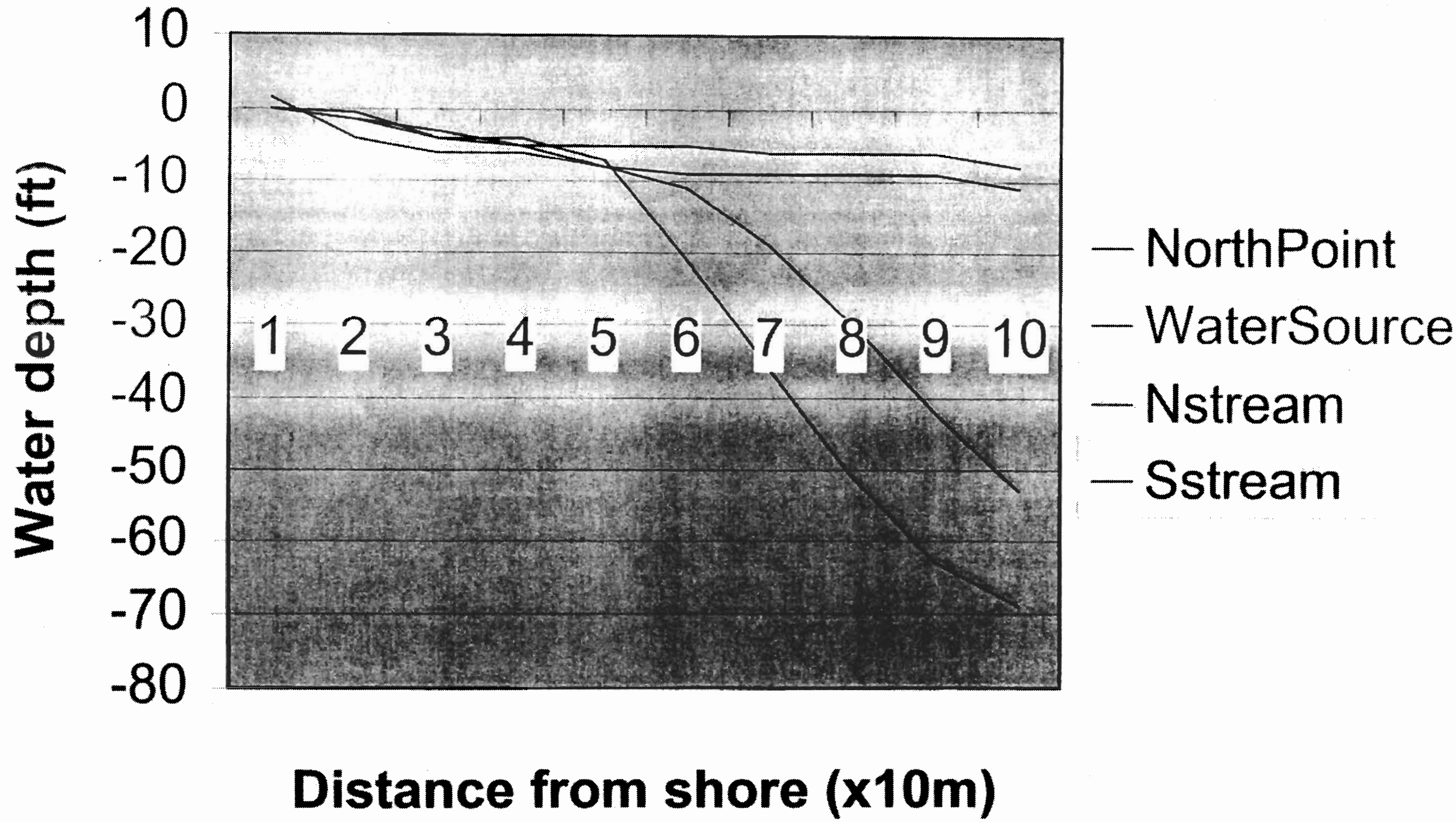
Fish Surveys

Beach seines were used to determine the composition of the nearshore fish community across the head of the Bay. Four hauls were made in March 2000 to assess winter fisheries. Two rock soles were captured on March 15, 2000. No salmon smolts were captured.

The same four sites were sampled on June 8, 2000. One hundred eighty-seven fish representing at least 10 species were captured. Rock sole (n=121) and Dolly Varden (n=38) dominated the catch, with smaller numbers of silver-spotted, northern, and great sculpins, starry flounder, Pacific cod, kelp greenling, crescent gunnel, and saffron cod. Four of these species are typically important to local subsistence users and the commercial fishing industry. No Dolly Varden or juvenile cod were observed during dive surveys completed later that same month.

The large numbers of rock sole and Dolly Varden indicated those fish were likely present to take advantage of young salmon leaving the streams at the head of the bay. No juvenile salmon,

Figure 4: Akutan Dive Profiles, June 2000



however, were captured at the head of the bay in June 2000. The absence of young salmon in our beach seines indicated that the juvenile salmon were well on their way out to the open ocean and/or were heavily preyed upon by the abundant predator population. Large numbers (often thousands) of juvenile salmon were captured per haul in seine sets made near the Pot Dock, the Whaling Station dock, and off the gravel beach near the southern entrance to Akutan Harbor (Robards and Schroeder 2000) supporting the conclusion that the young salmon were well on their way to the open ocean.

LGL 2000 reported capturing four recently emerged pink salmon fry in May 2000 in the northern stream. This led the authors to conclude that the outmigration of pink salmon was later than normal. In contrast, our surveys found a juvenile pink salmon smolt midway along the northern shoreline in March 2000.

Three beach seines conducted in July 1983 near the head of the bay collected the second highest number of fish species of four sites sampled in Akutan Harbor (Crayton 1983). Pink salmon and sandlance were the most abundant fish species present, with coho salmon, silver-spotted sculpin and Pacific tomcod (*Microgadus proximus*) also being captured in large numbers. Flatfishes were also caught. The coho salmon were captured near the southern-most beach segment. .

The site is within a known herring feeding area (Resource Analysts 1990) and huge schools of herring have been observed in Akutan Harbor in mid-summer (Schroeder 2000). ADFG (1984) reported that herring spawn along the entire shoreline of Akutan Harbor.

Alternative Site 3: Head of the Bay – Inland Basin

The Head of the Bay – Inland Basin ("Inland Basin") alternative moves the mooring basin and maneuvering area out of the marine environment and into a wetland complex located behind a large vegetated berm at the head of the bay. A portion of the berm would be breached for the construction of an entrance channel to the mooring basin.

Dive and Crab Pot Surveys

The nearshore and offshore marine environment would be identical to that previously described in the Offshore Basin alternative.

Fish Surveys

The marine fisheries were previously described under the previous Offshore Basin alternative. As the majority of the proposed harbor at this site would be created from the dredging of a large wetland complex, impacts to freshwater fisheries needed to be evaluated.

There are three streams that flow through the Inland Basin alternative vicinity (Fig. 2). In order of significance, these are:

North Stream: As many as 15,000 pink salmon (LGL 2000a) and tens of coho salmon have been observed spawning in this stream. Dolly Varden also occur in the entire system. Two adult chum salmon were observed in late September 2000 (ibid.). The coho salmon escapement in the north stream is reported to be about 1000 adults (ibid.).

South Stream: As many as 1,500 pink salmon (LGL 2000a), and lesser numbers of coho and Dolly Varden spawn or are resident in the south stream (Schroeder 1999, LGL 2000a). Three-spine sticklebacks also occur in the lower reaches or isolated lakes and ponds within the watershed (Schroeder 1999, LGL 2000a).

Middle Creek (Central Stream): This watershed supports Dolly Varden and large numbers of three-spine stickleback (Schroeder 1999, LGL 2000a). Juvenile coho rear in a small section of creek between a waterfall barrier and Akutan Harbor (LGL 2000a).

Many local residents subsist on salmon. Most salmon are sockeyes harvested with nets operated from shore or accessed nearby using skiffs. Some harvest of pink and coho salmon with gill nets occurs at the north and south streams at the head of the bay, but reliable harvest information is not available. One set in 2000 was reported to have captured 23 coho salmon at the entrance to the north stream (LGL 2000a). Subsistence harvest reports are not required for Akutan residents.

Avian Resources:

Bald eagles are frequently observed in the project area, especially during later summer salmon runs at the head of the bay. One pair of eagles reportedly nests near Akutan Point (Crayton 1983); no other eagle nests have been documented to occur within the project area, but a nest is reported on a rock outcropping about mid-way up the northern side of Akutan Harbor. The relationship of this unverified nest and the proposed road alignment has not been determined.

Bald eagles are frequently observed in the Akutan Harbor area, but no nests within the immediate vicinity of the three alternative sites were observed. One bald eagle nest is documented to occur at Akutan Point, a potential harbor site no longer under consideration.

Emperor geese are reported to occur in the Akutan Island vicinity and suitable nearshore habitat exists. Dedicated winter seabird surveys and other non-systematic surveys made during the summer have not documented the presence of emperor geese within Akutan Harbor (Schroeder 1999, 2000, 2001). For the purposes of this report we conclude that the use of the three alternative sites are not important to emperor geese.

Dedicated winter seabird surveys were completed in March 1999 (Schroeder 1999), January-March 2000 (LGL 2000b) and January-February 2001 (Schroeder 2001).

March 1999

Service biologists recorded between 87 and 358 Steller's eiders in the western half of Akutan Harbor in March 1999 during shore-based surveys (Schroeder 1999). The largest flocks were concentrated near the entrance to the south stream at the head of the bay and in smaller flocks along the southern shoreline, especially near small bays at the Whaling Station and the Pot Dock. Flocks of Steller's eiders and other seabirds used nearshore waters between Salthouse Cove and the eastern edge of the city of Akutan.

January-March 2000

Skiff-based seabird surveys completed in January 2000 by LGL and Service biologists found an average of 455 Steller's within Akutan Harbor (LGL 2000b). Total numbers of Steller's eiders within Akutan Harbor were 453, 451, and 461 on 23, 24, and 25 January 2000, respectively. One-hundred forty-seven (34%) of 439 Steller's identified to sex were male.

Seaducks were the most abundant group of birds observed (nearly 70% of all birds observed). Of the seaducks, Steller's eiders were the most abundant, followed by harlequin ducks and white-winged or black scoters. The LGL report concluded that eiders were consistently found in the southeast corner of Akutan Harbor and along the south side of the Harbor between a point directly across the Harbor from Akutan and west to the south stream. As many as 125 Steller's eiders frequented nearshore areas immediately off the community in the mornings and evenings. Use of the North Point site was low-moderate. Eider flocks appeared to move within the harbor depending on weather patterns. In general, flock size decreased and flushing distance increased during the boat surveys.

The same surveys were repeated during February and March 2000 (LGL 2000b). Total numbers of Steller's eiders within Akutan Harbor were 321, 336, and 252 on 16, 18, and 19 February 2000, respectively. Distribution patterns during the February survey were similar to those of the January 2000 survey. Additional observations were reported of eiders using nearshore waters at Water Source Point and the shoreline east of the city of Akutan.

Steller's eider numbers in Akutan Harbor were substantially lower during the March 2000 survey. One flock of 35 eiders was observed near North Point with a few other pairs and individuals scattered around the Harbor. A total of 48 Steller's eiders were seen along the northern shoreline, including nine eiders that were observed at the head of the bay, during a hike from the Trident seafood plant to the north stream at the head of the bay on March 19, 2000.

January - February 2001

Similar abundance and distribution patterns were observed during additional skiff- and shore-based surveys completed by a Service biologist in January and February 2001 (Schroeder 2001). A minimum of 252 Steller's eiders were observed in the western half of Akutan Harbor on 22

January 2001. Poor weather conditions hampered a more complete count of the entire area during January 2001.

Shore-based counts in mid-February 2001 found a minimum count of 199 Steller's eiders within the western half of Akutan Harbor. Eiders again were most often found in the southwest corner of Akutan Harbor, along the southern shoreline from its midpoint west, and off the community of Akutan/Salthouse Cove in the morning and evenings.

A skiff-based survey (using the same methodology as the 2000 surveys) was conducted on 18 February 2001. A total of 262 Steller's eiders was counted within Akutan Harbor. Eighty percent of all the Steller's eiders observed were found in Sector 4, the sector along the south side of Akutan Harbor that includes the south stream. This number is within the range of Steller's eider counts obtained during February 2000, indicating that eider numbers were comparable to the previous year.

Terrestrial and Marine Mammals

Terrestrial Mammals

Red foxes appear native to Akutan Island (Bailey 1993). No other native mammals are known to exist. Rats have become established at the Trident Seafood processing facility and within the community of Akutan (Schroeder, pers. obs.). Baits that were set around the south side of Akutan Harbor in June 2000 were undisturbed except for one bait that appeared chewed on by a rodent or shrew at the Whaling Station. This bait was sent to the Alaska Maritime NWR for evaluation.

Sea Otters

Sea otter numbers in the eastern Aleutian islands have declined by more than 50 percent in some portions of the Aleutian Islands. On November 9, 2000, the northern sea otter (*Enhydra lutris*) was listed as a candidate species for listing under the Endangered Species Act. Population surveys and other research aimed at identifying the cause of the decline are currently underway.

Sea otters (*Enhydra lutra*) feed on benthic invertebrates such as bivalves, sea urchins, and crabs. The abundance of macroalgae, clams, and sea urchins within some areas of Akutan Harbor indicated sea otters are not exerting appreciable predatory effect on sea urchin populations (Schroeder 2000, Estes et al. 1983), however it also appears that sea otters are now becoming more abundant in the area during the winter (Schroeder 2001). Sea otters periodically make intensive use of certain nearshore areas, feeding at a site until suitable prey organisms are below an efficient foraging threshold.

In the absence of sea otter predation, the size and density of clams and other invertebrates increases. For areas of high-density sea otter populations, coastal habitats of less than 30 m in depth should be considered to be of critical importance since most reproductive activity, rearing of young, and foraging occurs in these areas (DeGange et al. 1990).

The most recent dedicated survey of sea otters around Akutan Island was completed in 2000 (Doroff et al., in prep.) when biologists counted 20 sea otters, for a corrected estimate of 72 sea otters. An aerial survey completed in April 1992 counted 58 sea otters for a corrected estimate of 138 (Evans 1997). Using the two most recent survey estimates for Akutan Island, the estimated number of sea otters around Akutan Island has dropped by nearly 50%.

Sea otters appear to make use of the alternative harbor locations, but these use patterns may be dynamic. Surveys conducted January - March 2000 found a maximum of four sea otters within Akutan Harbor (LGL 2000b). The North Point site appeared to be actively used for feeding during January 2001 (Schroeder 2001). The largest concentration of sea otters (n = 29) was observed during the 2001 winter bird surveys, along the northwestern shoreline of Akutan Harbor. Most were near the north stream at the head of the Bay.

Dive surveys indicate there are areas within Akutan Harbor that would be considered productive foraging sites for sea otters. If sea otters from other areas (such as from the outside of Akutan Harbor) move in search of productive foraging areas, they would likely find an abundance of preferred foods in Akutan Harbor. Anecdotal observations indicate this may already be occurring.

Harbor Seals

Harbor seals (*Phoca vitulina*) generally require certain traditional beaches and offshore rocks for resting and pupping areas. Land areas where pups are born are particularly important to the welfare of harbor seals and disturbance of these areas should be avoided, especially during the first three weeks of June. Harbor seal observations made in Akutan Harbor indicate that females give birth on a secluded beach and leave the pup there while returning to the ocean to feed. The Service has documented seals leaving pups on the north and south beaches of Akutan Harbor in June. Harbor seals are observed in low numbers ($n \leq 4$) in nearshore waters of Akutan Harbor during most times of the year (Schroeder 1999, LGL 2000b, Schroeder 2001).

Harbor Porpoises

Harbor porpoises (*Phocoena phocoena*) may occur in low numbers in Akutan Harbor (Reeves et al. 1985), but no porpoises were observed during any of the winter seabird surveys or summer fisheries work reported on in this report (Schroeder 1998, 1999, LGL 2000b, Schroeder 2001).

Killer Whales

Killer whales (*Orcinus orca*) occasionally venture into Akutan Harbor (D. Pelkey, pers. comm.). No killer whales were observed by Service biologists within Akutan Harbor, but they would be expected to occur there in pursuit of salmon or marine mammal prey. Killer whale pods were observed in Akutan Pass and Unalaska Bay (Schroeder 2000, 2001).

Subsistence Resources

The population of Akutan is small (70-100 people) and many residents rely or subsist on foods harvested from the local area. The Service has an affirmative responsibility to protect subsistence resources and harvest opportunity. Specific documentation of subsistence uses for the alternative sites has been difficult to obtain.

The primary use of local resources can be broadly broken into the following two groups; 1) marine mammals and birds, and 2) fish and marine invertebrates.

Subsistence use of marine mammals and birds

Harbor seals are believed to be an important component in the annual marine mammal harvest at Akutan, providing meat to a number of Aleut families. As sea lions have declined, harbor seals have likely become the most utilized marine mammal in the area for subsistence purposes. As many as four harbor seals at a time have been documented to occur regularly within Akutan Harbor (Schroeder 1999, LGL 2000b, Schroeder 2001). Seal hunting is typically conducted by boat.

Presently, sea otters are allowed to be taken by local Native hunters for subsistence purposes although Veltre and Veltre (1982) indicated that the sea otter was protected from harvest since 1911 (and may not have been harvested up to 1981). Historically, sea otters were a highly prized animal, but are not reported to be utilized by Native hunters in the Akutan vicinity now. Sea otter numbers in the Aleutian Islands have declined dramatically in recent years and there is concern that the population will continue to decline.

Bird hunting for mallard, green-winged teal, scaup, goldeneyes, harlequin ducks was reported to occur during the fall and winter months. These birds were generally found near protected areas at the head of Akutan Harbor. These birds can be found in varying degrees of abundance at each of the alternative harbor sites, primarily near small coves where small streams enter the Harbor. Service biologists have observed locals actively harvesting harlequin ducks, one of the most abundant species present during the winter. Mallards and teal are less common, but are preferred and actively sought. Contemporary subsistence use patterns for these species are difficult to obtain, but any project that would decrease the abundance or distribution of these species would likely have a corresponding impact on subsistence harvest opportunity.

Subsistence use of fish and marine invertebrates

Veltre and Veltre (1982) reported that a number of fish and marine invertebrate species were used by the residents of nearby Unalaska for subsistence purposes. These included halibut, cod, salmon, Dolly Varden, and (occasionally) greenling (pogy), sea bass (rock fish), pollock, and flounder (soles). All but the salmon and Dolly Varden are typically harvested either in open waters away from the alternative harbor sites or are not specifically targeted where they do occur in the proposed harbor alternative locations. Rock fish are captured by hook and line off the docks at the Trident plant and the Akutan city dock.

Veltre and Veltre (1982) reported that salmon were the most important subsistence resource in nearby Unalaska when they prepared their report in 1982. They stated that because virtually all the community was included in a network of sharing of salmon, every family in Unalaska used salmon. We speculate that the same may be true for Akutan. Local residents use gill nets to harvest pink, coho, and sockeye salmon in Akutan Harbor. Subsistence salmon fishing remains very important to many Aleutian Islands communities (Shaul and Dinnocenzo 2000), including Akutan.

Service biologists have observed local residents harvesting (what were assumed to be) blue mussels from nearshore boulders during low tides during the summer. Locals are reported to have historically harvested urchins and clams within Akutan Harbor, but do not seem to harvest them as much in recent times. Similarly, king and tanner crab numbers have declined, and although harvested in the past, their low numbers do not appear to make crabbing worth the effort. Juvenile king crab were observed off the community of Akutan and tanner crabs were observed at 100 ft depth immediately offshore of the Whaling Station.

SIGNIFICANT RESOURCES LIKELY TO BE AFFECTED BY THE PROJECT

Some organisms tend to be less tolerant of activities than others. For example, early life stages of aquatic organisms are the most susceptible to heavy metals and pollutants in general but many chemical, physical and seasonal factors influence this toxicity. Although there may be an increase in the local contaminant load, as long as proper storage, handling, and disposal procedures are maintained for toxic substances and good circulation is maintained in the harbor, it is unlikely that contaminant concentrations would be lethal to or would significantly affect fish and wildlife resources. In the absence of these controls, however, there are a variety of effects that harbors have on significant fish and wildlife species.

The primary impacts that a harbor in Akutan Harbor would have include:

- Introduction of petroleum compounds and other hazardous materials into marine waters from vessels (Water Quality Issues);
- Direct loss of marine habitats from breakwaters and other nearshore structures or modifications (In-water Structures);
- Impacts to nearshore fish movement or increased access to fish predators (Road Access and In-water Structures);
- Habitat modifications from dredging (Dredging Issues);

- ♦ Displacement or harm to fish or wildlife from harbor sites due to floating or other structures or disturbing human activities (Displacement Issues); and
- ♦ Inducement of associated developments near the harbor site that will increase these impacts cumulatively over a larger area in the future (Cumulative Effects).

These issues are discussed by fish and wildlife resource group below.

Harbor effects on seaducks

Direct effects

Seabird mortality caused by large spills from tankers or barges usually attracts public attention and official investigation, but the cumulative mortality of seabirds from small, unreported spills may often be higher (Camphuysen 1989, as cited in Burger and Fry 1993). Beached bird surveys have demonstrated that small-volume, chronic oil pollution is an ongoing source of mortality in coastal regions (Burger and Fry 1993). Small volumes of oil may be released from leaking tanks and valves, accidents during loading and off-loading, flushing of tanks and bilges, etc.

Direct effects include impacts from chronic petroleum pollution, displacement by in-water structures, and disturbing activities associated with harbors.

Chronic petroleum pollution impacts to seaducks

Oil causes marked loss of insulation, waterproofing, and buoyancy in the plumage. In addition, petroleum oils contain many toxic compounds which can have fatal or debilitating effects on birds (Burger and Fry 1993).

Petroleum can be ingested through feather preening, drinking, consumption of contaminated food, and inhalation of fumes from evaporating oil. Ingestion of oil is seldom lethal, but it can cause many debilitating sublethal effects that promote mortality from other causes, including starvation, disease and predation. Effects include inflammation and hemorrhaging of the digestive tract, pneumonia, organ damage, red blood cell damage, hormonal imbalance, intoxication, inhibited reproduction, retarded growth in young, and abnormal parental behavior (Albers 1991).

Some oiled birds may tolerate oil pollution during warmer ambient temperatures, but have higher rates of mortality at colder temperatures. Nonspecific stresses had additive negative effects on body condition. Such an inability to handle low temperatures could explain the higher death rates for oiled birds during colder months (Bourne and Bibby 1975). Similarly, some birds exhibit hyperphagia to meet the increased demands of body heat loss. If they are unable to meet these demands due to impairment or environmental stresses, they will die.

Scavenging of oiled carcasses is also a major means of petroleum compounds transfer to other bird species. Oiled gulls, eagles, falcons and other birds have been reported following major spills (Burger and Fry 1993). Stewart et al. (1991) concluded that secondary oiling impacts may be underestimated, because the scavengers often roost away from the beaches and may go undetected when they die. About 90% of the radio-tagged bald eagles (*Haliaeetus leucocephalus*) that died in studies following the Exxon Valdez spill were found in brush, away from the beachfront (Stewart et al. 1991). Eagles are observed throughout Akutan Harbor. Because bald eagles nest in Akutan Harbor, adults could transfer oil or other contaminants to their young through contact with contaminated feathers, feet, food, or nesting materials.

The life history of small seaducks warrants special consideration when evaluating the effects of chronic petroleum pollution. Steller's eiders appear to prefer gently shelving, shallow coastline profiles (Fox and Mitchell 1996). Our observations indicate that they make extensive use of kelp beds and rocky reefs as foraging sites. Steller's eiders in Unalaska and Akutan appeared to seek sheltered areas during strong winds (LGL 2000b, Schroeder 1999, 2001).

Although the impacts of chronic pollution from a harbor at Akutan Harbor could impact a variety of species, the impacts to harlequin ducks and Steller's eiders are of paramount concern, because of the low numbers of their populations nationally and their local abundance in the Aleutian Islands. During the approximately 6 months that eiders are in the Akutan vicinity, they are subject to a wide variety of environmental constraints. Recent studies indicate certain life-history strategies of Steller's eiders, coupled with environmental features in their wintering range, may make them particularly vulnerable to chronic pollution. These include the extreme cold temperatures and winds, day length, their dependence on high quality food, and need to accumulate nutrient stores in preparation for migration and breeding.

There are few controlled experiments regarding Steller's eiders, but there are notable similarities between the life-history strategies used by Steller's eiders and harlequin ducks. In many cases, harlequin ducks can be used as a surrogate species to demonstrate how Steller's eiders would be expected to respond to environmental variables and certain perturbations such as chronic petroleum contamination.

Harlequin ducks have life history characteristics that make them vulnerable to population-level effects of spills for years following a spill event. These include high adult survival, occurrence in habitats most affected by oil spills (and which may hold residual oil indefinitely), adaptation to stable and predictable marine habitats, and high site fidelity (Esler et al. 2000). Chronic, low-level oil pollution would impact harlequin ducks and similar species the same way as would residual oil from a spill.

Goudie and Ankney (1986) described how body size affected the activity budgets and diets of sea ducks (common eiders, black scoters, long-tailed ducks, and harlequin ducks) wintering in Newfoundland. The smaller species, harlequin ducks and long-tailed ducks, had diets with higher energy densities and spent more time feeding than did the larger black scoters and common eiders. The two smaller species had little flexibility in adjusting their activity budgets.

Daylight available for foraging may be particularly limiting. Steller's eiders and harlequin are visual foragers and cannot forage when it is dark. Fischer and Griffin (2000) concluded that harlequin ducks were constrained in the amount of time they must spend feeding during the winter. Behavior of harlequin ducks was the most restricted during midwinter when they spent over 80% of their time feeding in the evening hours. Given the large amount of time spent feeding during midwinter daylight hours, harlequin ducks would not be able to extend their feeding bouts appreciably in the event of scarce food or cold temperatures. Because harlequin ducks have little flexibility for meeting increased energy demands during harsh winter conditions, which could result from either hydrocarbon ingestion or plumage oiling, they may be unable to accommodate the effects of oil spills, even if those spills are relatively small (Esler et al. 2000). As Steller's eiders are intermediate in weight (881 grams, 1.94 lbs) between harlequin ducks (604 grams, 1.33 lbs) and long-tailed duck (917 grams, 2.02 lbs)(Bellrose 1976), it is reasonable to predict that Steller's eiders would be susceptible to the same constraints as harlequin and other small ducks existing in a harsh environment. It follows then, that, like harlequin ducks, Steller's eiders would be especially prone to mortality from chronic petroleum spills (as described by Goudie and Akney 1986).

If seaduck prey resources remained stable, the seabirds could be displaced from an important feeding or resting site by fumes from evaporating oil or other disturbing human activities. Displacing seaducks, especially harlequin ducks or Steller's eiders, could result in increased mortality as they may not have the flexibility to move to another site and locate sufficient high energy foods during limited available light of the winter months to sustain themselves during long periods of darkness and/or inclement weather.

Indirect effects of chronic petroleum pollution:

Birds are predicted to allocate the greatest time in habitats with high food abundance and less in areas of low abundance. Indirect effects of oil pollution on eiders and other birds would be those primarily associated with altering the availability or suitability of various food sources at habitats having high food abundance. These effects are described under Harbor Effects on Benthic Invertebrates below.

Displacement by in-water structures:

Rubble-mound breakwaters, finger floats, and vessel hulls would interfere with use of the harbor site by seaducks. These effects are directly related to the size of the basin and the number of vessels/floats within it.

Disturbing activities associated with harbors:

Harbors are centers of activity that include the operation of machinery, engines, horns, etc. that can displace birds from adjacent areas. Seaducks can be displaced from concentration areas by frequent vessel traffic (i.e., noise, approach, wake). Harbor lighting can also interfere with bird migration and birds can strike antennas, guy wires, or other structures if they are disoriented or confused by bright lights.

Harbor Effects on Juvenile Fish

Fish are exposed to spilled oil through contact with dissolved petroleum compounds or particles of oil dispersed in the water column, ingestion of contaminated food or water, and through contact with surface oil. Juvenile fish are more sensitive to contamination, so mortality beyond the early juvenile stages usually requires a heavy exposure; however, fish species vary in their sensitivities to petroleum. Sublethal effects of oil on fish include changes in heart and respiratory rates, enlarged livers, reduced growth, fin erosion, a variety of biochemical and cellular changes, and behavioral responses (Albers 1991).

The literature suggests that some juvenile fish, salmon in particular, either prefer or become trapped within some harbor configurations (Cardwell and Koons 1981). Juvenile salmon may be "harbor-philic" if they seek the protective cover of the floating breakwaters, finger floats, and vessel hulls. This behavior would bring them into close proximity to sources of petroleum compounds and other contamination from vessels in the harbor, where concentrations of toxic materials would be greatest. These effects are directly related to the design of the harbor, especially the number and types of floats and vessels.

Many juvenile fish prefer nearshore waters to forage and use vegetated shallows for escape cover from predators. Harbors can directly impact these habitats through filling, dredging, breakwater construction, or modifications to circulation patterns that alters the composition of the vegetative community at the harbor site. Such community-level changes could alter the abundance or distribution of juvenile fish prey, primarily zooplankton.

Juvenile fish also migrate along shorelines and could be either blocked by breakwaters or experience increased rates of predation if they are forced to move through deeper waters where predatory fish are more abundant than in shallower nearshore waters. Shelves incorporated into the breakwater design or breaches in breakwaters are ways to allow these fish to move through shallow nearshore waters.

Harbors also have roads and upland fill areas that have the potential to fill wetlands or impact streams, particularly at crossings. Poorly designed, constructed, or maintained structures can become barriers to fish movement into and out of the stream or alter the hydrology such that the stream and their associated wetlands support fewer fish than the natural condition.

Harbor effects on benthic invertebrates

Each of the alternative harbor sites support marine food resources that attract certain wildlife species. Some of the more important food resources for sea otters and sea ducks, for example are molluscs and crustaceans. Mortality and sublethal effects on invertebrates, a significant

component of seabird diets, are caused by: smothering, contact by any life-stage (adults, juveniles, larvae) with dissolved oil or suspended oil particles, ingestion of oil or contaminated food and water, and possibly changes in the water, including oxygen depletion and pH change (Albers 1991). Kasymov and Gasanov (1987) determined that a 0.001 mg/L gasoline concentration tends to reduce the survival rate of crustaceans except crab. A gasoline concentration increased to 0.1 mg/L caused the mass elimination of shrimp and amphipoda. A concentration of 20 mg/L gasoline was absolutely lethal for crabs (Kasymov and Gasanov 1987).
Due to direct loss of habitats from breakwater construction, pollution of the harbor vicinity, and/or changes in circulation patterns, the harbor project would eliminate most shallow feeding area within (and to a lesser extent adjacent to) the harbor and would force wildlife, particularly seaducks and sea otters, to forage elsewhere. If other areas are already at carrying capacity, that is, supporting the maximum number of animals that the prey base can sustain over the long term, then it would result in a reduction in the sea otter and sea duck populations.

Pollution has been implicated as a primary or secondary factor in a number of large-scale perturbations to aquatic populations, including unusual phytoplankton blooms (Sarokin and Schulkin 1992). There have been a number of phytoplankton blooms documented in nearby Unalaska Bay (Tester and Mahoney 1995). These blooms can create an abundance of diatom spicules that irritate gill linings and, in conjunction with depressed dissolved oxygen levels, have resulted in deaths of fish and king crabs in the Aleutian Islands. These events could account for dead tanner crabs found below 100 ft offshore of the Whaling Station in June 2000, however, Akutan residents have reported that crabbers tied to the Whaling Station dock sometimes throw dead crabs overboard. These activities could occur to varying degrees at every harbor and reasonably could be expected to occur at the new harbor if constructed in Akutan Harbor.

FUTURE RESOURCE CONDITIONS WITHOUT THE PROJECT

Without the project, resource conditions would be expected to remain largely as they are today until another project is constructed. We are unaware of any other development proposals in any of the alternative project areas. Consequently, the habitat is likely to remain in its current condition indefinitely.

RESOURCE PROBLEMS, PLANNING OBJECTIVES , AND OPPORTUNITIES

Problems

The potential problems associated with a harbor of this magnitude and scope include pollution, direct loss of marine habitat, vessel disturbances, changes to subsistence use patterns, and could contribute to cumulative impacts if there are secondary or indirect impacts that can be anticiapte to occur following harbor construction.

Harbor Pollution

Construction of the harbor could introduce increased levels of petroleum hydrocarbons and other contaminants into the marine ecosystem through vessel moorings and operation and increased opportunities for petroleum spills and other accidents. These contaminants could directly impact birds, including Steller's eiders, emperor geese, black scoters, harlequin ducks, long-tailed ducks, and the prey organisms and habitats on which they depend.

Similarly, acute spills or chronic pollution could impact fish and crustacean species, including sensitive juvenile stages, that are of importance to subsistence, recreational, and commercial users. These organisms are important components of a larger food web leading to a number of other species, including marine mammals such as sea otters, sea lions , harbor seals, harbor porpoises, etc. that are commonly encountered in Akutan Harbor.

Direct loss of marine habitat

Construction of access roads and rubblemound breakwaters will result in direct impacts to the existing marine habitats through burial, changing substrate, altering current patterns, etc. While some of these breakwaters could be re-colonized by marine organisms, there is little evidence to document to what degree recolonization would occur and how long it could take. The constructed breakwaters would function as marine habitat, but likely at a much reduced level compared to pre-existing habitat.

Roads constructed for harbor access would have vehicle traffic that would displace wildlife. Road crossings could alter streams or result in the filling of important wetlands.

The rubble-mound breakwaters and finger floats and vessels would effectively displace wildlife from foraging in these areas.

AKUTAN
G:\EN-CW\EN-CW-ER\STERLIN\Wayne's mail lists\Akutan.doc
Modified 12 January 2004

JUDITH BITTNER
DEPARTMENT OF NATURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
550 W .7TH AVE SUITE 1310
ANCHORAGE, ALASKA 99501

Tim Rumfelt
Alaska Dept of Environ. Conservation
Division of Environmental Quality
555 Cordova Street
Anchorage, AK 99501-2617

Alaska Dept. of Fish & Game
Habitat Division
333 Raspberry Road
Anchorage, AK 99518-1599

Alaska Dept. of Natural Resources
Div. of Land and Water Mgmt.
Southcentral Region
550 W. 7th Ave., Suite 900
Anchorage, AK 99503-5937

ARLIS
3150 "C' STREET SUITE 100
ANCHORAGE, AK 99503-3916

Alaska Center for the Environment
807 "G" Street Suite 100
Anchorage, AK 99501-2343

Alaska Sierra Club
201 Barrow Street Suite 101
Anchorage, AK 99501

Honorable Frank Murkowski,
Governor of Alaska
P.O. Box 110001
Juneau, AK 99811-0001

Dept of Community & Economic Development
Community and Business Development
P.O. Box 110800
Juneau, AK 99811-0801

Ruth Carter
Alaska Dept. of Transportation and Public Facilities
Pouch 196900
Anchorage, AK 99519-6900

U.S. Environmental Protection Agency
222 W. Seventh Ave. Unit 19
Anchorage, AK 99513-7588

State Director
Bureau of Land Management
222 West Seventh Ave. Unit 13
Anchorage, AK 99513-7599

Honorable Lisa Murkowski
United States Senator
222 W. Seventh Ave., Box 1
Anchorage, AK 99513-7570

Honorable Don Young
United States Representative
222 W. Seventh Avenue, Box 3
Anchorage, AK 99513-7595

Sue McGee
Alaska Dept. of Natural Resources
Office of Project Management & Permit.
550 W .7th Ave Suite 1660
Anchorage, Alaska 99501

The Wilderness Society
430 W. Seventh Ave., #210
Anchorage, AK 99501-3550

Matt Eagleton
Nat'l. Marine Fisheries Service
222 W. Seventh Ave., Box 43
Anchorage, AK 99513-7577

Office of Environ. Proj. Rev.
Department of the Interior
1689 C Street, Room 19
Anchorage, AK 99501-5126

Alaska State Library
ATTN: Documents Section
P.O. Box 110571
Juneau, AK 99811-0571

Mark Schroeder
U.S. Fish & Wildlife Service
Western Alaska Ecological Services
605 West 4th Ave., Room 62
Anchorage, AK 99501-2249

Robert Juettner
Aleutians East Borough
3380 "C" Street Ste 205
Anchorage, AK 99503

Coastal Coordinator
Aleutians East Borough
P.O. Box 349
Sand Point, AK 99661-0349

William Lagen
PO Box 1027
Belleview, WA 98009-1027

Daryl Pelkey, President
Akutan Corporation
PO Box 8
Akutan, AK 99553-0003

Vincent Tutiakoff
Aleut Native Corp
4000 Old Seward Hwy Suite 300
Anchorage, AK 99503-6068

Joe Bereskin, Mayor
City. Akutan Office:
P.O. Box 109
Akutan, AK 99553

National Audubon Society
Alaska State Office
308 G Street Suite 217
Anchorage, AK 99501-2142

Honorable Ted Stevens
United States Senator
222 W Seventh Ave Box 2
Anchorage, AK 99513-7569

Erika Titremmel
City Administrator - Akutan
3380 "C" Street
Anchorage, AK 99503

Department of Community & Economic Development
550 W. 7th Ave Suite 1770
Anchorage, AK 99503-

Mirian Tanaka
Alaska Dept. of Transportation and Public Facilities
Pouch 196900
Anchorage, AK 99519-6900

Zenia Borenin
Akutan Traditional Council
PO Box 89
Akutan, AK 99553

Edward S. Syrjala
PO Box 149
Centerville, WA 02632

Larry Kibby, Program Director
Western Shoshone Historic Preservation Society
Elko Indian Colony
1581 Pine Circle
Elko, Nevada 89801

Marti louther
Parametrix Inc.
5808 Lake Washington Blvd NE, Suite 200
Kirkland, WA. 98033

Bill Wilson
LGL Alaska Research Associates Inc.
1101 E. 76th Ave. Suite B
Anchorage, AK 99518

Joe Dunbar
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

James Wakeley
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Thomas Berry
USCOE-ERD-EE-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Charla Stern
US Fish & Wildlife Service
605 West 4th Ave. Room 62
Anchorage, AK 99501

Ms Linda Cook
National Park Service
2525 Gambell Street
Anchorage AK 99503-2892

Mr. David Kuhlman
US Environmental Protection Agency
1200 Sixth Avenue
Seattle Washington 98101

Mr. John Malek
Environmental Protection Agency
1200 Sixth Avenue Eco-083
Seattle WA 98101-3188

Mr Harold Moeser
State Harbor Engineer
AK Dept Of Trans & Pub Fac
3132 Channel Dr
Juneau AK 99802-5550

Mr Scott Diener
Planning Director
Po Box 610
Unalaska, AK 99685-0610

Ms Karol Kolehmainen
Aleutians West CRSA
PO Box 1074
Palmer AK 99645-0045

Ms Janice L. Krukoff, President
Qawalangin Tribe Of Unalaska
PO Box 921234
Dutch Harbor, AK 99692

Mr Dimitri Philemonof
Aleutian-Priblof Island Association
201 East 3rd Avenue
Anchorage AK 99501-2503

Veda Webb, President
Unalaska/Dutch Harbor
Chamber Of Commerce
PO Box 920833
Dutch Harbor, AK 99692

Mr Richard Davis, President
Ounalaska Corporation
PO Box 149
Unalaska, AK 99685

Dutch Harbor Fisherman
PO Box 920472
Dutch Harbor, Alaska 99692

Ms. Judith Lee
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Alaska Crab Coalition
3901 Leary Way NW Suite 6
Seattle, WA 98107

Trident Seafoods, Inc.
5303 Shilshole Ave.
Seattle, WA 98107

Bureau Of Indian Affairs
PO Box 255200
Juneau AK 99802-5520

Alaska Fisheries Conservation Group
Box 910
Woodinville, WA 98072

John Daley
Tryck Nyman Hayes, Inc.
911 W. 8th Avenue Suite 300
Anchorage, AK 99501

Doug Jones
Coastline Engineering
5900 Lynkerry Circle
Anchorage, AK 99504

Ed Weiss
Alaska Dept. of Natural Resources
Office of Habitat Management & Permit.
550 W .7th Ave Suite 1660
Anchorage, Alaska 99501

FEIS-APPENDIX 2

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND U.S. ARMY CORPS OF ENGINEERS ALASKA DISTRICT RESPONSES

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
ALASKA REGION
P.O. Box 25520
Juneau, Alaska 99802-5520

VIA FACSIMILE **7 November 2002**

Guy R. McConnell
Chief, Environmental Resources Section
Alaska District, U.S. Army Corps of Engineers
P.O. Box 6898
Anchorage, AK 99506-6898

RE: Request for Participation

Dear Mr. McConnell:

1. We received your 22 Oct 2002 Public Meeting and Project Update Notice for Navigation Improvements at Akutan, Alaska, but were unable to participate, although we did review the *Draft Feasibility Report and Draft Environmental Impact Statement for Navigation Improvements, Akutan, Alaska.*

We have concerns with the draft material, which will be submitted under separate cover, however, this letter is a request to be considered as a cooperating agency for this NEPA action. We are especially interested in being involved with Tribal consultation and public scoping. Please correspond with our Branch of Environmental Services regarding this request.

As it becomes available, please send any other pertinent material to the above address, attention Kristin Holzinger, Environmental Scientist. Thank you for your attention to this matter.

Sincerely,
Niles Cesar
Regional Director

Cc: Akutan Traditional Council, Attn : Ms. Zenia Borenin

1. Comments from the Bureau of Indian Affairs (BIA) on the draft Feasibility Report and Environmental Impact Statement were never received by the Corps. The BIA's request to be a cooperating agency was reviewed and after careful consideration and much discussion, it was decided that the scoping for the project had concluded and the report preparation phase had progressed too far for a cooperating agency to be added to the project delivery team. The Corps has and will continue to conduct government-to-government coordination with the Akutan Traditional Council on the Akutan navigation improvements project.

ALEUTIANS EAST BOROUGH

SERVING THE COMMUNITIES OF

KING COVE | SAND POINT | AKUTAN | COLD BAY | FALSE PASS | NELSON LAGOON

November 8, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Ref: Navigation Improvements, Draft Feasibility Report And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell,

As the lead person for the Local Sponsor, I reviewed the above referenced document. The Aleutians East Borough continues to support the development of a boat harbor project in Akutan and is ready to continue into the next phase of work. The reports accurately represent the discussions with agencies, agreed to mitigation proposals and all other facets of the project. I must sound a cautionary note at this point. My comments reflect those of the Aleutians East Borough as the projects local sponsor. They should not be construed to be the comments of the Aleutians East Borough Coastal Management Program.

1. I would like to offer four comments that, I believe, would improve the documents. First, the DEIS should spend additional time explaining why the proposed alternative, the 12 acre basin, is the least environmental damaging proposal. Being aware of the potential NED project, a 20 acre mooring basin, and the unmet need for moorage by fishing vessels operating in the Bering Sea, Aleutian Islands and Gulf of Alaska, it is clear to me that the preferred 12 acre mooring basin is substantial mitigation in and of itself. However, the casual reader will not be aware of this fact. Section 3.4 of the Draft Feasibility Report, DFR, should be expanded as well as section 2.2 of the DEIS and on into section 4.2 of the DEIS.

2. Two, there is only a cursory discussion of the local impacts of this project under section 2.4 of the DFR and 3.3 of the DEIS. The new harbor will be an economic engine that will support the community for many years in the future. Jobs created as a result of the project will *offer* numerous employment opportunities to the local residents. This in turn should help to stimulate growth within the community and alleviate a pressing local problem-declining enrollment in the Akutan School. Within three years, school enrollment will drop substantially, possibly resulting

1. The Corps has expanded its discussion in Section 3.4 of the Feasibility Report and in Section 2.2 of the Final Environmental Impact Statement (FEIS) (including the addition of tables FEIS-2 and FEIS-3) to better describe the reasons why the reconfigured 12-acre basin is the least environmentally damaging proposal. The Corps agrees that the reconfigured 12-acre basin is substantial mitigation in and of itself, and it will be stated as such in FEIS Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures).

2. The information provided has been place in FEIS Section 4.4 (Socio-Economic Resources).

in the closure of the Akutan School. Economic growth following the construction of the harbor will offset this trend.

3. Three, the DEIS should reiterate all of the mitigation measures included in the choice of the 12 acre basin as the preferred alternative. In section 2.2.3.1 of the DEIS, you do not understand the scope of the mitigation because it is not contrasted with the impacts of either 15 or 20 acre mooring basin.

4. Finally, it would be best if the EIS contained a finalized Steller's Eider Biological Opinion. I believe that F&WS would be in a position to finalize this important document in the near future.

Again, the Aleutians East Borough wishes to stress its strong support for the Akutan Boat Harbor and that the DFR and DEIS accurately represent the project and mitigation.

Robert S. Juettner
Administrator

CC: AEBCMP

☐ CLERK/PLANNER	☒ BOROUGH ADMINISTRATOR	☐ FINANCE DIRECT	☐ RESOURCE DEPARTMENT
P.O. BOX 349	8380 C STREET, SUITE 205	P.O. BOX 49	211 4TH STREET, SUTIE 314
SAND POINT, AK 99661	ANCHORAGE, AK 99503-3952	KING COVE, AK 99612	JUNEAU, AK 99801
(907) 383-2699 (907) 383-3496 FAX e-mail: AEBCLERK@aol.com	(907) 274-7555 (907) 276-7569 FAX e-mail: aebanc@gci.net	907) 497-2588 (907) 497-2386 FAX e-mail: aebfinance@aol.com	(907) 586-6655 (907)586-6644 FAX e-mail gmeril@ptialaksa.net

3. The FEIS includes a more thorough discussion of the impacts associated with the 15- and 20-acre mooring basins…see FEIS Sections 2.2.3, 2.3, 2.4, and tables FEIS-2 and FEIS-3. In general, the larger basins would generate more dredged material, unavoidably impact more wetlands, generate more harbor and vessel activities, and potentially impact North Creek, a known anadromous fish stream.

4. The FEIS (Appendix 4) contains the U.S. Fish and Wildlife Service's final Steller's eider biological opinion.

CITY OF AKUTAN

Anchorage Office
3380 C Street, Suite 205
Anchorage, Alaska 99503-3952
Phone (907) 274-7555
Fax (907) 274-1813

AKUTAN

November 11, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Ref Navigation Improvements, Draft Feasibility Report
And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell,

We have reviewed the above referenced document and some of our Council members and residents attended the public hearing in Akutan on November 6, 2002. The community is in full support of this project and we look forward to its realization in the not too distant future.

1. One item we would like to that was brought up during the public hearing process. Although the need for the 20-acre basin has been proved, and the demand exists for the additional moorage, the reasons for abandoning that size project are not very clear in the document. Local residents and boat owners that use Akutan definitely prefer the 20-acre alternative. We are giving up almost half the usable moorage space as mitigation for the impact on the marine and bird life in the area and are leaving a good number of boats still searching for moorage elsewhere.
2. Akutan has been fortunate in having a fairly steady fishery in the region, from whaling to crab to pollock processing. This processing has always been at the whim of one processor or another. The boat harbor will give us stability in keeping those that participate in the fishery nearby, and it will

1. The reconfigured 12-acre mooring basin was chosen as the recommended plan because it balances the needs of the community and the Bering Sea commercial fishing fleet while protecting the environmental resources of the area to the maximum extent practicable. The Corps agrees that choosing the reconfigured 12-acre mooring basin is substantial mitigation (i.e., avoidance and minimization) in and of itself, and it has been stated as such in Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) of the Final Environmental Impact Statement (FEIS) and in Section 3.4 of the Feasibility Report.

give the community a much-welcome boost as well: There will be several year-round local jobs created with the boat harbor. It also means that local residents can better participate in the local fishery. They can finally replace same of their skiffs with boats that are a little larger and better suited for the ocean that surrounds us.

Thank you for the opportunity to comment and to extend our strong support for this project.
Sincerely,

Erika Tritremmel
City Administrator

2. The information provided has been incorporated into the Feasibility Report (Section 4.2.2) and FEIS (Section 4.4, Socio-Economic Resources).

AKUTAN CORPORATION

P.O. BOX 8 AKUTAN, ALASKA 99553 (907) 698-2206 FAX (907) 698-2207

U.S Army Engineer District, Alaska
Attn: CEPOA-EN-CW-ER (McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Akutan Corporation P.O.Box 8
Akutan Alaska 99553

Ref. Navigation Improvements, Draft Feasibility Report
And Environment Impact Statement, Akutan Alaska

Dear Mr. McConnell,

As President of the Akutan Corporation I attended the public hearing for the above referenced project in Akutan on November 6, 2002. The Akutan Corporation and it's shareholders are in full support of this project.

There is a little land in Akutan that can be developed for commercial use. The three parcels of the land that currently support Seafoods processing have always been held in private hands, with no financial benefit coming to the Akutan Corporation. The development of the boat harbor at the head of the bay will enventually bring some trade to the uplands surrounding the boat harbor and thus benefit the Corporation.

We also appreciate that there will be a cleanup of the shoreline between the whaling station and the Trident plant. Years of tidelands use by the state of Alaska have certainly left their mark.

The Corporation also has some interest in exploring tourism ventures. This would require the acquisition of a boat, and the boat harbor would provide the necessary moorage space for such a vessel.

Thank you for the opportunity to comment and extend our strong support for this project.

Sincerely,
Darryl Pelkey-President

Comments noted. The information provided has been incorporated into the Feasibility Report (Section 4.2.2) and Final Environmental Impact Statement (Section 4.4, Socio-Economic Resources).

AKUTAN TRADITIONAL COUNCIL

November 19, 2002

U. S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW F.It (McConnell PO. Box 6898
Mmendorf AFB, Alaska 99506-6898

RE: Navigation Improvements, Draft Feasibility Report And Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell:

Several members of the Akutan Traditional Council attended the public hearing for the above referenced project in Akutan on November 6, 2002. The Akutan Traditional Council is in support of this project.

The most significant way the project will benefit our members is that we will be able to have moorage for larger vessels, This will enable us to have better access to subsistence hunting and fishing in the waters surrounding our village. These larger boats also mean that people will be able to participate in the fishery and not always be at the whim of the weather when they go out in skiffs. We also welcome the year-round jobs the boat harbor will provide for the community, such as harbor workers and road maintenance crews.

Thank you for the opportunity to comment. We strongly support thus project.

Sincerely,

Joe Bereskin
President

P.O. BOX 89 AKUTAX. ALASKA 99593
907-698•2300
907-698-2301

Comments noted. The information provided has been incorporated into the Feasibility Report (Section 4.2.2 and Final Environmental Impact Statement (Section 3.1 Community and People and Section 4.4 Socio-Economic Resources).

Trident TRIDENT SEAFOODS CORPORATION

5303 Shilshole Ave NW, Seattle, WA 98107-4000 • (206) 783-3818 • Fax: (206) 782-7195
Domestic Sales: (206) 783-3474 • Fax: (206) 782-7246
Export Sales: (206) 783-3818 • Fax: (206) 782-7195

November 21, 2002

U.S. Army Engineer District, Alaska
ATTN: CEPOA-EN-CW-ER McConnell)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Re: Navigation Improvements Draft Feasibility Report and Environmental Impact Statement, Akutan, Alaska

Dear Mr. McConnell:

1. I am writing on behalf of Trident Seafoods Corporation to endorse the inland harbor proposal as set forth in the above referenced report. Specifically, Trident Seafoods Corporation extends its support in favor of the boat harbor in Akutan because it offers substantial benefits to the Bering Sea commercial fleet and the city of Akutan.

The Bering Sea commercial fleet currently operates without protected moorage space in Akutan. The fleet is forced to travel to other locations to obtain provisions for fishing and to moor during closed fishing periods. Trident, as one of the largest shore-based fish Pollock, Pacific cod, and halibut commercial fisheries, would benefit substantially by being able to safely and efficiently harbor in Akutan. The inland harbor proposal would provide for transient and permanent moorage in Akutan where none currently exists.

The city of Akutan would also substantially benefit from protective mooring space. Several year-round jobs would be created as a result of the harbor, and

1. Comments noted. The information provided has been incorporated into the Feasibility Report (section 4.2.2) and Final Environmental Impact Statement (FEIS) (Sections 3.1 Community and People, and 4.4 Soci-Economic Resources).

the economic growth would translate into increased school enrollment. All of these factors would serve to diversify the economic base of the city and help ensure its economic stability.

The proposed harbor would also provide private mooring space for privately owned vessels, which would enable local residents to better participate in the local fishery by replacing their skiffs with larger boats. These larger boats would provide safer and easier access to subsistence areas, particularly during inclement weather.

2. It should be noted that Trident, along with the local residents, prefers the 20-acre basin alternative to the 12-acre basin recommendation. The 20-acre basin alternative provides mooring for 79 vessels whereas the 12-acre basin alternative only provides mooring for 57 vessels. Although the Environmental Impact Statement asserts that the 12-acre basin recommendation causes the least environmental damage when compared to the 15- and 20-acre proposals, the report fails to adequately support this conclusion. Moreover, the amount of mitigation required by the recommended plan, which includes sacrificing a considerable amount of moorage space, substantially outweighs the potential impact on the marine and bird life in the area.

Trident appreciates the opportunity to comment on this issue and wants to stress its strong support in favor of the inland harbor project.

Sincerely,

TRIDENT SEAFOODS CORPORATION

Joseph T Plesha
General Counsel

2. The Corps has expanded its discussion of the impacts associated with the 15- and 20-acre mooring basins, and why the reconfigured 12-acre basin is the least environmentally damaging alternative (FEIS Section 2.0 Alternatives and Recommended Plan). The Corps also agrees that the 12-acre basin is substantial mitigation in and of itself, and it is stated as such in FEIS Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) and Section 3.4 of the Feasibility Report.

Crayton, Wayne M POA02

From: Mary Walter [mary Walter@dnr.state.ak.us]

Sent: Wednesday, November 27, 2002 2:46 PM

To: Crayton, Wayne M

Subject: Akutan Harbor Harbor

Comment	Response
1. Wayne, I have a question about the material that will be dredged from state land in Akutan Harbor. What is the beneficial use of the material? Where do you propose to stockpile this material? We have some serious concerns as the State has very limited uplands in this area if any and storing state material on private land becomes a huge problem for us. I understand that DOTPF may have an interest in this material for the airport project. This, however, doesn't solve the problem with stockpiling on private uplands. If the material has a value for commercial purposes, we are obligated to sale it but if it has a value for a public purpose, the state can give the materials to DOTPF.	1. The DNR material (seaward and below MHW) is dredged from the entrance channel. This material will be considered fill for the basin perimeter and the 1- acre uplands for the sponsor's operations (harbormaster office, spill response equipment, etc.). DNR dredged material will not exceed the quantity needed for these fill requirements.
2. Another concern I have is who is applying for the lease for this project? Will it be the city, borough or DOTPF? The applicant needs to apply ASAP so that the process can begin.	2. The Aleutians East Borough (local sponsor) will apply for the State lands required for the project.
3. A survey will also be necessary for the state lands being used for the project. We would like to see the survey completed in the beginning of the prpoject rather than at the end. This will save a significant amount of time for the applicant if the survey is completed in the near future. Surveyors will already be on site, why not take advanage of them and get it done. I can't stress the importance this aspect of the adjudication process. I would highly recommend that you consider this now. Thanks for the opportunity to comment. Mary	3. A survey will be done during the planning, engineering, and design phase. State lands anticipated for project use will be surveyed at the same time. However, minor alignment changes may occur as final project details are developed.

United States Department. of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services Anchorage
605 West 4th Avenue, Room 61
Anchorage, Alaska 99501-2249

WAES(TACORPS\AKUTAN\Almtan DEIS Commerts:wpd)

DEC - 2 2002

Guy McConnell
CEPOA-EN-ER
U.S. Army Engineer District, Alaska P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Dear Mr. McConnell:

Re: Akutan Harbor Feasibility
Report and Draft EIS

We have reviewed the Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) for Navigation Improvements at Akutan, Alaska and have the following comments.

1. Page 3, Section 1.4 Environmental Coordination: We are aware of previous efforts to construct a harbor at Akutan.. We believe it would be helpful to the reader to briefly detail those efforts in this section because it would show how the siting/feasibility process has evolved over time, especially in regards to resource impacts and mitigation. Furthermore, we recommend including a table of specific mitigation measures already or to be implemented for the proposed project.

2. Page 7, Section 2.3.2. Wildlife: There are a few revisions we would suggest to the species list. From our perspective, voles are perhaps suspected, but are unconfirmed on Akutan. We have not observed arctic foxes on Akutan and believe that where sympatric, red foxes exclude arctic foxes. We suggest thrushes be replaced with sparrows as thrushes are uncommon and sparrows occur all year at Akutan.

1. Section 1.4 (Public Involvement and Issues of Concern) in the Final Environmental Impact Statement (FEIS) has been revised to include a reference about previous coordination efforts to construct a harbor at Akutan. Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) in the FEIS has been revised to include a more thorough description of mitigation measures already or to be implemented for the proposed project.

2. Section 3.3.2 (Fish and Wildlife) in the FEIS has been revised to include the submitted information.

3. Section 2.3.3. Freshwater Fish: It would be helpful to have a map that shows the locations of these streams (and other streams such as "Rust" Creek) mentioned throughout the document.	3. The subject streams have been appropriately labeled in the Feasibility Report (FR) and FEIS figures.
4. Section 2.3.4. Threatened and Endangered Species: There are occasional, but unclear references to the Steller's eider being listed as "an endangered species" when the species should be referred to as being listed as Threatened under the Endangered Species Act.	4. The FR and FEIS (Section 3.3.3 Threatened and Endanaged Species) have been corrected to reference the Steller's eider as a threatened species.
5. The Steller sea lion is listed as Endangered and is under the jurisdiction of NMFS. This needs to be addressed in several places where listed species have some significance, such as the bottom of page 31. Sea otters are occasionally described under text describing NMFS jurisdiction or conclusions. Under the Marine Mammal Protection Act, The US Fish and Wildlife Service (Service) has management responsibilities for the sea otter. The western Alaska population of sea otter is a candidate species currently being considered for listing under the Endangered Species Act by the Service.	5. FEIS Section 3.3.3 (Threatened and Endangered Species) has been revises to clearly state that sea otters are managed by the U.S. Fish and Wildlife Service. Test has also been revised to clearly identify the "status" of the species as significant.
6. There are local resident reports of humpback whales entering Akutan Harbor, presumably to forage on large schools of small fish. Huge schools of herring, for example, occur within Akutan Harbor during the summer. We do not suggest the infrequent occurrence of humpback whales would alter any of the findings of the DEIS, but do recommend they be included in the general discussion of threatened and endangered species for completeness.	6. Comments noted. Section 2.3.4 of the Feasibility Report and sections 3.3.2.2 (Terrestrial and Marine Mammals) and 3.3.3 (Threatened and Endangered Species) of the FEIS have been revised to incorporate the provided information.
7. Page 15, Section 3.2.4. Whaling Station: This section includes the first references of the dependence of the harbor project on a future road to be a "pre-existing" condition of the proposed harbor project. We believe it would be important to note that the feasibility of an airport on Akutan is in the preliminary stages of evaluation by the state and that another EIS will be required for that project. We are unaware of an established time-frame for the airport project. The two projects are somewhat inter-dependent, but the extent of the inter-dependence is unclear when it comes to cumulative impacts on physical and natural resources.	7. Comments noted. The Corps is aware that the feasibility of an airport on Akutan is in the preliminary stages of evaluation by the State of Alaska, and that a road to the airport may pass through the Corps' project area at the head of Akutan Harbor. Assuming the road is a "pre-existing condition," the Corps has evaluated in the FEIS what harbor-induced traffic-related impacts might occur.

8. Pages 25-27. Figures 8-10 show the difference in mooring basin size and corresponding dredge spoil piles. From our perspective there needs to be a clear emphasis and intent to minimize encroachment on the North and South Creek watersheds, yet there appears to be little noticeable difference in the footprint of the projects compared to significant differences in their basin sizes. We also propose that the basin could start out smaller and be expanded in the future if necessary and appropriate.

9. Figures 8 (20-acre basin), 9 (15-acre basin), and 10 (12-acre basin) all indicate the relocation of what we believe is Rust Creek. We reiterate that we recommended the reconstruction of this creek be avoided if at all possible and the sections to be reconstructed have the same dimension, pattern, and profile as the section to be impacted.

10. Furthermore, these figures show the airport access road traveling up the North Creek valley in close proximity to Rust Creek. As detailed in the Coordination Act Report, reconstruction of Rust Creek, removal of an existing fish migration barrier, and the establishment of 100-foot stream protection setbacks were mitigative measures recommended as partial mitigation for the 12-acre harbor project design. Larger basin sizes would require large spoil pile storage sites, more conceivable encroachment upon North (and possible South) Creek(s). These potential additional impacts would be very difficult and/or expensive to mitigate.

11. Page 31, 4.0 Description of Tentatively Recommended Plan. We acknowledge that the spoil pile for any of the inland harbor alternatives is of sufficient size to result in wetland impacts. We recommend the Corps emphasize that filling of wetlands, even low-value wetlands, is a secondary alternative to filling existing uplands at the project site. In other words, we would expect that all available upland areas would be covered with spoils first, unless the full extent of the dredge spoil footprint needed is clearly known before any fill is deposited. As presently written the document implies that wetlands would be filled with the dredge spoil while adjacent uplands would not be preferentially used for dredge spoil storage, which would be inconsistent with the Section 404 (b)(1) guidelines.

8. The primary differences between the dredged material stockpiles' footprints are their acreage (between 20 and 29 acres) and top of fill elevation (between ±35 and ±50 feet); see table FEIS-4. The recommended plan minimizes encroachment on the North and South Creeks' watersheds to the maximum extent practicable.

9. The recommended plan (reconfigured 12-acre basin) incorporates a plan to reconstruct Rust Creek to the same dimension, pattern, and profile as the section to be impacted.

10. The subject figures have been revised to exclude any alignment of the airport access road traveling up the North Creek valley. The State of Alaska will determine the road alignment should it be determined that such a road is necessary for the Akutan airport development project.

11. Comments noted. The text (Sections 2.3.2, Dredging Activities and Disposal Alternatives; Section 2.4, Recommended Mitigation Plan and Environmental Protection Measures) has been revised to more clearly state that available upland areas would be covered with spoils first and wetlands second, unless the full extent of the dredged spoil footprint is clearly known before any fill is deposited.

12. DEIS Page 73: We recommend that all waters from the uplands constructed around the harbor be directed into the harbor instead of the adjacent freshwater stream systems. We have no objection to decant water from the spoil piles being directed into the freshwater stream systems provided state water quality standards for turbidity, suspended sediments, and other parameters are met. We continue to recommend that waters normally collected within the Central Creek watershed be redirected as appropriate into the North or South creeks to augment their flows. There is some possibility that these slightly-increased flows would aid in deterring saltwater intrusion into these watersheds. Water quality issues are complicated and we request the Corps coordinate a meeting with the Service/resource agencies to specifically discuss water quality issues.

12. Comments noted. The suggested subject meeting occurred on January 22, 2002, and proved very useful in identifying water quality concerns associated with the project. Best management harbor plans will be incorporated to control surface water runoff into the mooring basin, and waters normally collected within the Centeral Creek watershed would be diverted as appropriate into the North and/or South creeks to augment their flows (see section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

13. DEIS Page 77, Figure 16. We recommend against the settling basin concept as it would take up areas needed for dredge spoil storage and (as shown) discharge treated water into the harbor. Additional dredge spoil space would likely increase wetland impacts. Freshwater discharged into the harbor could lead to periodic icing problems and create a freshwater lens on the marine waters affecting mixing and other dispersal properties.

13. An individual settling basin concept is no longer being considered. However, during the mooring basin dredging operation, the basin itself would act as a settling basin for dredged material runoff (see section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

14. Page DEIS 82. End of first paragraph. Our recommendation for a stream-protection easement was for a minimum 100 feet of contiguous wetlands measured from both outer banks of the streams. This easement would ensure that important functions and values of contiguous wetlands critical to the integrity of stream resources are maintained. As such, many of the project drawings show the hypothetical airport access road within this easement. This easement would be in place along the re-constructed reach of "Rust Creek" except for a clear-span crossing. At present, there are no anadromous fish resources in Rust Creek, however a migration barrier would be removed as a recommended mitigation project and salmon adults and/or juveniles would be expected to occur in Rust Creek. For clarity, we recommend this easement be shown in a figure where it is first introduced. This figure should be referenced when describing anticipated developments after the harbor is constructed (as mentioned on page DEIS-85).

14. Figure FEIS-13 has been added that illustrates the location of the conservation easement along North and Rust creeks and the 100-foot setback along South creek.

15. Page DEIS 87, Section 4.3.3.3. Marine Mammals. Jurisdictional issues between NMFS and USFWS for endangered species are unclear.

16. Page DEIS 94, Section 4.7, Cumulative Impacts: We agree there will likely be future development pressure on the head of Akutan Harbor once a harbor is constructed. We have tried to reiterate to the Corps and others that the siting of this future development should first focus on the footprints of the dredge spoil piles. The Service has no objections to the use of dredge spoil for construction of a future airport access road, provided adequate planning and mitigation are a part of the NEPA/Section 404 process. As dredge spoils are used for the road, suitable harbor uplands will be made available. The Service would, however, likely object to the use of any dredge spoil material being used for the further destruction of freshwater wetlands or tidelands at the head of Akutan Harbor. The Service recommends a special condition in the eventual Section 404 authorization for the project that dredge spoils cannot be used for non-airport-related projects below the 200-foot contour west of the North Creek delta.

Thank you for the opportunity to comment on the DEIS. We look forward to our continued involvement in the harbor and related projects. Please contact Mark Schroeder, Fish and Wildlife Biologist, at 271-2797 if you have any questions, require additional information, or want to schedule a coordination meeting.

Sincerely,

Ann G. Rappoport
Field Supervisor

cc: ADFG, Wayne Dolezal
EPA, Region 10
NMFS, Brad Smith

15. Sections 3.3.2.2 (Terrestrial and Marine Mammals) and 3.3.3 (Threatened and Endangered Species) of the FEIS have been revised to clarify jurisdictional issues between the USFWS and NMFS.

16. A conservation easement has been proposed within the North Creek drainage, which protects valuable wetlands that support anadromous fish and other fish and wildlife resources. The Corps' Regulatory Branch has the responsibility to issue Section 404 permits for the placement of fill material within the waters (i.e. wetlands) of the United States. The information contained in the Feasibility Report and FEIS would be valuable in their assessment of potential impacts resulting from any proposed fill in and around Akutan Harbor. The USFWS's recommendation will be forwarded to Alaska Districts's Regulatory Branch for their consideration in issuing Section 404 permits (if any) in the project area.

Subject: RE: **Akutan Harbor,** AK0209-09AA, ACMP **Additional Information Reque st Date:** Thu, 5 Dec 2002 14:47:30 -0900
From: "Rumfelt, Tim" <tim Rmfelt@envircon.state. ak.us>
To: "'Crayton, Wayne M POA02'" Wayne.M.Crayton@poa02.usace.army.mil> CC: "Rumfelt, Tim" <tim Rmfelt@envircon.state. ak.us>, "ADOT/PF-Smith Harvey (E-mail)" <Harvey Smith@dot. state. ak.us>, 'Susan Magee' <susan magee@gov.state. ak.us>, "Slemons, Jonne" <Jonne Slemons@envircon.state. ak.us>, 'Wayne Dolezal' <WayneDZ@FishGame.state. ak.us>

Wayne,

1. This department is very concerned with the proposed harbor's effects upon water quality. As stated in the DEIS, Akutan Harbor is already impaired and is presently on the State of Alaska's Impaired Waterbody List. Due to the present biochemical oxygen demand (BOD) placed upon the waterbody, dissolved oxygen levels (DO) are low, causing EPA to implement a Total Maximum Daily Load (TMDL) allocation to the present waterbody users. Because of the waterbody's environment and the proposed harbor location, circulation within the proposed harbor will be minimal. This will cause the BOD load within the harbor to lower the harbor DO and as water from the harbor and adjacent lands is discharged into the bay, it will also effect the bay DO. Both actions will effect biota utilizing that end of the bay. Thus, we need answers to the following, prior to being able to process the State's 401 Certification of Reasonable Assurance or find the project consistent with the Alaska Coastal Management Program (ACMP).

1. Comments noted and addressed below.

2. 1. Activities within and adjacent to the harbor will discharge BOD into the marine waters. EPA has determined the BOD carrying capacity of Akutan Harbor and through their TMDL process has allocated the allowable BOD discharges to the present users of the waterbody. Thus, either the Corps must show that this harbor (both during the construction and operational phases) will not increase the existing BOD load or must seek an EPA TMDL reallocation which would include this facility. Please contact Christine Psyk, EPA Region 10

2. Soon after receiving the Alaska Department of Environmental Conservation's (ADEC) comments, the Corps held an interagency (January 22, 2002) meeting to discuss in more detail the agency's concerns about the project's impacts on water quality, including BOD. The Corps researched the issue (see appendix FEIS-5) and estimated future BOD loads from the harbor to be about 24 and 499 lbs/day for the normal and extreme operating conditions. This equiates to 0.02 % to 0.34% of the TMDL of 149,000 lbs/day. Given the Corps' finding, the Corps requested the USEPA Region X , to reallocate Akutan Harbor's BOD and SSR waste loads established in 1995, taking into account the future construction and operation of the new harbor at the head of Akutan Harbor.

TMDL Unit Manager, (206) 553-0253, to discuss this matter. ADEC can not proceed with the certification process for the subject project until the above has been addressed.

3. 2. The DEIS states that the configuration of the proposed harbor can be adjusted to provide maximum circulation. Determining the best design can be accomplished through a modeling process. Prior to certification, ADEC needs to see the results of said modeling. We would also like to see this modeling done for the other proposed harbor sites which are located farther down the bay where the natural circulation is better and for the offshore and offshore/onshore alternatives. We believe that water quality was not a high priority during the site selection process. However, the water quality effects of this harbor will be felt for the life of the harbor.

3. As a result of the January 22, 2002, interagency meeting, water circulation and flushing models were run by Coastline Engineering in an effort to design a mooring basin that would facilitate improved water quality. The recommended plan (reconfigured 12-acre basin, figure FEIS-9) is the product of the modeling study and coordination with the ADEC and Alaska Department of Transportation and Public Facilities.

4. 3. The DEIS does not discuss the construction and operation of onshore facilities for the receiving and treatment of bilge water and domestic wastes. We understand that the Corps may wish to have these facilities considered under the Akutan Harbor Management Plan, but DEC must be assured that such facilities will be present and operable. Due to the amount of surrounding wetlands at the preferred site, construction and operation maybe a problem, thus we need up front assurance. Please describe your proposed type, location, and operation of said facilities.

4. The Corps recognizes ADEC's concerns about having onshore facilities for receiving and treating bilge water and domestic wastes The to-be-developed Akutan Harbor Management Plan will addresss ADEC concerns, the specifics of which (proposed type, location, and operation) will be developed in concert between the Corps, project sponsor, and ADEC during the preconstruction engineering and design phase of the project. See section 2.4 Recommended Mitigation Plan and Environmental Protection Measures.

We cannot process this application without the above information. By copy of this letter, we ask the Division of Governmental Coordination [DGC] to extend the coastal zone consistency determination comment period deadline, if we have not received the information by December 20, 2002. Please send DGC, 550 W. 7th, Suite 1660, Anchorage, Alaska 99501, a copy of your response.

STATE OF ALASKA *FRANK MURKOWSKI, GOVERNOR*

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET

DIVISION OF GOVERNMENTAL COORDINATION

SOUTHCENTRAL REGIONAL OFFICE
550 W. 7TH AVENUE, SUITE 1660
ANCHORAGE, ALASKA 99501
PH: (907) 269-7470 / FAX: (907) 269-3981 3829

CENTRAL OFFICE
P.O. BOX 110030
JUNEAU, ALASKA 99811-0030
PH: (907) 465-3562 / FAX: (907) 465-3075

PIPELINE COORDINATOR'S OFFICE
411 WEST 4TH AVENUE, SUITE 2C
ANCHORAGE, ALASKA 99501-2343
PH: (907) 257-1351 / FAX: (907) 272-

December 12, 2002

Mr. Guy R. McConnell
Environmental Resources Section
U.S. Army Corps of Engineers PO Box 6898
Anchorage, AK 99506-6898

Dear Mr. McConnell:

SUBJECT: AKUTAN HARBOR
STATE I.D. NO. AK 0209-09AA
REQUEST FOR ADDITIONAL INFORMATION/EXTENSION

1. Pursuant to the State of Alaska's review of your proposed project for consistency with the Alaska Coastal Management Program (ACMP), the Alaska Department of Environmental Conservation (ADEC) sent you a request for additional information (RFAI) on December 5, 2002 (see enclosure). The ADEC requires the requested information to determine if the proposed project is consistent with the ACMP and to process your application for a 401 Certification of Reasonable Assurance.

You have indicated that you will not be able to provide the requested information by the RFAI deadline of December 23, 2002, Day 25. Per 6AAC 50.070(g) and 6AAC 50.110(b)(6), I will suspend the review on that date until you are able to provide the information. The requesting review participant has seven calendar days to review your response for adequacy. Once ADEC notifies me that the information is adequate I will restart the review at Day 25 (per 6AAC 50.110(d)).

If you have questions regarding the request for additional information, please contact me at (907) 269-7472 or email Susan Magee@gov.state.ak.us.

Sincerely,
Susan E. Magee
Project Review Coordinator

1. Comments noted: The subject requested information has been provided to ADEC and incorporated into the final feasibility report and environmental impact statement. The Corps will request a restart of the coastal consistency process under separate cover.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

Reply To
Attn of: ECO-088 DEC 1 6 2002 99-059-COE

Colonel Steven T. Perrenot, District Engineer
Department of the Army
U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Dear Colonel Perrenot:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for the proposed *Akutan Harbor Navigation Improvements Project* pursuant to Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA) as amended. Section 309, independent of NEPA, directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions.

The proposed inland harbor would consist of an entrance channel dredged through the beach berm with the entire basin dredged out of the wetlands inland of the beach bean, producing 850,000 cubic yards of dredged material. Dredged material would be disposed of in adjacent wetlands to create upland areas associated with the proposed harbor. Dredged material in excess of requirements for upland construction would be stockpiled on adjacent wetlands for future uses, including the filling of other wetlands and intertidal areas for the construction of the planned airport and airport road as well as for future, yet-to-be identified, construction projects. The proposed mooring basin at Akutan would be designed to accommodate the larger Bering Sea commercial fishing vessels.

EPA, has rated this draft EIS, EO-2 (Environmental Objections-Insufficient Information).
This rating and a summary of our comments will be published in the Federal Register.
EPA has environmental objections because:
- the proposed project would directly impact 60 acres of wetlands and indirectly impact the remaining 35 acres of wetlands at Akutan Head;
- the proposed project would likely result in exceedances of fully allocated Total Maximum Daily Loads (TMDLs) for Biochemical Oxygen Demand (BOD) and Settleable Solid Residues (SSR) which will likely violate State Water Quality Standards (WQSs) for these two parameters.

EPA has determined that the draft EIS contains insufficient information because:

- the draft EIS does not evaluate the full range of reasonable alternatives and mitigation measures required by NEPA and Clean Water Act Section 404(b)(1) guidelines to avoid and minimize impacts to aquatic resources;
- the draft EIS does not describe in sufficient detail reasons for eliminating other alternatives from detailed analyses; and

1. • the EIS should more fully describe the sensitivity analyses which concludes that the need for the project remains largely unaffected despite significant decreases in harvesting in the fisheries described in Appendix B.

2. The EIS essentially presents only two alternatives, the action and no-action alternatives. Our analysis of information in the draft EIS indicates that there is little to no difference between the three inland moorage alternatives concerning impacts to wetlands and water quality. Although the 12-acre mooring basin alternative limits the direct impacts of the proposed project to wetlands compared to the 15- and 20-acre alternatives, consideration of the indirect and cumulative effects indicate that the entire 95 acre complex would be eliminated or functionally impaired with adoption of any of the three action alternatives and adoption of any of these alternatives would likely exceed the TMDLs for BOD and SSR and result in violations of WQSs. We recommend that the Corps defer its project decision until it addresses impacts to wetlands and water quality in a more substantive way.

Enclosed please find our detailed comments which elaborate on these issues. I encourage you to contact Chris Gebhardt of my staff at (206) 553-0253 to discuss our comments and how they might best be addressed. Thank you for the opportunity to comment.

Sincerely,

L. John Iani
Regional Administrator

Enclosures

1. The final Feasibility Report and Environmental Impact Statement has expanded its discussion and increased the level of detail on the subject issues raised by the USEPA. See Appendix FEIS-6, Section 404(b)(1) Evaluation; Sections 2.1 (Alternatives Eliminated from Further Consideration) and 2.2 (Alternatives Considered in More Detail); and in the Feasibilty Report, Appendix B, table A2-11 shows a demand of 158 vessels. This project accomodates less than 1/3 of the demand due to the selection of the smaller harbor for environmental reasons. Therefore, the fishery would have to completely stop, which is unlikely, to eliminate the need for this harbor.

2. The USEPA and Alaska Department of Environmental Conservation assisted the Corps at a January 22, 2002, meeting with identifying the necessary studies needed to address the potential impacts to wetlands and water quality. Since the subject meeeting, water circulation and harabor flushing modeling studies have been performed by Coastline Engineering, as well as a more detailed analysis of the affected wetland's functions and values. The appropriate sections of the feasibility report and EIS have been expanded to include the new data and impacts analysis. See FEIS sections 3.3.5 (Wetlands) and 4.3.5 (Wetlands). Via an email from USEPA-Region X (dated December 23, 2003), the USEPA stated that the Corps has satisfied their concerns regarding the potential impacts of the project on Akutan Harbor's TMDLs for BOD and SSR.

EPA Detailed Comments on the Draft Environmental Impact Statement (EIS) for the Proposed Akutan Harbor Navigation Improvements Project

Loss of Wetland Habitat

1. EPA has environmental objections concerning the impacts of proposed construction of moorage, stockpiling, and road construction to wetlands and the lack of sufficient proposed mitigation measures to compensate for these effects. The draft EIS states that the tentatively selected proposal for a 12-acre inland mooring basin would eliminate 60 acres of palustrine emergent wetlands together with the associated streams and small ponds in the Central Creek Basin through dredging, filling, and stockpiling. These 60 acres of wetlands are a majority of the 95-acre biologically rich aquatic complex which comprises wetlands, streams, and ponds at the head of Akutan Harbor that contains pink and coho salmon, Dolly Varden, and threespine stickleback habitat. In addition to the 60 acres of direct impacts, the draft EIS states that the remaining ridge and adjacent wetlands extending between the harbor basin and the bay are very likely to be lost or functionally impaired due to indirect impacts from lowering of the water table and future development. Therefore, the proposed action would result in the effective loss of the entire wetland complex: a total of 95 acres of freshwater wetlands and associated ecological functions. This biologically rich area is the only wetland complex on this part of Akutan Island. The complex also supports passerine birds, waterfowl, sea otters, and two species listed under the Endangered Species Act (ESA), the endangered Steller sea lion and threatened Steller's eider.

1. Comments noted. The recommended plan (reconfigured 12-acre moring basin) directly impacts approximately 43.7 acres of wetlands and 13.5 acres of upland. Harbor associated development would likely be associated to the storage area and dredged material disposal area. No development is expected to occur on the beach berm between the eastern side of the harbor basin and Akutan Harbor.

2. The draft EIS characterizes building the 12-acre inland mooring basin with the associated dredging and filling of wetlands, streams, and ponds in the Central Creek Basin as acceptable and environmentally preferable even though this proposed action would eliminate habitat for numerous species (including ESA listed species) and likely change surface and subsurface flows and lower the watertable (we acknowledge that the Corps is conducting an ESA Section 7 consultation with the US Fish and Wildlife Service regarding impacts to endangered species and their habitats). The draft EIS bases the conclusion of environmental preferability on a) the selection of the lowest quality wetlands in the Central Creek Basin versus the North Creek and South Creek Basins; b) the selection of the smallest inland mooring basin; and c) adoption of a series of Best Management Practices (BMPs), and several compensation measures to help mitigate impacts to aquatic resources.

2. Comments noted.

3. Regardless of the efforts made to minimize and mitigate direct impacts to wetlands, the entire 95-acre wetland complex would still be lost. This includes the 60 acres of wetlands directly impacted and the remaining 35 acres of surrounding wetlands south between the harbor basin and the bay and in the North Creek and South Creek

3. The project's mitigation plan (which includes impact avoidance, minimization, rectification and compensatory measures) was developed in concert with the U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, Alaska Division of Governmental Coordination (now the Office of Permitting and Project Management), National Marine Fisheries Service, USEPA (Anchorage Office), and project sponsors.

Basins, which would be lost or functionally impaired as the saltwater interface moves inland and as reasonably foreseeable future development occurs as described in the draft EIS occurs. The mitgation measures discussed in the EIS are for the most part avoidance measures that attempt to reduce impacts (e.g., standard construction BMPs). These measures, however, are too limited in scope to compensate for the permanent elimination or functional impairment of the wetland complex.

3.Cont. No additional mitigation measures have been identified other than those listed in the feasibility report (FR) and EIS (see FEIS Section 2.4 Recommended Mitigation Plan and Environmental Protection Measures). Also, see FEIS tables 3, 5, 8, 9, and 11; and figures 13, 24, 25, and 26 which more accurately enumerate and describe the wetlands and uplands impacted by the recommended plan (reconfigured 12-acre mooring basin).

4. Two wetland compensation measures mentioned in the document, reconstruction of a pocket of wetlands within the footprint of the stockpile area and establishment of a 100-foot wide conservation easement along North Creek, lack detail concerning size, location, and responsible parties. We recommend that the Corps provide additional detail regarding these measures to allow reviewers to evaluate the amount of compensation they provide.

4. Discussions on the topic (reconstruction of Rust Creek, North and Rust creeks conservation easement, 100-foot setback on South Creek, etc.) within the feasibility report and EIS have been expanded to address this concern. The design of Rust Creek's reconstruction will be developed with the assistance of the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game during the Preconstruction Engineering Design phase of the project.

Proposed Project Would Likely Result in Violations in Water Quality Standards (WQSs)

5. EPA has environmental objections to the proposed inland mooring basins because proposed action alternatives would likely exceed Total Maximum Daily Loads (TMDLs) for Biochemical Oxygen Demand (BOD) and Settleable Solid Residues (SSR). The draft EIS describes how poor circulation in Akutan Harbor and the disposal of large quantities of processed fish waste result in low levels of dissolved oxygen (i.e., high BOD) and high levels of SSR. The State of Alaska consequently identified Akutan Harbor as water quality impaired on its Clean Water Act (CWA) Section 303(d) list and EPA later developed TMDLs to limit BOD and SSR to help ensure that dischargers meet Water Quality Standards (WQSs) for these two parameters.[1] The TMDLs for BOD and SSR show that these pollutants are fully allocated indicating that Akutan Harbor appears unable to receive any additional load of these pollutants without violating State WQSs. The draft EIS states that dredging activities would increase suspended solids, decrease oxygen concentrations, and increase dissolved nutrients concentration in receiving waters, thereby adding to the already full load allocations for BOD and SSR and resulting in likely violations of WQSs.

Section 31: of the CWA requires that federal agencies comply with standards and frameworks established under the CWA. Therefore, the project should be modified so as to demonstrate that action alternatives would not result in any additional BOD and SSR in Akutan Harbor, thereby preventing likely violations of WQSs. Water quality analyses

[1]Please contact Jayne Carlin in our TMDL Unit at (206) 553-4762 to discuss the Akutan Harbor TMDLs.

5. Since receiving USEPA's comments on this matter, the Corps has worked with selected USEPA and ADEC staff to address water quality concerns. The Corps submitted to USEPA Region X under separate cover, a report identifying potential BOC sources related to the harbor and enumerating their contributions. Potential sources included storm water runoff, dredging, petroelum spills, sewage, graywater, wastewater from fish holds, bilge water, ballast water, wastewater from deck washing, algal blooms, debris, and fish waste. The Corps estimated future BOD loads from the harbor to be about 24 and 499 lbs/day for the normal and extreme operating condistions. This equates to 0.02% to 0.34% of the TMDL of 149,000 lbs/day. Given the Corps' findings, the Corps requests a reallocation of Akutan Harbor's BOD and SSR wasteloads that were established in 1995, taking into account the future construction and operation of the new harbor at the head of Akutan Harbor. The Corps also believes that the changes in mooring basin design to facilitate water circulation and flushing will help to prevent violations of State water quality standards. Via a December 23, 2003, email, EPA stated that their concerns pertaining to TMDLs and water quality expressed in their DEIS comment letter dated December 16, 2002, are resolved.

should incorporate: 1) proposed dredge and construction activities, 2) residue and waste discharge from the concentrations of boats that would be found in the proposed mooring basin, 3) how changing the geometry at the head of bay and harbor/moorage design would affect circulation, 4) runoff from stockpiled dredged material, and 5) how project induced changes in surface and subsurface flow at Akutan Head would affect levels of dissolved oxygen delivered to the marine environment.

In addition, we are concerned that the construction and use of the inland mooring basin would result in more numerous and extensive oil spills based on information in the draft EIS that 1) diesel is considered to be one of the most acutely toxic oil types to fish, invertebrates, and algae and 2) spill reporting in Alaska between 1990 and 1999 shows that Akutan was one of the top three harbors for the number of petroleum spills and the amount of material spilled. The EIS should predict the number and size of oil spills using historical accounts at similar harbors, predict the effectiveness of BMPs, and describe how project proponents would ensure implementation of BMPs, the resulting success rate, and whether the WQSs for petroleum would be met.

The FEIS adequately discusses the potential impacts of oil spills within Akutan Harbor and the ultimate fate of the oil spilled. BMP's will be established with the to-be-developed Akutan Harbor Management Plan. The project sponsor and Corps have agreed to participate in the development of a geographic oil spill response strategy for Akutan Harbor, the purpose of which is to identify environmentally sensitive areas within Akutan Harbor and develop methods/procedures to protect them from the effects of oil spills.

Analysis of Alternatives

6. The draft EIS identifies potential impacts to wetlands and degraded water quality issues that were identified as significant during scoping, however, the tentatively recommended alternative proposed in the draft EIS is not effective at avoiding, minimizing, or mitigating impacts to the environmental impacts, other than those to Steller's eider. While the EIS does provide a limited discussion of why several other locations for a harbor site within Akutan Harbor were considered but eliminated from further consideration, we suggest that additional information be provided to support the elimination of these alternative sites. Moreover, we suggest that additional information be provided as to why harbor sites outside the Akutan Harbor area, including existing harbors within the moorage market area in the Aleutian Islands, were eliminated from consideration. The document contains three onsite project designs examined in detail at

7. the selected alternative site, all of which entail constructing inland mooring basins at Akutan Head. While the selected design minimizes impacts to Stellar's eider, it does not otherwise avoid, minimize or mitigate impacts to aquatic resources.

6. Discussions in Section 3.4.1 have been added to the FR and Sections 2.1 (Alternatives Eliminated from Further Consideration) and 2.2 (Alternatives Considered in More Detail) have been expanded to address the "elimination of alternatives" issues raised by USEPA.

7. See Corps response #3.

8. Purpose and Need: The Purpose and Need section (Section 1-3) states that the proposed action is to "provide a safe and efficient harbor for the Bering Sea commercial fleet and the City of Akutan". The underlying need appears to be providing permanent and temporary safe moorage for commercial and local subsistence fishing. A complete statement of present moorage problems in the project region is found in Appendix B to the draft EIS. A very brief summary of this material should be included in Section 1-3 to make the purpose and need clear. The complete action, as described in Section 2.2.2.3,

8. A brief summary of present moorage problems in the project area has been added to Section 1.3 (Purpose amd Need) of the FEIS.

also includes a spur access road to connect to an eventual airport road, and permanent disposal or indefinite stockpiling of dredged material. Thus, the EIS states that the project has two additional related purposes or elements: road construction and construction of a wetland disposal site to stockpile dredged material. These project elements will be discussed below (in sections entitled Road Spur and Alternatives to Dredging and Disposal at the Selected Project Site).

9. There are constant fluctuations in available moorage in different locations in the region that includes Akutan Harbor depending on the weather, season, and the types of vessels that are used in the five major fisheries in the Bering Sea, Aleutian Islands area (BSAI). The present conditions in Akutan Harbor for the commercial fleet and those of the local subsistence fishers are distinct, and the needs for permanent moorage and temporary shelter from storms, both of which are part of the purpose and need, might be met by multiple, separate and different types of moorage facilities in Akutan Harbor or elsewhere (such as pilings or dolphins added for temporary moorage). The EIS should explore whether there might be different alternative means of meeting these distinct purposes.

9. Pilings and dolphins without wave protection will not be used in inclement weather. In calm weather and seas, anchoring is sufficient temporary moorage. Multiple protected moorage sites cannot be economically developed.

10. The Sensitivity Analysis in the draft EIS (Appendix B) concludes that regardless of reductions in the demand for moorage (a reduced demand of 25% was assumed), the project is still fulfilling a compelling need. However, the Appendix contains some information that does not appear to corroborate this conclusion. For example, the critical groundfish fishery tonnage has been in decline, dropping from 390,790.35 Metric tons to 236,734.75 Metric tons between 1994 and 1999, decline of 46% (EIS Appendix B, Page B-13). While the region produced large harvests of king and tanner crab through the 1960s and 1970s, these species are at historically very low densities. Implementation of provisions of the American Fisheries Act are also beginning to bring about dramatic reductions in the numbers of fishing vessels operating in the area. Associated limitations in vessel licensing instituted by North Pacific Fisheries Management Council are having the same effect. Appendix B acknowledges that vessel reductions both in the groundfish and crab fisheries are expected to continue in the future. Additionally, the Trident Seafoods processing plant is proposing an expansion of its docking facility, which might conceivably further reduce any seasonal or temporary moorage scarcity in Akutan Harbor and the surrounding area. The EIS should explain in additional detail the estimated demand for moorage in Akutan Harbor. This will assist us in understanding design requirements for moorage and help in the additional analysis of alternative sites and design options for the project.

10. FR Appendix B, table A2-11 shows a demand for 158 vessels. Note: this is a current demand and not a past demand when historical catches were higher. The project accommodates less than 1/3 of the demand due to the selection of the smaller harbor for environmental reasons. The Trident expansion is working-dock expansion and will not have any protection from incoming waves. It will not provide protected moorage.

11. Alaska Wetlands Intiative: The Alaska Wetlands Initiative of May 1994 (a joint document by the EPA, the Corps, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service) discusses Mitigation Requirements of the Army Corps of Engineers Regulatory Program, and Applying Flexibility in Alaska. While this document does not apply specifically to the Corps' Civil Works program, the guidance it offers should be considered. In view of the guidance presented in the initiative, we do not believe that the present design measures aimed at minimizing project impacts are sufficient to offset the losses to aquatic resources. EPA concludes that based on available information in the DEIS, the impacts in this case are not small, there appear to be opportunities to avoid wetlands that have not been explored, and that the document does not demonstrate a scarcity of potential wetland mitigation sites. Therefore, additional compensatory mitigation for wetlands impacts should be developed if the inland harbor alternative is selected as the recommended plan.

Evaluation of Altenatives and Mitigation Measures Required by NEPA and the Substantive Requirements of the Clean Water Act Section 404(b)(1) guidelines: The draft EIS does not demonstrate that the proposed project would meet the substantive requirements of the Section 404(b)(1) Guidelines, at 40 CFR Part 230, nor that the project would be consistent with the EPA/ Department of Army Memorandum of Agreement Concerning the Determination of Mitigation Under the Clean Water Act 404(b)(1) Guidelines.

Under the Section 404(b)(1) Guidelines, it is first necessary to define the proposal's basic project purpose. For this project, the basic project purpose is moorage. For non-water dependent actions, the Guidelines, at 40 CFR Section 230.10(a)(3), state that practicable alternatives that do not involve special aquatic sites are presumed to be available (and to have less adverse impact) unless clearly demonstrated otherwise. For water dependent actions, it is still necessary to seek the least damaging alternative.

The Mitigation MOA, while designed primarily for compliance with Section 404 of the Clean Water Act through the Corps' Regulatory program, interprets the requirements of the Section 404(b)(1) Guidelines as first avoiding potential impacts to the maximum extent practicable, then requiring steps to minimize impacts, and finally requiring compensation for the loss of aquatic resource functions, known as `sequencing'. The EIS and Section 404(b)(1) Guidelines Evaluation do not describe how the project meets these sequencing requirements. In order for a determination to be made that these requirements are met, the EIS should include information that describes the search for alternative sites and why they were rejected, as discussed previously in this letter.

11. The Corps agrees with the USEPA that the impacts associated with the recommended plan are not small. However, the Corps has directly coordinated the development of a mitigation plan with numerous State and Federal agencies...see Corps comment #3. In addition, Appendix FEIS-6 (Evaluation Under Section 404(b)(1)) has been expanded to more thoroughly address the impacts of the recommended plan on area wetlands and fish and wildlife resources.

12. <u>Offsite Alternatives</u> The EIS does not analyze offsite alternatives in a comprehensive way, as required by the 404(b)(1) guidelines, in order to demonstrate that the proposal is the least damaging practicable alternative. EPA is concerned that there maybe a number of practicable alternatives, potentially including off-site alternatives, that might meet the basic project purpose but were not examined or were prematurely eliminated from further consideration. Additional information is needed to better explain the alternatives analysis, and a more systematic presentation of the analysis would be helpful.

The EIS discusses reasons for selecting or eliminating alternatives on the basis of one or more advantages or disadvantages, as listed in Table DEIS-1. This table and the accompanying text do not appear to consider all of these listed advantages or disadvantages equally and consistently or select the site that necessarily best fits them. A set list of criteria should be developed using some of these factors, and others as appropriate, to evaluate each alternative equally and consistently. Where appropriate, the criteria should be expressed quantitatively and selected criteria from the list be weighted by importance.

We have developed for your consideration the following criteria based on our review of the proposed project:

1. Shelter and wave protection from north and west storms
2. Shelter from Bering Sea long period waves
3. Shelter from large southerly ocean swells or reflected swells
4. Sufficient size to be safe for navigation and provide sufficient capacity to meet present demand (or future demand - the analysis should specify)
5. Presence or absence of deep water
6 Good water quality and mixing zone
7. Amount of upland area potentially developable
8. Presence or absence of shallow bedrock
9. Presence or absence of environmentally sensitive areas
10. Degree of local preference, or local rejection
11. Proximity to the local community and / or Trident facility, ferry dock or seaplane ramp
12 Possibility of stimulating local development (possibly same as previous)
13. Presence of contaminated soil requiring cleanup
14. Consideration of current and potential future land use

Applying the same set of criteria to all sites would ensure their equal and consistent consideration as alternatives. Following are examples where it is not clear that this occurred. The Corps notes in Table DEIS-1 that several sites are eliminated on the basis of excessive wave energy, distance from the Akutan village, or lack of local sponsor preference for these sites, although there are important advantages to each

12. The Corps incorporated many of USEPA's recommended criteria into a revised table (FEIS-1, Comparative criteria used to equally screen the feasibility of constructing navigation improvements in Akutan Harbor). The revised table more comprehensively and equally compares the project's alternatives. Accompanying text has been expanded to more thoroughly address USEPA's concerns.

(Table DEIS-1). The document does not define or quantify what constitutes excessive wave energy. The Salthouse Cove site was rejected because Trident Seafoods is planning to expand there. It might be possible to combine the Trident expansion with the harbor improvements so that both projects may be designed and function together, while avoiding some wetland impacts. The text also states that the Salthouse Cove site is not large enough, without specifying how large a site has to be to become a practicable alternative.	The term "excessive wave energy" is no longer used. More descriptive terms/language has been added
13. <u>Spur Road</u>: The proposed action discusses construction of a spur road. The document does not clarify whether the road is a required project element since road construction is proposed for placement in a special aquatic site and is not a water dependent use, it would be necessary to demonstrate that no upland sites are available. The EIS states however, that construction of the road is contingent on future joint action by the Federal Aviation Administration (Airport Master Planning) and Alaska Department of Transportation and Public Facilities (Road design) for construction together with an airport. It is not clear whether these actions are necessary parts of the moorage basin project, or whether the moorage basin is a viable project without them. Since the road and the airport are reasonably foreseeable future actions, the EIS and 404(b)(1) Guidelines analysis should consider the cumulative impacts of these projects along with the moorage basin. **Alternatives to Dredging and Disposal at the Selected Project Site** The proposed action includes dredging and disposal of dredged material in a special aquatic site (i.e, wetlands). In order to do so in a manner consistent with the 404(b)(1) guidelines, the EIS must demonstrate that there are no less environmentally damaging practicable alternatives. In considering options for the disposal of dredged material, the DEIS briefly discussed open water, intertidal and land disposal sites (including upland and wetland sites), but rejected the first two because of environmental impacts, cost, and the "suitability of the material for stockpiling and use in the construction of upland areas around the harbor and as sub-base material for the access road or airstrip." Suitability of the dredge material for construction of other projects is not related to the stated purpose and need for the project, which is to provide a safe and efficient harbor for the Bering Sea commercial fishing fleet and the City of Akutan.	13. The recommended plan identifies where a spur road from the harbor <u>might</u> connect with the road linking the city of Akutan to an airport. The road to the head of the harbor will either be constructed by the city of Akutan and/or Aleutians East Borough or by the Alaska Department of Transportation and Public Facilities as part of their future action with the Federal Aviation Administration to construct an airport on Akutan Island. The Corps' impact analyses of the road from the city of Akutan to the head of the bay is restricted to the likely increase in foot and vehicle traffic generated by harbor-related activities.
14. The EIS must first consider upland disposal, rather than filling wetlands, as the presumptive least damaging alternative for the disposal of dredged material, if sites are available and practicable. There presently is no direct discussion of upland sites. The EIS should also analyze the practicability of deep water disposal of the dredged material. The draft EIS states that stockpiling dredged material in a wetland would avoid the environmental impacts of ocean disposal. While the draft EIS discusses how stockpiled fill material might be used for future development, it lacks sufficient analyses	14. Discussions in the final FR and EIS have been expanded to address alternatives to dredging and disposal at the selected project site. See sections 2.3.2 (Dredging Activities and Disposal Alternatives), 2.4 (Recommended Plan Mitigation and Environmental Protection Measures), and 4.0 (Environmental Consequences of the Recommended Plan).

and discussion of the comparative environmental impacts of filling wetlands at Akutan Head versus ocean disposal and does not attempt to determine which is least environmentally damaging.

EPA's experience with administering the Ocean Dumping or Marine Protection, Research, and Sanctuaries Act of 1973 has shown that ocean disposal can be environmentally benign, and in some cases, environmentally beneficial. The EPA believes that inherent flexibility in the location and design method (confined versus dispersed sites) and the selection of possible multiple disposal sites of clean sediments strongly indicates that ocean disposal of dredged material is very likely to be less environmentally damaging than the proposed use of dredged material to fill many acres of highly valuable wetlands. In addition, EPA believes that the beneficial use of dredged material in a manner or location that provides ecological benefits, such as creation of intertidal habitat at a subtidal site, is less damaging to the aquatic environment and more consistent with the goals of the Clean Water Act than stockpiling fill in wetlands and later using this material for further fill in wetlands. Consequently, the alternatives section should examine different methods to dispose of dredged material (including ocean disposal) and the environmental consequences section should fully disclose the impacts of adopting different disposal methods.

Consistent with the 404(b)(1) guidelines, the EIS should be able to demonstrate that disposal of the dredged material in wetlands is less damaging than ocean disposal before considering suitability of the dredged material for disposal in the intertidal or wetland environment until such a demonstration is made.

On-Site Minimization Through Design Alternatives:

15. *Offshore Harbor Basin:* This section cites a high frequency of maintenance and inspection, the high cost of a floating breakwater, and the risk of failure of the structure as a reason to reject this design. Cost and failure risk make this design of questionable practicability. It appears that the total cost of this alternative would be $33.8 million because the $17 million cost of the floating breakwater must be added to the rest of the costs of constructing the mooring basin, but this is not clear in the EIS or the feasibility study. The Corps rejects this alternative on the basis that terrestrial dredge disposal and project-induced development would result in the loss of wetland habitat. However, it may be possible to build the offshore harbor basin using aquatic dredge disposal to reduce wetland impacts. EPA therefore disagrees with the Corps' conclusion that the project should be rejected on this basis. The inland harbor basin design would result in greater direct impacts to wetlands (although we acknowledge that it would reduce impacts to the marine environment), and yet this design was selected for the project. Again, if the costs for this design are not excessive, the Corps has not yet shown that the

15. The Corps believes the offshore and offshore/onshore alternatives are not feasible for engineering and environmental reasons. Environmental impacts to overwintering Steller's eiders and their habitat would be significant, in addition to the adverse impacts to the nearshore movement of fish, especially anadromous fish that use North and South creeks. Both alternatives would directly and indirectly affect the same wetlands that the inland alternative would affect directly.

offshore harbor basin is more damaging than the inland basin. As we have discussed above, under the 404(b)(1) guidelines, it can be assumed until demonstrated otherwise that 1) discharges of dredge material could take place outside the wetlands environment, and 2) those discharges would be less damaging unless the proponent demonstrates otherwise. The alternative, in our view cannot be rejected until the alternatives analysis is complete, avoidance and minimization measures are incorporated as appropriate, and. the extent of aquatic resource impacts from each alternative are known and can be compared.

16. ***Offshore /Onshore Harbor Basin:*** The EIS states that the required curtain-wall wave barrier and rubblemound jetty make this alternative too costly. However, the costs are not quantified or compared to the other two alternatives, and it cannot be determined if this alternative is practicable. This information should be presented in the EIS.

Environmental Justice

17. Additional analyses and conclusions are needed to understand whether disproportionately adverse effects to Alaskan Natives (a recognized minority) would occur with the implementation of the proposed project (individually or cumulatively). This analysis is an important element of the Federal decision making process. The intent of Executive Order (EO) 12898 *(Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)* and accompanying memorandum is to "promote fair treatment of people of all races, so no person or group of people shoulders a disproportionate share of the negative environmental effects from this country's domestic and foreign programs." We recognize that the EIS's economic analysis provides excerpts from interviews with subsistence harvesters in Akutan who support the proposed project. We also recognize that the proposed project is supported by the city of Akutan, the Aleutians East Borough, and the Aleutian Pribilof Community Development Association. However, the EIS should conduct a full Environmental Justice analysis to provide more detailed information regarding impacts to Alaskan Natives.

The key objectives of evaluating effects to minority and low-income populations pursuant to EO 12898 are to 1) identify if any potentially affected minority or low-income populations exist, 2) reach a conclusion as to whether any effects associated with a known course of action would be disproportionately adverse to those affected populations, 3) effectively communicate with and involve minority or low-income populations in project development, and 4) identify an appropriate course of action that would avoid or otherwise minimize or offset such effects. EPA Region 10 can provide you with assistance and guidance on how to best prepare this analysis; please contact Chris Gebhardt at (206) 553-0266 for additional information.

16. FR Section 3.3.4 shows the screening costs for the various head of the bay concepts. This shows the inland as being least expensive and thus was chosen for more detailed development. Also, the conflicting envirioinmental issues of marine habitat, Steller's eider habitat, and wetland habitat went into the selection of the inland harbor.

17. Discussions in the FEIS have been expanded to cover the Environmental Justice issues raised by the USEPA…see Sections 3.1 (Community and People), 4.4.1 (Protection of Children), and 4.4.2 (Environmental Justice).

U.S. Environmental Protection Agency Rating System for

Draft Environmental Impact Statements
Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective. measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1- - Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce he environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA <u>Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment.</u> February, 1987.

Crayton, Wayne M POA02

From: Matthew Eagleton [matthew.eagleton@noaa.gov]

Sent: Wednesday, January 15, 2003 4:03 PM

To: Crayton, Wayne M POA02

Cc: Brad Smith

Subject: Akutan Harbor Mtg and EIS Comment

1. I have reviewed the Akutan Navigational Improvements EIS. EFH, ESA, and mitigation rec's all seemed good and provide some good practices to avoid/minimize impacts. I liked the commitment to the beach clean-up - maybe it will happen yearly by volunteers if this one is done positively. After the review of our resources, I would only suggest a precautionary statement to protect Steller sea lions such as: Should SSL's be within the project site, then we ask you to cease any in-water activities until they are no longer present and, if needed, give our office a call at (907) 271-5006 for further guidance (also see below).

Also, fyi, we have divers in our office now and, with some heads-up, they may be able to assist in gathering baseline info and things. Let me know if you need this support sometime and if you want them to go out to Akutan this summer or whenever.

Again, sorry for the late review. If you need more formal comments please let me know.
Here are informal comments:

After review, NMFS offers the described action will not result in any adverse effect to EFH. NMFS does not offer any EFH Conservation Recommendations, and no further EFH consultation is necessary. Additionally we offer NMFS ESA trust resources, specifically Steller sea lions (SSL), are unlikely to occur within the footprint of the project site and therefore no effect to SSL populations is anticipated. Should SSL's be come within the project site, then we ask you to cease any in-water activities and give our office a call at (907) 271-5006 for further guidance.

1. The precautionary statement to protect Steller sea lions has been incorporated into the final Feasibility Report (Section 4.15 by referencing the EIS for operaitonal items for construction)and final environmental impact statement (Section 2.4 Recommended Mitigation Plan and Environmental Protection Measures).

FEIS-APPENDIX 3

U.S. FISH AND WILDLIFE SERVICE
FINAL COORDINATION ACT REPORT
AKUTAN NAVIGATION IMPROVEMENTS

U.S. Fish & Wildlife

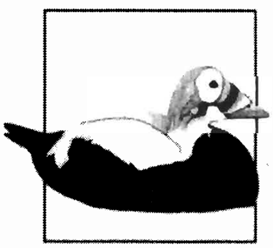
Anchorage Fish & Wildlife Field Office

AKUTAN NAVIGATION IMPROVEMENTS

Project Planning

Final Fish and Wildlife Coordination Act Report

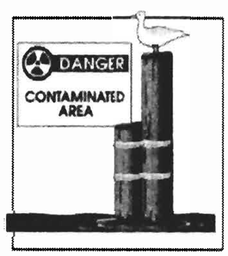
(AFWFO-CAR-04-02)



Endangered Species

Prepared by:

Mark T. Schroeder



Environmental Contaminants

December 2003

AKUTAN
NAVIGATION IMPROVEMENTS

Fish and Wildlife Coordination Act Report
(with December 2003 Addendum)

Submitted to Alaska District
U.S. Army Corps of Engineers
Anchorage, Alaska

Prepared by: Mark T. Schroeder, Fish and Wildlife Biologist
Approved by: Ann G. Rappoport, Field Supervisor

Ecological Services Anchorage Field Office
U.S. Fish and Wildlife Service
Anchorage, Alaska

December 2001

TABLE OF CONTENTS

LIST OF FIGURES

Figure

INTRODUCTION

This report constitutes the U. S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act Report (report) on the U.S. Army Corps of Engineers' (Corps) construction of a boat harbor at the community of Akutan, Alaska (Figure 1). The purpose of this report is to provide the Corps with planning information to discuss the presence of significant fish and wildlife resources likely to be affected by construction of the boat harbor; define the fish and wildlife resource problems and opportunities that should be addressed by the study; define the potentially significant impacts that could result from meeting other study purposes and objectives; highlight potentially significant fish and wildlife issues or concerns; and provide preliminary recommendations on measures for mitigating those impacts and concerns.

This report is prepared in accordance with the Fiscal Year 1999-2001 Scopes of Work and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.). This document constitutes the draft report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

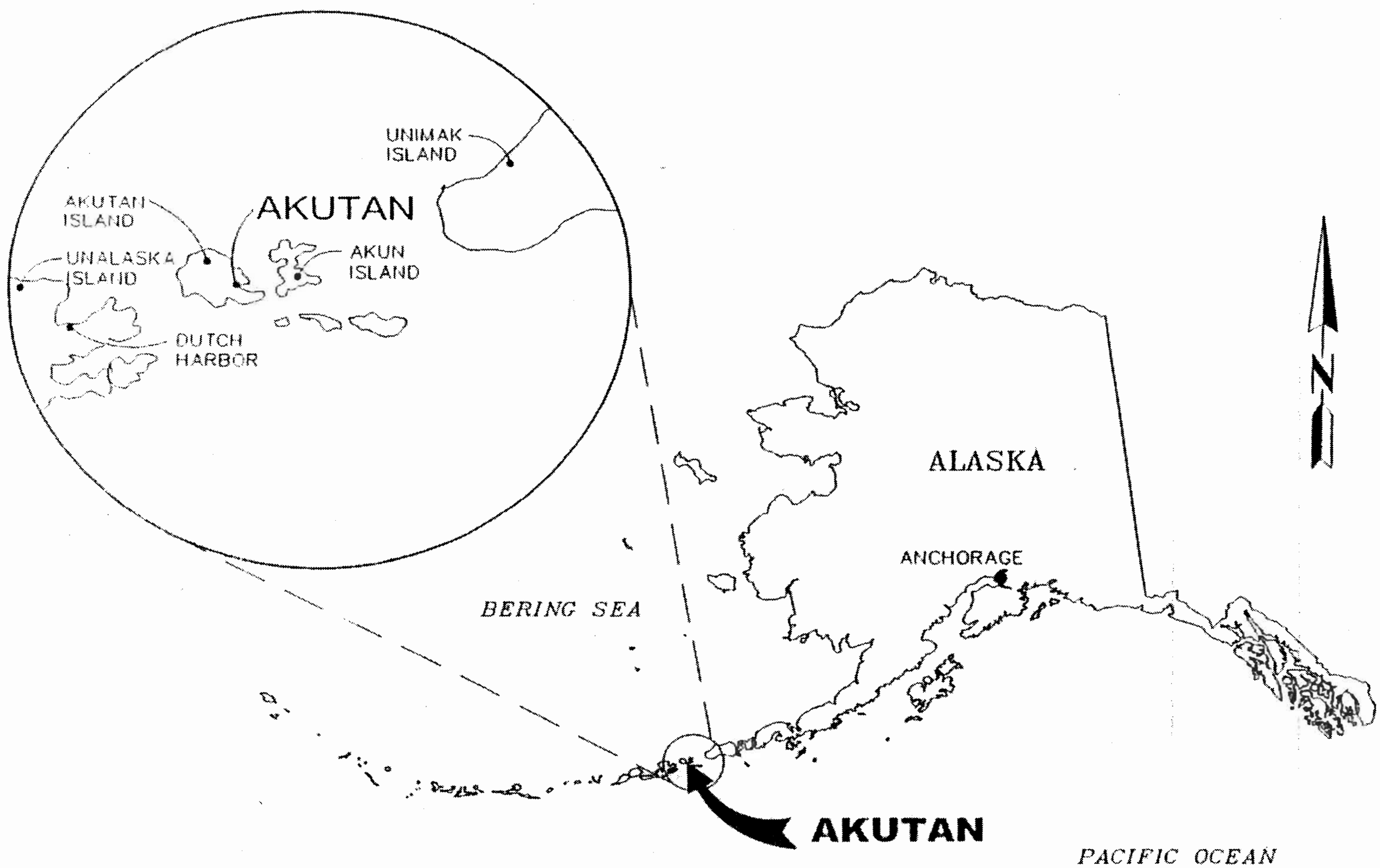
The report also contains information on threatened and endangered species, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act). The Corps requested initiation of formal consultation under the Act in a June 15, 2001, letter. Our July 23, 2001, response to that request described additional information required to complete the initiation package and we received a response to that request in a letter dated September 19, 2001.

We agreed with the Corps' biological assessment of "No Effect" for the short-tailed albatross and no "reasonable and prudent alternatives" or "reasonable and prudent measures" were recommended. The formal consultation process for the Steller's eider will conclude with the Service's Biological Opinion which will include nondiscretionary terms and conditions additional to the recommendations contained in this report.

The following report is based on information provided by Corps' project biologists Wayne Crayton and John Burns; a review of pertinent literature; discussions with local resource agency staff and residents; and several on-site evaluations.

STUDY AREA

The eastern Aleutian Islands are characterized by a maritime climate of high humidity, frequent precipitation and strong surface winds. The nearest weather station to Akutan is at Unalaska, 40 miles west of Akutan. The mean annual temperature in the region is 4.8 degrees C (41 F) with mean monthly temperatures ranging from about 0 degrees C (32 F) in February to 11.9 C (53 F) in August. Total mean precipitation is 1475 mm (58 in). Low-lying fog occurs about 30 days per year and is more frequent in the summer than in the winter. Winds average 18 kph (11 mph) and extreme winds may reach 130 kph (80 mph). Tides in the area are not great, having a maximum amplitude of near 10 ft.



LOCATION MAP

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 1

The mean tidal amplitude (mean high water to mean low water) in the area is about 4 ft (Stewart and Tangarone 1977) and consequently the intertidal zone is typically between mean higher water (MHHW:+3.9 ft) and extreme low water (ELW:-2.5 ft) (Crayton 1983). In steep areas the intertidal zone is relatively narrow; however, the intertidal zone can be extensive in gradually sloping areas, such as near the head of the bay.

Akutan is in the Aleutian Island physiographic section of the Alaska-Aleutian province. Similar to other Aleutian islands, Akutan resulted from the ongoing convergence of tectonic plates and is mostly volcanic in origin. Akutan Volcano dominates the western part of the island. The steep volcano slopes are drained by swift streams, some of which run over porous rock and flow only during heavy rains. Lakes and other poorly-drained wetlands are found in nearshore basins that were carved by glacial activity.

Akutan Harbor is a glacially-formed fjord approximately 6.3 km (3.9 mi) long. The Harbor is approximately 3 km (1.8 mi) wide at its mouth and narrows to about 1 km (0.6 mi) at its head. The northern and southern shorelines are rocky and steep. The head of the bay is a flat valley with a gradually increasing slope as it curves around to a ridge to the northeast. A large, vegetated berm behind the beach, separates a wetland complex from the sea waters of Akutan Harbor.

The bathymetry of Akutan Harbor has submarine slopes along the sides of the fjord that are steep with water depths of 18 m (60 ft) within 146 m (480 ft) from shore, an 8:1 slope. The fjord bottom is relatively flat and gradually deepens from 27 m (88 ft) at the head of the bay to 61 m (200 ft) at the mouth of the harbor. The harbor does not have a large outer barrier sill that acts to inhibit the exchange of deeper waters between the fjord and the Bering Sea.

The vegetation of Akutan Island is characterized as either alpine tundra or moist tundra. The moist tundra occupies low elevation areas and consists of tall grass meadows, low heath shrubs, mosses, lichens, and tufted hair grass. Commonly occurring plants include lupine, cow parsnip, monks hood, orchids, Indian paint brush, chocolate lily, wild geraniums, ferns, and a variety of aster and grass species (M. Schroeder, pers. comm.; Crayton 1983). Tree species are limited to a few low-growing willows near water courses. Wetlands are primarily limited to an estimated 50-acre complex at the head of the bay.

FISH AND WILDLIFE RESOURCES

A wide variety of harbor locations were evaluated during the past 16 years. Several of these have been eliminated for a number of reasons and are not evaluated in this document. A brief description of the sites and the reason they are no longer under consideration is contained under the Project Alternatives section. This report focuses on three alternatives: North Point, Head of the Bay – Offshore Basin, and Head of the Bay – Inland Basin.

Endangered and Threatened Species

The project is within the range of the Steller's eider (threatened), Steller sea lion (endangered), fin whale (endangered), and humpback whale (endangered). The status of the short-tailed albatross, American peregrine falcon, and Aleutian Canada goose are also addressed below.

Steller's Eider

The Alaska breeding population of Steller's eiders was listed as a threatened species on 11 July 1997. The project site does not contain designated critical habitat for the Steller's eider. Steller's eiders are sea ducks that spend the majority of the year in shallow, near-shore marine waters where they feed on mollusks, polychaete worms, and crustaceans. The breeding distribution of the north Pacific population of Steller's eider encompasses the arctic coastal regions of northern Alaska and parts of eastern Russia. Most of the north Pacific population of Steller's eiders winters along the Alaska Peninsula from the eastern Aleutian Islands to southern Cook Inlet.

Additional systematic surveys and occasional surveys have been completed around Akutan. The Service completed an opportunistic winter waterfowl survey of Akutan Harbor in March 1998 (USFWS 1998, unpub. files). These data were used to justify the more systematic and extensive surveys that followed.

Larned (2000) completed aerial surveys of the region in February and March 2000 and indicated that Steller's eiders concentrated in certain protected bays during the winter. Surveys including Amaknak, Unalaska, and Akutan islands, for example, documented that most Steller's eiders were located in Akutan Harbor, Captains Bay, Iliuliuk Bay, and Unalaska Bay. Eiders were observed feeding and loafing at these sites both on shore and in nearshore (<100m) waters.

Steller Sea Lion

The Steller sea lion (northern) was upgraded to endangered status in April 1997 due to recent declines in populations in the western Gulf of Alaska. The 1997 population in the area from Prince William Sound to the Aleutian Islands was estimated to be around 44,300. Recent declines are believed to be primarily the result of juvenile mortality. The northern sea lion is distinctive in its use of a few specific locations along the coast as rookeries and haulouts. Sea lion haul-out sites are designated critical habitat because of their limited numbers and high density use. Known sea lion haul-outs associated with Akutan Island are located between Lava and Reef points and near Cape Morgan (Nysewander et al. 1982).

Alteration of these haul-out sites through disturbance or habitat destruction could have a significant impact on use of these areas by sea lions. Steller sea lions make frequent use of Akutan Harbor, especially during the winter, including observations of 32 near the Trident seafood waste outfall plume on January 22, 2001 (Schroeder 2001).

Fin Whale

Eastern North Pacific fin whales may occur infrequently near Akutan Island in spring when en route to northern feeding grounds in the Chukchi Sea. They feed on a wide variety of species including squid, krill, and other zooplankton and schooling fishes such as capelin, sand lance, and herring. The eastern North Pacific population of fin whales was estimated between 8,500 and 16,000 animals (Zimmerman 1996).

Humpback Whale

Humpback whales occur infrequently inside Akutan Harbor, especially when large schools of baitfish (e.g., herring) are present. Large schools of baitfish are present in Akutan Harbor during the summer when they are preying on sandlance (Byrd 2001). During the summer, they inhabit coastal waters from southern California through the Gulf of Alaska to the Southern Chukchi Sea. In Alaska, they feed primarily on krill and small fish. The North Pacific population is estimated to be between 1,000 and 1,200 (Faris 1996).

Short-tailed albatross

The short-tailed albatross (*Phoebastria albatrus*) is endangered throughout its range except in the United States. It is a very large seabird with long, narrow wings adapted for soaring low over the ocean. Historically, millions of short-tailed albatrosses bred in the western North Pacific on several islands south of the main islands of Japan. During the late 1800s and 1900s, feather hunters killed an estimated five million short-tailed albatrosses, stopping only when the birds were nearly extinct. Only two breeding colonies remain active today. The world population is currently estimated to be about 1,200 birds. Contemporary threats include entanglement in fishing gear, ingestion of plastic debris, and contamination from oil spills.

American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) was delisted from endangered status on 25 August 1999. American peregrine falcon populations are being monitored for 5 years following de-listing in accord with the Endangered Species Act. It may be present in the project vicinity during migration; however, their occurrence in the area is probably irregular and transitory.

Aleutian Canada Goose

The introduction of foxes on nesting islands of the Aleutian Canada goose (*Branta canadensis leucopareia*) led to the species being reduced to nesting on two islands in the Aleutian Islands. Due to years of effort devoted to removing arctic foxes from former nesting islands and reintroducing the geese, the formerly endangered species was delisted in March 2001.

The Aleutian Canada goose may pass through Akutan during migrations to and from wintering areas in California and Oregon. Hunting of Canada geese west of Unimak Pass has been closed since 1973. Use of the Akutan vicinity by Canada geese is unknown. No Canada geese were observed during bird surveys conducted between 1998-2001 (USFWS files), however Herter (1990) conducted limited bird surveys and reported that emperor geese use nearshore habitats of the Krenitzin Island group in the non-breeding season.

Fish and Invertebrate Resources

Methods

We attempted to describe the marine resources of three proposed alternative sites (Fig. 2) by completing a variety of surveys including dive surveys, pot-trapping, and beach seining. We supplemented our direct observations with scientific literature, reports, files, and reliable local informants, where appropriate.

The Service completed dive surveys at potential harbor sites in June 2000. Two transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S,1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+). Scientific and common names to marine organisms are included in the appendices for each set of dive transects. Common names are often used in the report for clarity.

Biotic data was also recorded along the transect using a camcorder in an underwater housing. The data sheets were supplemented by replaying the videotape and noting the occurrence of plants/animals the observer may not have detected. The same observer was used to record data for the alternative harbor sites.

We also attempted to capture benthic invertebrates using "hair-crab" pots placed in water about 50-feet deep for two days during the dive surveys. The pot mesh was approximately 3-inch (stretched). We baited the pots with three herring and soaked them near where the dive transects were to be completed. Representative specimens captured were photographed.

Fish were surveyed using a 30 meter-long beach seine with a fine mesh net at the cod-end. This net was deployed from shore using a small inflatable skiff and retrieved by two people on shore, with the cod end coming ashore last. Fish were counted according to species and returned. Sub-samples of the catches were measured. A full description of these activities is described in Robards and Schroeder (2000).

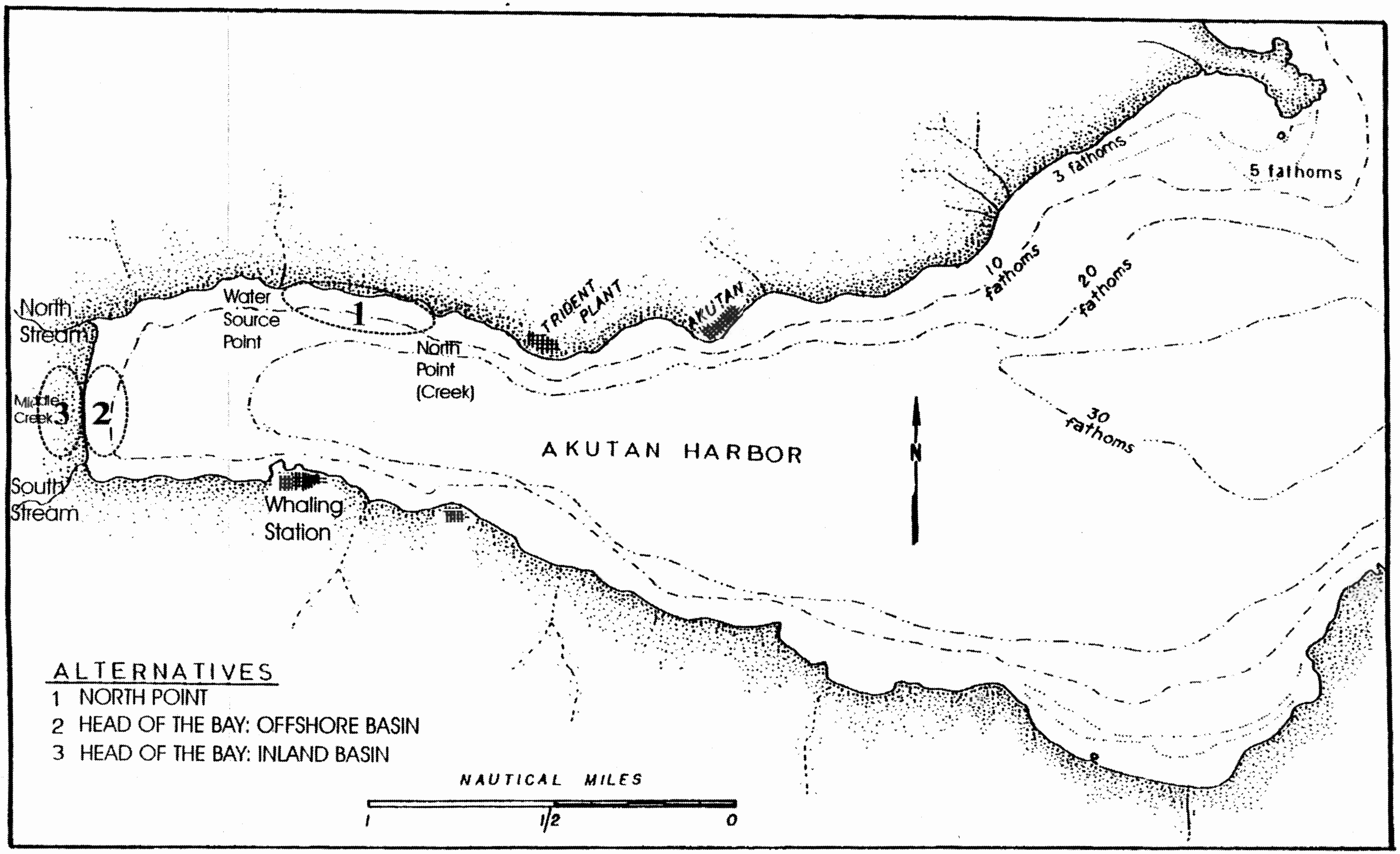


Figure 2: Alternative locations for a mooring basin within Akutan Harbor, Akutan Island, Alaska (adapted from Crayton 1983).

<u>Alternative Site 1: North Point</u>

Akutan Harbor was formed by glacial scouring, creating a U-shaped valley that was later flooded by the sea. There are a few minor promontories jutting out from the shoreline, one we refer to as North Point (Figures 2 and 3).

Dive Surveys

<u>North Point</u>: One marine transect was completed from North Point in June 2000 (Fig. 3). The divers ventured to approximately 19 m (60ft) in depth before losing natural light. The intertidal substrate was characterized by cobble and pebbles, changing to granule and sand sized particles further from shore (Appendix 1). The slope was gradual until about 60 m from shore then it dropped off rapidly.

Ulva and *Alaria* dominate the algae community in the intertidal and subtidal zones, with lesser amounts of *Palmeria* and *Laminaria*. Filamentous green algae (*Enteromorpha intestinalis*) was conspicuously abundant in the subtidal zone, down to about 20ft deep. Intertidal and subtidal animals included blue mussels, limpets, barnacles, periwinkles, with hermit crabs and other snails more common in deeper areas. Butter clams were abundant along the transect between 30m and 90m from shore; other clam species were also observed. An abundance of predatory starfish (*Pycnopodia* and *Evasterias*) were also found associated with the clam bed. Adult and juvenile rock sole were the most abundant fish species observed along the entire transect.

Anecdotal observations made from an elevated point above the North Point site noted two sea otters feeding on clams at the site. The otters had no difficulty locating clams, returning to the surface to eat the clam before diving to find another. This behavior was observed for over 20 minutes before the biologist had to leave the overlook. These observations indicated that shellfish are abundant at the site.

<u>Water Source Point Transect</u>: Water Source Point is approximately midway between North Point and the north stream at the head of the bay (Figure 3). The intertidal substrates are cobble and boulders, but change to a combination of sand and boulders further offshore (Appendix 1). At 50 m from shore, the boulders become fewer and are replaced with a substrate of sand and large granules. The bathymetry of the site was shallower than the North Point site, reaching a maximum depth of about 11 ft at 100 m from shore.

Ulva and *Alaria* dominated the algal community, with lesser amounts of *Desmarestia*, *Costaria*, and *Porphyra* in deeper areas. Patches of *Lamanaria* were attached to some larger boulders at stations 6,7, and 9. As with the North Point site, intertidal animals included blue mussels, barnacles, and periwinkle snails. Hermit crabs and other snails were also recorded. Occasional boulders provided protection for some large anemones, such as *Telia* and provided anchor sites for *Metridium*.

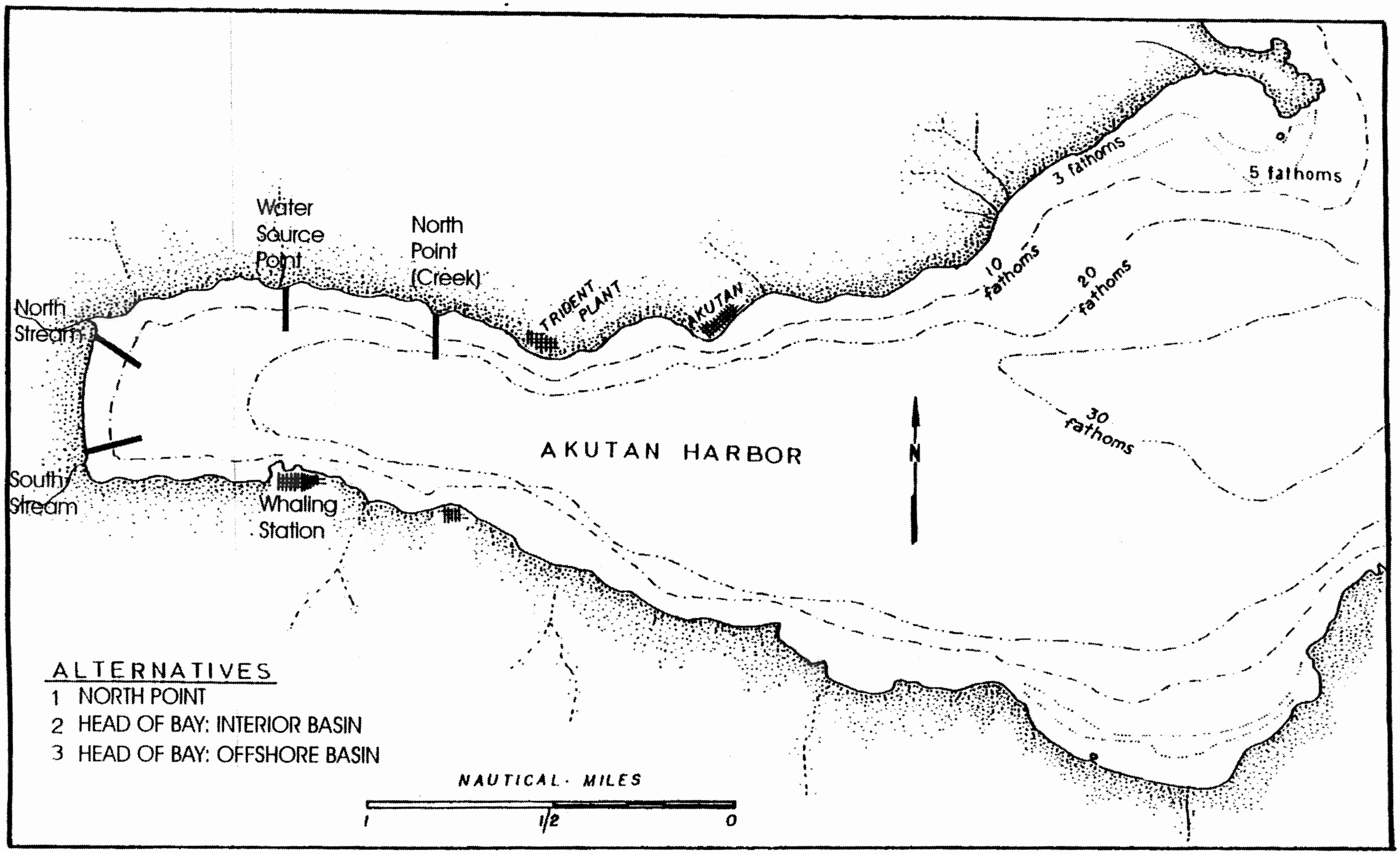


Figure 3: Dive survey transect locations within Akutan Harbor, Akutan Island, Alaska, June 2000 (adapted from Crayton 1983).

A substantial clam bed, consisting primarily of *Saxidomus giganteus* and *Clinocardium nutalli*, was found between 40 m and 90 m from shore in waters 6-9 ft deep. *Pycnopodia* and *Evasterias* seastars were common in and around the clam bed. Rock sole and various sculpins were common along the transect, with many juvenile rock sole found in the upper subtidal zone.

Crab Pot Surveys

Two "hair-crab" pots were placed offshore of the North Point site in June 2000. One pot was lost. Another pot set 0.3 km further west in similar habitat captured a large sunstar (*Pycnopodia helianthoides*).

The site is within the distribution of red king crab and dungeness crab (Resource Analysts 1990, ADFG 1985). Tanner crab (*Chionoecetes bairdi*) are reported to occur in nearby Akutan Bay. All of these crabs are within a reported commercial harvest area (Resource Analysts 1990, ADFG 1985).

Fish Surveys

We attempted to use beach seines to determine the composition of the nearshore fish community at this site. The shoreline is studded with large bounders that snagged and tore the net. One person constantly freed the net from these boulders and it is believed that captured fish had ample opportunity to escape. One haul was made at this site. A total of 53 fish was captured: 29 Dolly Varden, 3 juvenile (pink?) salmon, 4 greenlings, 1 sculpin, 14 rock sole, and 6 starry flounder. One unidentified juvenile non-salmonid fish and two saffron cod were also captured. Saffron cod were unexpected, but two others were captured in similar habitat approximately 0.3 km west of North Point at a site called Water Source Point. Silver-spotted sculpins and sandlance were also captured at Water Source Point. Although the catch-per-unit-effort was not large, a large number of species was captured in this type of habitat. We believed more fish would have been captured, had the net not continually snagged on rocks and boulders.

One juvenile pink salmon was captured near this site in March 2000, one of few fish captured during beach seining in the late winter.

The site is within a known herring feeding area (Resource Analysts 1990) and huge schools of herring have been observed in Akutan Harbor in mid-summer (Schroeder, USFWS files). ADFG (1984) reported that herring spawn along the entire shoreline of Akutan Harbor.

Alternative Site 2: Head of the Bay – Offshore Basin

Dive Surveys

Two marine transects (Fig. 3) were completed in June 2000 off the freshwater streams at the north and south sides of the head of the bay (Fig. 2). The substrates from the beach edge and seaward 100 meters for both transects were classified during dive surveys. Descriptions for the

June 2000 transects were combined into Appendix 2. The substrates for the two transects were primarily sand and larger granules (Appendix 2).

The intertidal zone occupied a narrow band along the steep-sloped profile; however, unlike the other dive sites, there is a relatively flat sublittoral bench located between 6 and 12 ft in depth. The intertidal zone, extending seaward up to 30 meters, was dominated by sea lettuce (*Ulva*) and *Alaria* with smaller patches of filamentous green algae (*Enteromorpha intestinalis*), red laver (*Porphyra pseudolinearis*) and other brown and red algae. Small clumps of rockweed (*Fucus gardneri*) attached to occasional rocks or debris. Small snails and barnacles were attached to occasional rocks. Blue mussels also used their byssal threads to attach to a cluster of small rocks to anchor themselves in the substrate. Hermit crabs, amphipods, and some sea stars were also common. Past the subtidal zone and down to about minus 10 ft, the algae community did not change appreciably, but there were noticeable concentrations of butter clams and their primary predator, sunstars. The number of rock sole and sculpins along this transect was impressive, but not all of the sculpins could be identified without collecting them.

The south creek dive had a different profile in that it encountered the shelf break approximately 55 m from shore. *Metridium* and a few other anemone species were encountered past the shelf break in deeper water where they attached to the occasional large butter clam shell or piece of debris. The silts were encountered mid-slope (at about 55 ft) on the south creek dive, approximately 85 m from shore. (Soft black silts were not encountered on the north creek dive as the transect never went below minus 8 ft.) Although organisms were observed beyond this point, there was a noticeable change in their abundance. Dense concentrations of the spinoid polychaete worm (*Boccardia spp.*) became more common.

Crayton (1983) describes the marine environment at the head of the bay. He described the beach environment in the early 1980s as being extremely polluted, being heavily laden with oil or diesel fuel. This contamination was imbedded in the sands along the beach. Dive surveys and beach seines were used to assess the biotic community, especially fish. Crayton states, "At depths greater than 10 feet, the substrate become(s) extremely silty. Very few organisms were seen below 30 feet."

Large quantities of seafood waste discharges and petroleum product spills appear to have impacted Akutan Harbor, especially the head of the bay where there is poor circulation. The impacts to water quality likely impacted the head of the bay and lowered its biological productivity, especially in the vicinity of the seafood waste discharge sites. These were the conditions that Crayton described in his previous survey reports.

The general biological productivity and diversity of the head of the bay now appears to have improved significantly since the early 1980s. The black silty substrates described by Crayton have migrated further offshore into deeper water. Marine organisms are abundant up to and briefly past the new boundary with what appear to be anoxic seafood waste deposits. The dense concentrations of the spinoid polychaete worm (*Boccardia spp*) indicated that the site remains disturbed, but that new organic material (their preferred food source) is readily available. We surmise that continual organic input from the Trident seafood plant likely keeps this system at *status quo*, the available biological oxygen being used to decompose the continual waste input rather than being available to aid in the decomposition of historic waste piles that remain on the Akutan Harbor seafloor.

Comparisons between dive sites: The marine topography was different between the two sites based on dive profiles (Fig. 4). This may account for some of the differences in species found between the sites. Similarly, the substrates of the two sites were not the same and would have influenced the distribution and abundance of certain organisms, especially those requiring firm attachment surfaces. Some differences in species abundance between the two sites appeared to be related to local circulation patterns and water quality.

Despite having generally poor large-scale circulation patterns, the marine habitats of the two alternative sites appeared to be biologically productive and the intertidal and nearshore subtidal zones have a greater marine species diversity than similar sites surveyed in industrial portions of nearby Dutch Harbor. Habitats at the head of the bay appear to have improved somewhat from their seriously degraded state observed in the mid-1980s.

Crab Pot Surveys

Two "hair-crab" pots were placed offshore of the northern and southern freshwater streams. The northern pot captured a large sunstar (*Pycnopodia helianthoides*) and the southern pot captured 3 sunstars and a large helmet crab (*Telmessus cheiragonus*).

The site is within the distribution of red king crab and dungeness crab (Resource Analysts 1990, ADFG 1985). Tanner crab (*Chionoecetes bairdi*) area reported to occur in nearby Akutan Bay. All of these crabs are within a reported commercial harvest area (Resource Analysts 1990, ADFG 1985).

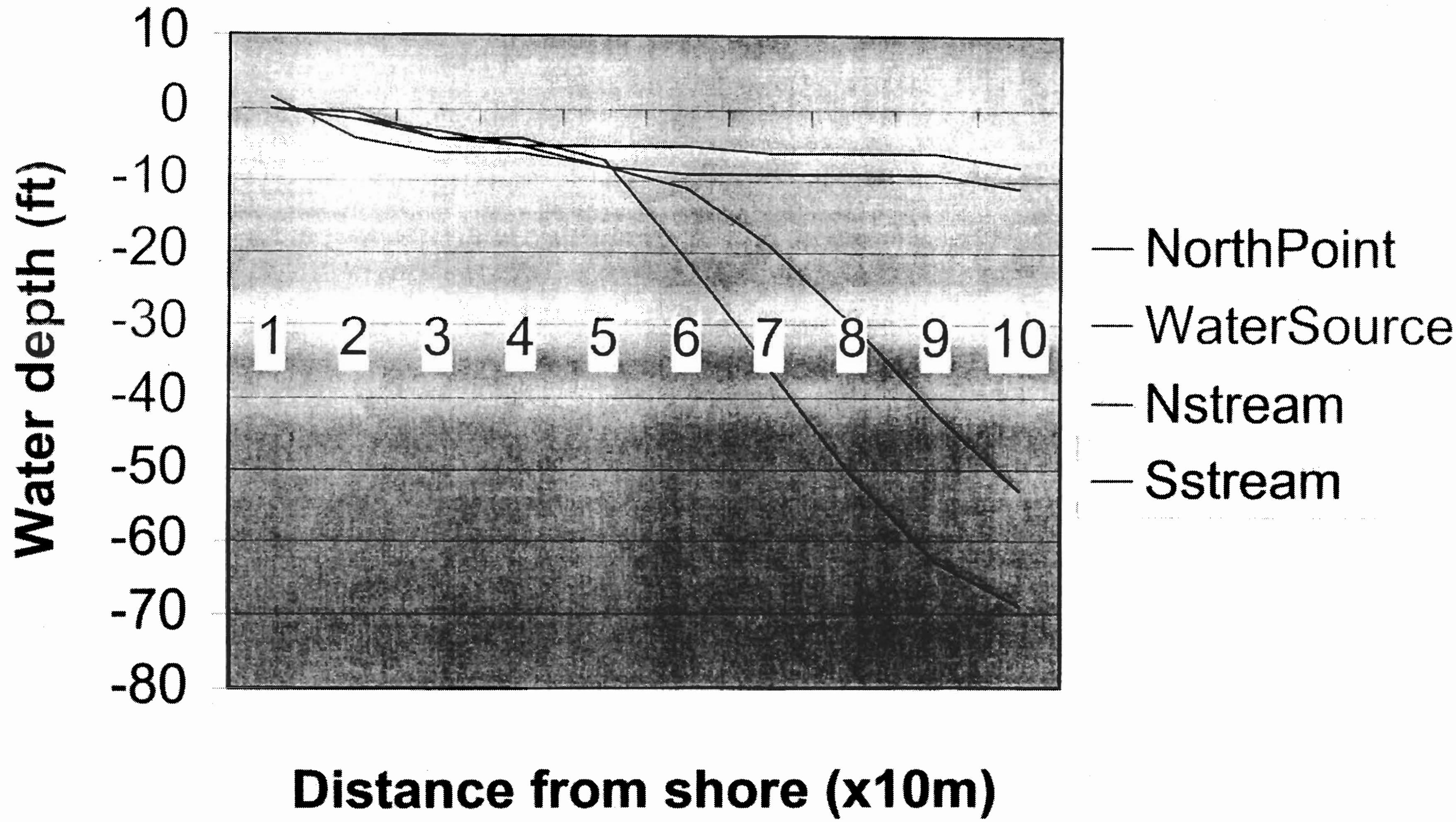
Fish Surveys

Beach seines were used to determine the composition of the nearshore fish community across the head of the Bay. Four hauls were made in March 2000 to assess winter fisheries. Two rock soles were captured on March 15, 2000. No salmon smolts were captured.

The same four sites were sampled on June 8, 2000. One hundred eighty-seven fish representing at least 10 species were captured. Rock sole (n=121) and Dolly Varden (n=38) dominated the catch, with smaller numbers of silver-spotted, northern, and great sculpins, starry flounder, Pacific cod, kelp greenling, crescent gunnel, and saffron cod. Four of these species are typically important to local subsistence users and the commercial fishing industry. No Dolly Varden or juvenile cod were observed during dive surveys completed later that same month.

The large numbers of rock sole and Dolly Varden indicated those fish were likely present to take advantage of young salmon leaving the streams at the head of the bay. No juvenile salmon,

Figure 4: Akutan Dive Profiles, June 2000



however, were captured at the head of the bay in June 2000. The absence of young salmon in our beach seines indicated that the juvenile salmon were well on their way out to the open ocean and/or were heavily preyed upon by the abundant predator population. Large numbers (often thousands) of juvenile salmon were captured per haul in seine sets made near the Pot Dock, the Whaling Station dock, and off the gravel beach near the southern entrance to Akutan Harbor (Robards and Schroeder 2000) supporting the conclusion that the young salmon were well on their way to the open ocean.

LGL 2000 reported capturing four recently emerged pink salmon fry in May 2000 in the northern stream. This led the authors to conclude that the outmigration of pink salmon was later than normal. In contrast, our surveys found a juvenile pink salmon smolt midway along the northern shoreline in March 2000.

Three beach seines conducted in July 1983 near the head of the bay collected the second highest number of fish species of four sites sampled in Akutan Harbor (Crayton 1983). Pink salmon and sandlance were the most abundant fish species present, with coho salmon, silver-spotted sculpin and Pacific tomcod (*Microgadus proximus*) also being captured in large numbers. Flatfishes were also caught. The coho salmon were captured near the southern-most beach segment. .

The site is within a known herring feeding area (Resource Analysts 1990) and huge schools of herring have been observed in Akutan Harbor in mid-summer (Schroeder 2000). ADFG (1984) reported that herring spawn along the entire shoreline of Akutan Harbor.

Alternative Site 3: Head of the Bay – Inland Basin

The Head of the Bay – Inland Basin ("Inland Basin") alternative moves the mooring basin and maneuvering area out of the marine environment and into a wetland complex located behind a large vegetated berm at the head of the bay. A portion of the berm would be breached for the construction of an entrance channel to the mooring basin.

Dive and Crab Pot Surveys

The nearshore and offshore marine environment would be identical to that previously described in the Offshore Basin alternative.

Fish Surveys

The marine fisheries were previously described under the previous Offshore Basin alternative. As the majority of the proposed harbor at this site would be created from the dredging of a large wetland complex, impacts to freshwater fisheries needed to be evaluated.

There are three streams that flow through the Inland Basin alternative vicinity (Fig. 2). In order of significance, these are:

North Stream: As many as 15,000 pink salmon (LGL 2000a) and tens of coho salmon have been observed spawning in this stream. Dolly Varden also occur in the entire system. Two adult chum salmon were observed in late September 2000 (ibid.). The coho salmon escapement in the north stream is reported to be about 1000 adults (ibid.).

South Stream: As many as 1,500 pink salmon (LGL 2000a), and lesser numbers of coho and Dolly Varden spawn or are resident in the south stream (Schroeder 1999, LGL 2000a). Three-spine sticklebacks also occur in the lower reaches or isolated lakes and ponds within the watershed (Schroeder 1999, LGL 2000a).

Middle Creek (Central Stream): This watershed supports Dolly Varden and large numbers of three-spine stickleback (Schroeder 1999, LGL 2000a). Juvenile coho rear in a small section of creek between a waterfall barrier and Akutan Harbor (LGL 2000a).

Many local residents subsist on salmon. Most salmon are sockeyes harvested with nets operated from shore or accessed nearby using skiffs. Some harvest of pink and coho salmon with gill nets occurs at the north and south streams at the head of the bay, but reliable harvest information is not available. One set in 2000 was reported to have captured 23 coho salmon at the entrance to the north stream (LGL 2000a). Subsistence harvest reports are not required for Akutan residents.

Avian Resources:

Bald eagles are frequently observed in the project area, especially during later summer salmon runs at the head of the bay. One pair of eagles reportedly nests near Akutan Point (Crayton 1983); no other eagle nests have been documented to occur within the project area, but a nest is reported on a rock outcropping about mid-way up the northern side of Akutan Harbor. The relationship of this unverified nest and the proposed road alignment has not been determined.

Bald eagles are frequently observed in the Akutan Harbor area, but no nests within the immediate vicinity of the three alternative sites were observed. One bald eagle nest is documented to occur at Akutan Point, a potential harbor site no longer under consideration.

Emperor geese are reported to occur in the Akutan Island vicinity and suitable nearshore habitat exists. Dedicated winter seabird surveys and other non-systematic surveys made during the summer have not documented the presence of emperor geese within Akutan Harbor (Schroeder 1999, 2000, 2001). For the purposes of this report we conclude that the use of the three alternative sites are not important to emperor geese.

Dedicated winter seabird surveys were completed in March 1999 (Schroeder 1999), January-March 2000 (LGL 2000b) and January-February 2001 (Schroeder 2001).

March 1999

Service biologists recorded between 87 and 358 Steller's eiders in the western half of Akutan Harbor in March 1999 during shore-based surveys (Schroeder 1999). The largest flocks were concentrated near the entrance to the south stream at the head of the bay and in smaller flocks along the southern shoreline, especially near small bays at the Whaling Station and the Pot Dock. Flocks of Steller's eiders and other seabirds used nearshore waters between Salthouse Cove and the eastern edge of the city of Akutan.

January-March 2000

Skiff-based seabird surveys completed in January 2000 by LGL and Service biologists found an average of 455 Steller's within Akutan Harbor (LGL 2000b). Total numbers of Steller's eiders within Akutan Harbor were 453, 451, and 461 on 23, 24, and 25 January 2000, respectively. One-hundred forty-seven (34%) of 439 Steller's identified to sex were male.

Seaducks were the most abundant group of birds observed (nearly 70% of all birds observed). Of the seaducks, Steller's eiders were the most abundant, followed by harlequin ducks and white-winged or black scoters. The LGL report concluded that eiders were consistently found in the southeast corner of Akutan Harbor and along the south side of the Harbor between a point directly across the Harbor from Akutan and west to the south stream. As many as 125 Steller's eiders frequented nearshore areas immediately off the community in the mornings and evenings. Use of the North Point site was low-moderate. Eider flocks appeared to move within the harbor depending on weather patterns. In general, flock size decreased and flushing distance increased during the boat surveys.

The same surveys were repeated during February and March 2000 (LGL 2000b). Total numbers of Steller's eiders within Akutan Harbor were 321, 336, and 252 on 16, 18, and 19 February 2000, respectively. Distribution patterns during the February survey were similar to those of the January 2000 survey. Additional observations were reported of eiders using nearshore waters at Water Source Point and the shoreline east of the city of Akutan.

Steller's eider numbers in Akutan Harbor were substantially lower during the March 2000 survey. One flock of 35 eiders was observed near North Point with a few other pairs and individuals scattered around the Harbor. A total of 48 Steller's eiders were seen along the northern shoreline, including nine eiders that were observed at the head of the bay, during a hike from the Trident seafood plant to the north stream at the head of the bay on March 19, 2000.

January - February 2001

Similar abundance and distribution patterns were observed during additional skiff- and shore-based surveys completed by a Service biologist in January and February 2001 (Schroeder 2001). A minimum of 252 Steller's eiders were observed in the western half of Akutan Harbor on 22

January 2001. Poor weather conditions hampered a more complete count of the entire area during January 2001.

Shore-based counts in mid-February 2001 found a minimum count of 199 Steller's eiders within the western half of Akutan Harbor. Eiders again were most often found in the southwest corner of Akutan Harbor, along the southern shoreline from its midpoint west, and off the community of Akutan/Salthouse Cove in the morning and evenings.

A skiff-based survey (using the same methodology as the 2000 surveys) was conducted on 18 February 2001. A total of 262 Steller's eiders was counted within Akutan Harbor. Eighty percent of all the Steller's eiders observed were found in Sector 4, the sector along the south side of Akutan Harbor that includes the south stream. This number is within the range of Steller's eider counts obtained during February 2000, indicating that eider numbers were comparable to the previous year.

Terrestrial and Marine Mammals

Terrestrial Mammals

Red foxes appear native to Akutan Island (Bailey 1993). No other native mammals are known to exist. Rats have become established at the Trident Seafood processing facility and within the community of Akutan (Schroeder, pers. obs.). Baits that were set around the south side of Akutan Harbor in June 2000 were undisturbed except for one bait that appeared chewed on by a rodent or shrew at the Whaling Station. This bait was sent to the Alaska Maritime NWR for evaluation.

Sea Otters

Sea otter numbers in the eastern Aleutian islands have declined by more than 50 percent in some portions of the Aleutian Islands. On November 9, 2000, the northern sea otter (*Enhydra lutris*) was listed as a candidate species for listing under the Endangered Species Act. Population surveys and other research aimed at identifying the cause of the decline are currently underway.

Sea otters (*Enhydra lutra*) feed on benthic invertebrates such as bivalves, sea urchins, and crabs. The abundance of macroalgae, clams, and sea urchins within some areas of Akutan Harbor indicated sea otters are not exerting appreciable predatory effect on sea urchin populations (Schroeder 2000, Estes et al. 1983), however it also appears that sea otters are now becoming more abundant in the area during the winter (Schroeder 2001). Sea otters periodically make intensive use of certain nearshore areas, feeding at a site until suitable prey organisms are below an efficient foraging threshold.

In the absence of sea otter predation, the size and density of clams and other invertebrates increases. For areas of high-density sea otter populations, coastal habitats of less than 30 m in depth should be considered to be of critical importance since most reproductive activity, rearing of young, and foraging occurs in these areas (DeGange et al. 1990).

The most recent dedicated survey of sea otters around Akutan Island was completed in 2000 (Doroff et al., in prep.) when biologists counted 20 sea otters, for a corrected estimate of 72 sea otters. An aerial survey completed in April 1992 counted 58 sea otters for a corrected estimate of 138 (Evans 1997). Using the two most recent survey estimates for Akutan Island, the estimated number of sea otters around Akutan Island has dropped by nearly 50%.

Sea otters appear to make use of the alternative harbor locations, but these use patterns may be dynamic. Surveys conducted January - March 2000 found a maximum of four sea otters within Akutan Harbor (LGL 2000b). The North Point site appeared to be actively used for feeding during January 2001 (Schroeder 2001). The largest concentration of sea otters (n = 29) was observed during the 2001 winter bird surveys, along the northwestern shoreline of Akutan Harbor. Most were near the north stream at the head of the Bay.

Dive surveys indicate there are areas within Akutan Harbor that would be considered productive foraging sites for sea otters. If sea otters from other areas (such as from the outside of Akutan Harbor) move in search of productive foraging areas, they would likely find an abundance of preferred foods in Akutan Harbor. Anecdotal observations indicate this may already be occurring.

Harbor Seals

Harbor seals (*Phoca vitulina*) generally require certain traditional beaches and offshore rocks for resting and pupping areas. Land areas where pups are born are particularly important to the welfare of harbor seals and disturbance of these areas should be avoided, especially during the first three weeks of June. Harbor seal observations made in Akutan Harbor indicate that females give birth on a secluded beach and leave the pup there while returning to the ocean to feed. The Service has documented seals leaving pups on the north and south beaches of Akutan Harbor in June. Harbor seals are observed in low numbers ($n \leq 4$) in nearshore waters of Akutan Harbor during most times of the year (Schroeder 1999, LGL 2000b, Schroeder 2001).

Harbor Porpoises

Harbor porpoises (*Phocoena phocoena*) may occur in low numbers in Akutan Harbor (Reeves et al. 1985), but no porpoises were observed during any of the winter seabird surveys or summer fisheries work reported on in this report (Schroeder 1998, 1999, LGL 2000b, Schroeder 2001).

Killer Whales

Killer whales (*Orcinus orca*) occasionally venture into Akutan Harbor (D. Pelkey, pers. comm.). No killer whales were observed by Service biologists within Akutan Harbor, but they would be expected to occur there in pursuit of salmon or marine mammal prey. Killer whale pods were observed in Akutan Pass and Unalaska Bay (Schroeder 2000, 2001).

Subsistence Resources

The population of Akutan is small (70-100 people) and many residents rely or subsist on foods harvested from the local area. The Service has an affirmative responsibility to protect subsistence resources and harvest opportunity. Specific documentation of subsistence uses for the alternative sites has been difficult to obtain.

The primary use of local resources can be broadly broken into the following two groups; 1) marine mammals and birds, and 2) fish and marine invertebrates.

Subsistence use of marine mammals and birds

Harbor seals are believed to be an important component in the annual marine mammal harvest at Akutan, providing meat to a number of Aleut families. As sea lions have declined, harbor seals have likely become the most utilized marine mammal in the area for subsistence purposes. As many as four harbor seals at a time have been documented to occur regularly within Akutan Harbor (Schroeder 1999, LGL 2000b, Schroeder 2001). Seal hunting is typically conducted by boat.

Presently, sea otters are allowed to be taken by local Native hunters for subsistence purposes although Veltre and Veltre (1982) indicated that the sea otter was protected from harvest since 1911 (and may not have been harvested up to 1981). Historically, sea otters were a highly prized animal, but are not reported to be utilized by Native hunters in the Akutan vicinity now. Sea otter numbers in the Aleutian Islands have declined dramatically in recent years and there is concern that the population will continue to decline.

Bird hunting for mallard, green-winged teal, scaup, goldeneyes, harlequin ducks was reported to occur during the fall and winter months. These birds were generally found near protected areas at the head of Akutan Harbor. These birds can be found in varying degrees of abundance at each of the alternative harbor sites, primarily near small coves where small streams enter the Harbor. Service biologists have observed locals actively harvesting harlequin ducks, one of the most abundant species present during the winter. Mallards and teal are less common, but are preferred and actively sought. Contemporary subsistence use patterns for these species are difficult to obtain, but any project that would decrease the abundance or distribution of these species would likely have a corresponding impact on subsistence harvest opportunity.

Subsistence use of fish and marine invertebrates

Veltre and Veltre (1982) reported that a number of fish and marine invertebrate species were used by the residents of nearby Unalaska for subsistence purposes. These included halibut, cod, salmon, Dolly Varden, and (occasionally) greenling (pogy), sea bass (rock fish), pollock, and flounder (soles). All but the salmon and Dolly Varden are typically harvested either in open waters away from the alternative harbor sites or are not specifically targeted where they do occur in the proposed harbor alternative locations. Rock fish are captured by hook and line off the docks at the Trident plant and the Akutan city dock.

Veltre and Veltre (1982) reported that salmon were the most important subsistence resource in nearby Unalaska when they prepared their report in 1982. They stated that because virtually all the community was included in a network of sharing of salmon, every family in Unalaska used salmon. We speculate that the same may be true for Akutan. Local residents use gill nets to harvest pink, coho, and sockeye salmon in Akutan Harbor. Subsistence salmon fishing remains very important to many Aleutian Islands communities (Shaul and Dinnocenzo 2000), including Akutan.

Service biologists have observed local residents harvesting (what were assumed to be) blue mussels from nearshore boulders during low tides during the summer. Locals are reported to have historically harvested urchins and clams within Akutan Harbor, but do not seem to harvest them as much in recent times. Similarly, king and tanner crab numbers have declined, and although harvested in the past, their low numbers do not appear to make crabbing worth the effort. Juvenile king crab were observed off the community of Akutan and tanner crabs were observed at 100 ft depth immediately offshore of the Whaling Station.

SIGNIFICANT RESOURCES LIKELY TO BE AFFECTED BY THE PROJECT

Some organisms tend to be less tolerant of activities than others. For example, early life stages of aquatic organisms are the most susceptible to heavy metals and pollutants in general but many chemical, physical and seasonal factors influence this toxicity. Although there may be an increase in the local contaminant load, as long as proper storage, handling, and disposal procedures are maintained for toxic substances and good circulation is maintained in the harbor, it is unlikely that contaminant concentrations would be lethal to or would significantly affect fish and wildlife resources. In the absence of these controls, however, there are a variety of effects that harbors have on significant fish and wildlife species.

The primary impacts that a harbor in Akutan Harbor would have include:

- Introduction of petroleum compounds and other hazardous materials into marine waters from vessels (Water Quality Issues);
- Direct loss of marine habitats from breakwaters and other nearshore structures or modifications (In-water Structures);
- Impacts to nearshore fish movement or increased access to fish predators (Road Access and In-water Structures);
- Habitat modifications from dredging (Dredging Issues);

- ♦ Displacement or harm to fish or wildlife from harbor sites due to floating or other structures or disturbing human activities (Displacement Issues); and

- ♦ Inducement of associated developments near the harbor site that will increase these impacts cumulatively over a larger area in the future (Cumulative Effects).

These issues are discussed by fish and wildlife resource group below.

Harbor effects on seaducks

Direct effects

Seabird mortality caused by large spills from tankers or barges usually attracts public attention and official investigation, but the cumulative mortality of seabirds from small, unreported spills may often be higher (Camphuysen 1989, as cited in Burger and Fry 1993). Beached bird surveys have demonstrated that small-volume, chronic oil pollution is an ongoing source of mortality in coastal regions (Burger and Fry 1993). Small volumes of oil may be released from leaking tanks and valves, accidents during loading and off-loading, flushing of tanks and bilges, etc.

Direct effects include impacts from chronic petroleum pollution, displacement by in-water structures, and disturbing activities associated with harbors.

Chronic petroleum pollution impacts to seaducks

Oil causes marked loss of insulation, waterproofing, and buoyancy in the plumage. In addition, petroleum oils contain many toxic compounds which can have fatal or debilitating effects on birds (Burger and Fry 1993).

Petroleum can be ingested through feather preening, drinking, consumption of contaminated food, and inhalation of fumes from evaporating oil. Ingestion of oil is seldom lethal, but it can cause many debilitating sublethal effects that promote mortality from other causes, including starvation, disease and predation. Effects include inflammation and hemorrhaging of the digestive tract, pneumonia, organ damage, red blood cell damage, hormonal imbalance, intoxication, inhibited reproduction, retarded growth in young, and abnormal parental behavior (Albers 1991).

Some oiled birds may tolerate oil pollution during warmer ambient temperatures, but have higher rates of mortality at colder temperatures. Nonspecific stresses had additive negative effects on body condition. Such an inability to handle low temperatures could explain the higher death rates for oiled birds during colder months (Bourne and Bibby 1975). Similarly, some birds exhibit hyperphagia to meet the increased demands of body heat loss. If they are unable to meet these demands due to impairment or environmental stresses, they will die.

Scavenging of oiled carcasses is also a major means of petroleum compounds transfer to other bird species. Oiled gulls, eagles, falcons and other birds have been reported following major spills (Burger and Fry 1993). Stewart et al. (1991) concluded that secondary oiling impacts may be underestimated, because the scavengers often roost away from the beaches and may go undetected when they die. About 90% of the radio-tagged bald eagles (*Haliaeetus leucocephalus*) that died in studies following the Exxon Valdez spill were found in brush, away from the beachfront (Stewart et al. 1991). Eagles are observed throughout Akutan Harbor. Because bald eagles nest in Akutan Harbor, adults could transfer oil or other contaminants to their young through contact with contaminated feathers, feet, food, or nesting materials.

The life history of small seaducks warrants special consideration when evaluating the effects of chronic petroleum pollution. Steller's eiders appear to prefer gently shelving, shallow coastline profiles (Fox and Mitchell 1996). Our observations indicate that they make extensive use of kelp beds and rocky reefs as foraging sites. Steller's eiders in Unalaska and Akutan appeared to seek sheltered areas during strong winds (LGL 2000b, Schroeder 1999, 2001).

Although the impacts of chronic pollution from a harbor at Akutan Harbor could impact a variety of species, the impacts to harlequin ducks and Steller's eiders are of paramount concern, because of the low numbers of their populations nationally and their local abundance in the Aleutian Islands. During the approximately 6 months that eiders are in the Akutan vicinity, they are subject to a wide variety of environmental constraints. Recent studies indicate certain life-history strategies of Steller's eiders, coupled with environmental features in their wintering range, may make them particularly vulnerable to chronic pollution. These include the extreme cold temperatures and winds, day length, their dependence on high quality food, and need to accumulate nutrient stores in preparation for migration and breeding.

There are few controlled experiments regarding Steller's eiders, but there are notable similarities between the life-history strategies used by Steller's eiders and harlequin ducks. In many cases, harlequin ducks can be used as a surrogate species to demonstrate how Steller's eiders would be expected to respond to environmental variables and certain perturbations such as chronic petroleum contamination.

Harlequin ducks have life history characteristics that make them vulnerable to population-level effects of spills for years following a spill event. These include high adult survival, occurrence in habitats most affected by oil spills (and which may hold residual oil indefinitely), adaptation to stable and predictable marine habitats, and high site fidelity (Esler et al. 2000). Chronic, low-level oil pollution would impact harlequin ducks and similar species the same way as would residual oil from a spill.

Goudie and Ankney (1986) described how body size affected the activity budgets and diets of sea ducks (common eiders, black scoters, long-tailed ducks, and harlequin ducks) wintering in Newfoundland. The smaller species, harlequin ducks and long-tailed ducks, had diets with higher energy densities and spent more time feeding than did the larger black scoters and common eiders. The two smaller species had little flexibility in adjusting their activity budgets.

Daylight available for foraging may be particularly limiting. Steller's eiders and harlequin are visual foragers and cannot forage when it is dark. Fischer and Griffin (2000) concluded that harlequin ducks were constrained in the amount of time they must spend feeding during the winter. Behavior of harlequin ducks was the most restricted during midwinter when they spent over 80% of their time feeding in the evening hours. Given the large amount of time spent feeding during midwinter daylight hours, harlequin ducks would not be able to extend their feeding bouts appreciably in the event of scarce food or cold temperatures. Because harlequin ducks have little flexibility for meeting increased energy demands during harsh winter conditions, which could result from either hydrocarbon ingestion or plumage oiling, they may be unable to accommodate the effects of oil spills, even if those spills are relatively small (Esler et al. 2000). As Steller's eiders are intermediate in weight (881 grams, 1.94 lbs) between harlequin ducks (604 grams, 1.33 lbs) and long-tailed duck (917 grams, 2.02 lbs)(Bellrose 1976), it is reasonable to predict that Steller's eiders would be susceptible to the same constraints as harlequin and other small ducks existing in a harsh environment. It follows then, that, like harlequin ducks, Steller's eiders would be especially prone to mortality from chronic petroleum spills (as described by Goudie and Akney 1986).

If seaduck prey resources remained stable, the seabirds could be displaced from an important feeding or resting site by fumes from evaporating oil or other disturbing human activities. Displacing seaducks, especially harlequin ducks or Steller's eiders, could result in increased mortality as they may not have the flexibility to move to another site and locate sufficient high energy foods during limited available light of the winter months to sustain themselves during long periods of darkness and/or inclement weather.

Indirect effects of chronic petroleum pollution:

Birds are predicted to allocate the greatest time in habitats with high food abundance and less in areas of low abundance. Indirect effects of oil pollution on eiders and other birds would be those primarily associated with altering the availability or suitability of various food sources at habitats having high food abundance. These effects are described under Harbor Effects on Benthic Invertebrates below.

Displacement by in-water structures:

Rubble-mound breakwaters, finger floats, and vessel hulls would interfere with use of the harbor site by seaducks. These effects are directly related to the size of the basin and the number of vessels/floats within it.

Disturbing activities associated with harbors:

Harbors are centers of activity that include the operation of machinery, engines, horns, etc. that can displace birds from adjacent areas. Seaducks can be displaced from concentration areas by frequent vessel traffic (i.e., noise, approach, wake). Harbor lighting can also interfere with bird migration and birds can strike antennas, guy wires, or other structures if they are disoriented or confused by bright lights.

Harbor Effects on Juvenile Fish

Fish are exposed to spilled oil through contact with dissolved petroleum compounds or particles of oil dispersed in the water column, ingestion of contaminated food or water, and through contact with surface oil. Juvenile fish are more sensitive to contamination, so mortality beyond the early juvenile stages usually requires a heavy exposure; however, fish species vary in their sensitivities to petroleum. Sublethal effects of oil on fish include changes in heart and respiratory rates, enlarged livers, reduced growth, fin erosion, a variety of biochemical and cellular changes, and behavioral responses (Albers 1991).

The literature suggests that some juvenile fish, salmon in particular, either prefer or become trapped within some harbor configurations (Cardwell and Koons 1981). Juvenile salmon may be "harbor-philic" if they seek the protective cover of the floating breakwaters, finger floats, and vessel hulls. This behavior would bring them into close proximity to sources of petroleum compounds and other contamination from vessels in the harbor, where concentrations of toxic materials would be greatest. These effects are directly related to the design of the harbor, especially the number and types of floats and vessels.

Many juvenile fish prefer nearshore waters to forage and use vegetated shallows for escape cover from predators. Harbors can directly impact these habitats through filling, dredging, breakwater construction, or modifications to circulation patterns that alters the composition of the vegetative community at the harbor site. Such community-level changes could alter the abundance or distribution of juvenile fish prey, primarily zooplankton.

Juvenile fish also migrate along shorelines and could be either blocked by breakwaters or experience increased rates of predation if they are forced to move through deeper waters where predatory fish are more abundant than in shallower nearshore waters. Shelves incorporated into the breakwater design or breaches in breakwaters are ways to allow these fish to move through shallow nearshore waters.

Harbors also have roads and upland fill areas that have the potential to fill wetlands or impact streams, particularly at crossings. Poorly designed, constructed, or maintained structures can become barriers to fish movement into and out of the stream or alter the hydrology such that the stream and their associated wetlands support fewer fish than the natural condition.

Harbor effects on benthic invertebrates

Each of the alternative harbor sites support marine food resources that attract certain wildlife species. Some of the more important food resources for sea otters and sea ducks, for example are molluscs and crustaceans. Mortality and sublethal effects on invertebrates, a significant

component of seabird diets, are caused by: smothering, contact by any life-stage (adults, juveniles, larvae) with dissolved oil or suspended oil particles, ingestion of oil or contaminated food and water, and possibly changes in the water, including oxygen depletion and pH change (Albers 1991). Kasymov and Gasanov (1987) determined that a 0.001 mg/L gasoline concentration tends to reduce the survival rate of crustaceans except crab. A gasoline concentration increased to 0.1 mg/L caused the mass elimination of shrimp and amphipoda. A concentration of 20 mg/L gasoline was absolutely lethal for crabs (Kasymov and Gasanov 1987).
Due to direct loss of habitats from breakwater construction, pollution of the harbor vicinity, and/or changes in circulation patterns, the harbor project would eliminate most shallow feeding area within (and to a lesser extent adjacent to) the harbor and would force wildlife, particularly seaducks and sea otters, to forage elsewhere. If other areas are already at carrying capacity, that is, supporting the maximum number of animals that the prey base can sustain over the long term, then it would result in a reduction in the sea otter and sea duck populations.

Pollution has been implicated as a primary or secondary factor in a number of large-scale perturbations to aquatic populations, including unusual phytoplankton blooms (Sarokin and Schulkin 1992). There have been a number of phytoplankton blooms documented in nearby Unalaska Bay (Tester and Mahoney 1995). These blooms can create an abundance of diatom spicules that irritate gill linings and, in conjunction with depressed dissolved oxygen levels, have resulted in deaths of fish and king crabs in the Aleutian Islands. These events could account for dead tanner crabs found below 100 ft offshore of the Whaling Station in June 2000, however, Akutan residents have reported that crabbers tied to the Whaling Station dock sometimes throw dead crabs overboard. These activities could occur to varying degrees at every harbor and reasonably could be expected to occur at the new harbor if constructed in Akutan Harbor.

FUTURE RESOURCE CONDITIONS WITHOUT THE PROJECT

Without the project, resource conditions would be expected to remain largely as they are today until another project is constructed. We are unaware of any other development proposals in any of the alternative project areas. Consequently, the habitat is likely to remain in its current condition indefinitely.

RESOURCE PROBLEMS, PLANNING OBJECTIVES , AND OPPORTUNITIES

Problems

The potential problems associated with a harbor of this magnitude and scope include pollution, direct loss of marine habitat, vessel disturbances, changes to subsistence use patterns, and could contribute to cumulative impacts if there are secondary or indirect impacts that can be anticiapte to occur following harbor construction.

Harbor Pollution

Construction of the harbor could introduce increased levels of petroleum hydrocarbons and other contaminants into the marine ecosystem through vessel moorings and operation and increased opportunities for petroleum spills and other accidents. These contaminants could directly impact birds, including Steller's eiders, emperor geese, black scoters, harlequin ducks, long-tailed ducks, and the prey organisms and habitats on which they depend.

Similarly, acute spills or chronic pollution could impact fish and crustacean species, including sensitive juvenile stages, that are of importance to subsistence, recreational, and commercial users. These organisms are important components of a larger food web leading to a number of other species, including marine mammals such as sea otters, sea lions , harbor seals, harbor porpoises, etc. that are commonly encountered in Akutan Harbor.

Direct loss of marine habitat

Construction of access roads and rubblemound breakwaters will result in direct impacts to the existing marine habitats through burial, changing substrate, altering current patterns, etc. While some of these breakwaters could be re-colonized by marine organisms, there is little evidence to document to what degree recolonization would occur and how long it could take. The constructed breakwaters would function as marine habitat, but likely at a much reduced level compared to pre-existing habitat.

Roads constructed for harbor access would have vehicle traffic that would displace wildlife. Road crossings could alter streams or result in the filling of important wetlands.

The rubble-mound breakwaters and finger floats and vessels would effectively displace wildlife from foraging in these areas.

Vessel Disturbances

Increased numbers of large fishing boats using a harbor constructed in certain areas could result in disturbance to those species (e.g., eiders, mallards, teal) that are sensitive to the presence of humans or vessels, forcing them to other areas where food/or shelter is sub-optimal.

Frequent vessel disturbances could ultimately result in increased mortality to certain species (e.g., eiders, harlequin ducks) that may be at the tolerance threshold for environmental conditions around Akutan Harbor.

Effects on Subsistence Activities

Subsistence activities could be displaced by the construction of a harbor at known harvest locations.

Construction of the harbor may also result in localized reductions of important subsistence foods such as fish and shellfish or other invertebrates.

Construction of the harbor may also result in contamination of important subsistence foods such as fish, shellfish, and other invertebrates. These contaminants could be passed through the food chain to humans or other harvested species, such as harbor seals.

Cumulative Impacts

Harbor construction stimulates commercial development of adjacent lands and marine areas for support services and other facilities such as parking, fuel sales, etc. These businesses benefit from servicing the nearby fleet. These developments also result in additional impacts as those previously described for the harbor. These resulting developments are a predictable direct result of constructing a new harbor and need to be considered when evaluating the overall impact of a harbor design or placement on the resources in the project area.

Planning Objective

Our planning objective for this project is to conserve the habitat values associated with the Akutan Harbor marine ecosystem and the fish and wildlife that are a part of the ecosystem. Specifically, for this project, our primary mitigation goal is to minimize loss or degradation of important fish and wildlife habitats from direct and secondary habitat loss, contamination of coastal waters and food chain organisms, displacement or diminishment of subsistence opportunity, and disturbance of wintering birds from increased vessel and human activity. We also have a goal to maintain, if not improve, the water quality of Akutan Harbor.

Opportunities

We believe there are opportunities to minimize avoidable impacts to natural resources that are important to local residents, the state of Alaska, and the nation. One of the over-riding resource goals of designing a harbor at this site was to minimize impacts to wintering seabirds and fishery resources. For the preferred alternative, harbor engineers were challenged to refrain from placing any developments in either the north or south watersheds and instead, to concentrate it within the lower-value Middle Creek watershed.

DESCRIPTION OF PROJECT

The purpose of the proposed action is to prevent overcrowding and provide additional moorage space for 57 large vessels (29 to 58 m, 80 to 160 ft) near Akutan, Alaska. The Aleutians East Borough requested the Corps of Engineers conduct a feasibility study of navigation improvements to provide permanent mooring slips for about 70 vessels under 200 ft in length. Vessels unable to secure moorage in the existing harbor seek refuge at other ports. Some vessels that do not seek refuge at other ports have to anchor offshore where they may experience some damage during periodic storms.

The stated intent of the harbor is for use primarily by commercial fishing vessels for moorage during closed fishing periods and for protection during adverse weather conditions. The project description and information disseminated by the Corps of Engineers clearly indicated that the economics of the project are based on commercial vessels and there would be little expected use of the harbor by smaller fishing or recreational craft. The location of the proposed harbor would be such that local skiffs could make use of the harbor, but it would require either another skiff to access the harbor to reach the skiffs, or to drive/walk the road to the head of the bay to reach the harbor. Presently there is only one true passenger vehicle in Akutan, a few 4-wheelers, and one utility ATV.

There were two objectives identified for the project:

A. Prevent overcrowding in the existing harbors by providing a safer and more efficient moorage area for the fleet.

B. Provide additional moorage for large commercial fishing vessels that have been on the waiting list for mooring space for many years.

The purpose of the project is to provide a safe and efficient harbor in an economically and environmentally sound manner that satisfies the above two objectives.

PROJECT ALTERNATIVES

The following design and alternatives analyses were based on information provided by the Corps of Engineers.

No-Action Alternative

The no-action alternative would leave all the alternative sites in their present condition. The project purpose and need would not be met. Damage to vessels and docking facilities from overcrowding in other nearby ports would continue; economic benefits to the fleet from slip rental fees would not be achieved; and vessels unable to secure moorage in the existing harbor would continue seeking refuge at other ports. There are, however, proposals to enlarge or construct new harbors in the region. The opportunities for these other potential harbors to provide alternative moorage space to vessels currently mooring in crowded conditions or unable to moor in Akutan have not been investigated. Other harbors are being proposed at sites that may have different environmental impacts as well, but these regional comparisons have not been evaluated.

Steep hillsides and rocky cliffs plunging into the sea and rapidly dropping into deep water characterize the shorelines of Akutan Harbor. Flat islands within Akutan Harbor are scarce and generally limited in size. Within Akutan Harbor five possible locations for a harbor have been identified. These are North Point, Akutan Point, Salthouse Cove, Whaling Station, and Head of the Bay. Three sites (Akutan Harbor, Salthouse Cove, Whaling Station) were eliminated due to engineering and/or economic constraints. The Head of Bay alternative had three different designs. Two Head of Bay designs are evaluated by this report; the Offshore basin and the Inland Basin (preferred alternative). Fuel services would continue to be supplied from other existing sources and are not at all part of the mooring basin project.

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 mi east of the village. Village residents access the site by boat for recreation and subsistence purposes. The area is reportedly use for the placement of subsistence fishery nets.

Of all the sites considered, this location was the most exposed to wind and waves with large ocean waves and swell from the southerly direction. Upland development areas were limited. Bathymetry is not available, but the area appeared shallow and would have needed dredging for the basin. Rubble mound breakwaters appeared to be the best wave protection.

The harbor would have required a 2 mi long intertidal fill road past the village connecting to the existing road at Salthouse Cove. The city of Akutan occupies all the flat land, so the road would have to be placed either in front of or behind the village. Either road scenario would have disrupted life in Akutan including moving houses, blasting, increased traffic and noise, and other safety concerns.

This site was dropped from further consideration because of the cost for building road access. Initial study for road access, wave protection, and moorage facilities could not be justified by the project benefits. Additionally, the unique adjacent habitats and associated resource concerns at Akutan Point, led to the evaluation of other locations.

Salthouse Cove

Salthouse Cove, in a shallow bight, serves as a buffer between the Trident plant on the west and the community of Akutan on the east. The cove is naturally protected from the east and west. Water depths are shallow for a relatively short distance, then drop off sharply. The existing seaplane ramp is in the cove and the city dock is on the east edge adjacent to the village. There are no developable uplands to the east, and there are steep bluffs to the west. Trident Seafoods built a church with a large gym in the limited uplands of Salthouse Cove.

Engineering constraints limited the size of a harbor that could be designed for this site. Economics were not favorable because the mooring basin could not accommodate enough vessels to justify its cost. The local community also opposed the site. A combination of these factors led to the site being eliminated from further consideration.

Whaling Station

Uplands, consisting of natural and constructed fill, front steep mountain hillsides at the southwest corner of the head fo the bay. Originally a whaling station, the U.S. Navy occupied the site during World War II. The upland area is contaminated with Bunker C fuel oil from previous military spills. Subtidal areas may be contaminated with petroleum hydrocarbons as well. The site is leased to Trident for gear storage.

Existing docks at this site were constructed near shore, however the bathymetry drops off rapidly into deep water. Deep water limits offshore expansion and cost-effectiveness of rubblemound breakwaters and wave barriers. A 2 ½ mi access road from the village would be required. After construction of a proposed airport, the access road to the harbor site would be reduced to 1 mile.

This site was not carried into further evaluation because of access road length, contaminated materials, and deep water.

North Point (Alternative 1)

A rocky coastline, with rock outcrops and rocky points, extends west of the Trident seafood plant to the head of the Bay. Steep hillsides extend to the edge of the high water line and the bathymetry drops off rapidly into deep water. There are two creeks and their alluvial fans along this coastline. The second and larger creek is located about 4,000 ft west of the Trident plant. Four submerged plastic pipes supply water from a hillside dam on this creek to the Trident complex.

The road to a new airport will probably follow the top of the slope and not be routed along the beach to reach the head of the bay. Therefore a 1/4 mi access to the site would have to be constructed. This road from the existing trail/road system at the west end of the Trident complex will be primarily within the tideland region due to steep topography of the hillside. Tideland fill contained by structural bulkheads or conventional slopes is required to construct uplands adjacent to the harbor. Deep water within the area limits offshore expansion and cost effectiveness of conventional fill construction for breakwaters.

A concept harbor 1,200 ft long by 320 ft wide with a moorage basin of 8.8 acres was evaluated at North Point. This basin would hold 46 fleet vessels. The initial cost estimate was $15-16 million. Economic evaluation showed the number of boats accommodated in this harbor would not justify the cost. Because of the constraints limiting size increases to linear expansion, no economies could be realized by lengthening the harbor to accommodate more vessels. When this harbor concept could not be justified on the basis of economic and engineering analyses, alternative sites were evaluated.

Head of the Bay

<u>Offshore harbor design</u> (Alternative 2)

Deep water limits offshore expansion and the cost effectiveness of conventional fill construction for breakwaters at this site. Pile-supported barriers are limited to 60 ft of water depth. Steep bathymetry limits a wave barrier to 320 ft offshore. A long narrow harbor had the same benefit/cost concerns as the harbor at North Point. Anticipated impacts to threatened species were also anticipated to be significant. Consequently, alternatives to the offshore harbor design were considered further.

<u>Half and Half design</u>

This was a harbor layout with half in uplands/wetlands and half offshore. Two alternatives were evaluated for this concept. The first was a wave barrier 320 ft offshore in depths to 60 ft. This would create a 15-acre basin with an estimated cost of $20.6 million.

The second alternative was a rubblemound breakwater 200 ft offshore in depths to 50 ft. This would have been 2/3 upland/wetland and 1/3 offshore. The cost for this design was estimated to be $16.2 million.

Because this compromise concept did not offer any real benefit to avoidance of marine or wetland resources and would cost at least as much as other alternatives, the Corps and Service agreed to drop it from further consideration.

<u>Inland Basin</u> (Alternative 3, preferred)

This configuration has the most adverse impact on the wetland complex at the head of the bay, and the least impact on the adjoining marine habitat. Up to 40 acres of wetlands are impacted by dredging the mooring basin and constructing dredge material disposal sites. Despite the vastness of the wetland complex, very little bird nesting occurs, primarily due to the abundance of red foxes on the island. The only unavoidable loss of marine habitat is within the footprint of the entrance channel.

Initial costs for a 12-acre inland harbor are $11.5 million. Initial benefits for 57 boats in the 12-acre basin were $0.92 million for a benefit/cost ratio of 1.2. There are other designs that increase the size of the harbor, but only the 12-acre site is evaluated here.

The Corps of Engineers identified the Inland Basin as the tentative recommended plan. This design has the following associated features:

- A 12-acre, 57-vessel mooring basin dredged to between 14-18 ft MLLW.
- A 200-foot-wide entrance channel dredged to a project depth of 20 ft MLLW, protected by 400-foot-long jetties protecting the north and south sides of the entrance channel.
- Approximately 40 acres of uplands constructed from 750,000 cubic yards of dredged disposal material
- A spur road, 600 ft-long, connects the harbor to a proposed road connecting the community of Akutan to a proposed airport site.

There are three possible sizes for the proposed Inland Basin harbor; 12 , 15 and 20 acres in size. The harbor being considered would be accessed by a road to be constructed prior to the construction of the harbor. As a pre-existing condition, it is not considered in this report.

DESCRIPTION OF POTENTIAL IMPACTS

No-Action Alternative

There would likely be negligible increases in impacts on fish and wildlife resources under this alternative. No new harbor would be developed and no habitat purposefully altered or destroyed.

Spill History for Akutan

It is important to evaluate the history of petroleum spills in the Akutan Harbor vicinity as an indicator of the existing risk spills pose in the Akutan area. The Corps of Engineers contracted for a compilation of hazardous spill history for 10 harbors in western Alaska during the 1990s and characterization of the potential number of spills that could be expected at these harbors into the future (Day et al. 2000a,b). Relevant findings from that work include:

- Of the10 existing harbors studied, Akutan had the third highest rate for petroleum compound spills.

- An average of 6.5 petroleum compound spills were reported in Akutan every year.

- The average size of petroleum compound spills in Akutan over the 10-year period was 1167.4 gallons per spill. Eighty-five percent of these spills were directly to the marine environment.

- Some spills at Akutan were relatively small, of course, but these are offset by larger spills. Akutan Island was the site of one of the largest spills in the region – 10,000 gallons reportedly spilled in 1995 at the Trident seafood plant.

- The number of reported petroleum compound spills in Akutan are less than the number of actual spills. For example, three petroleum compound spills discovered by Service biologists at Akutan Point, Bayview Beach, and North Point in 2000 had not been reported. The extent of under-reporting of petroleum compound spills for Akutan Island is unknown, but may be considerable.

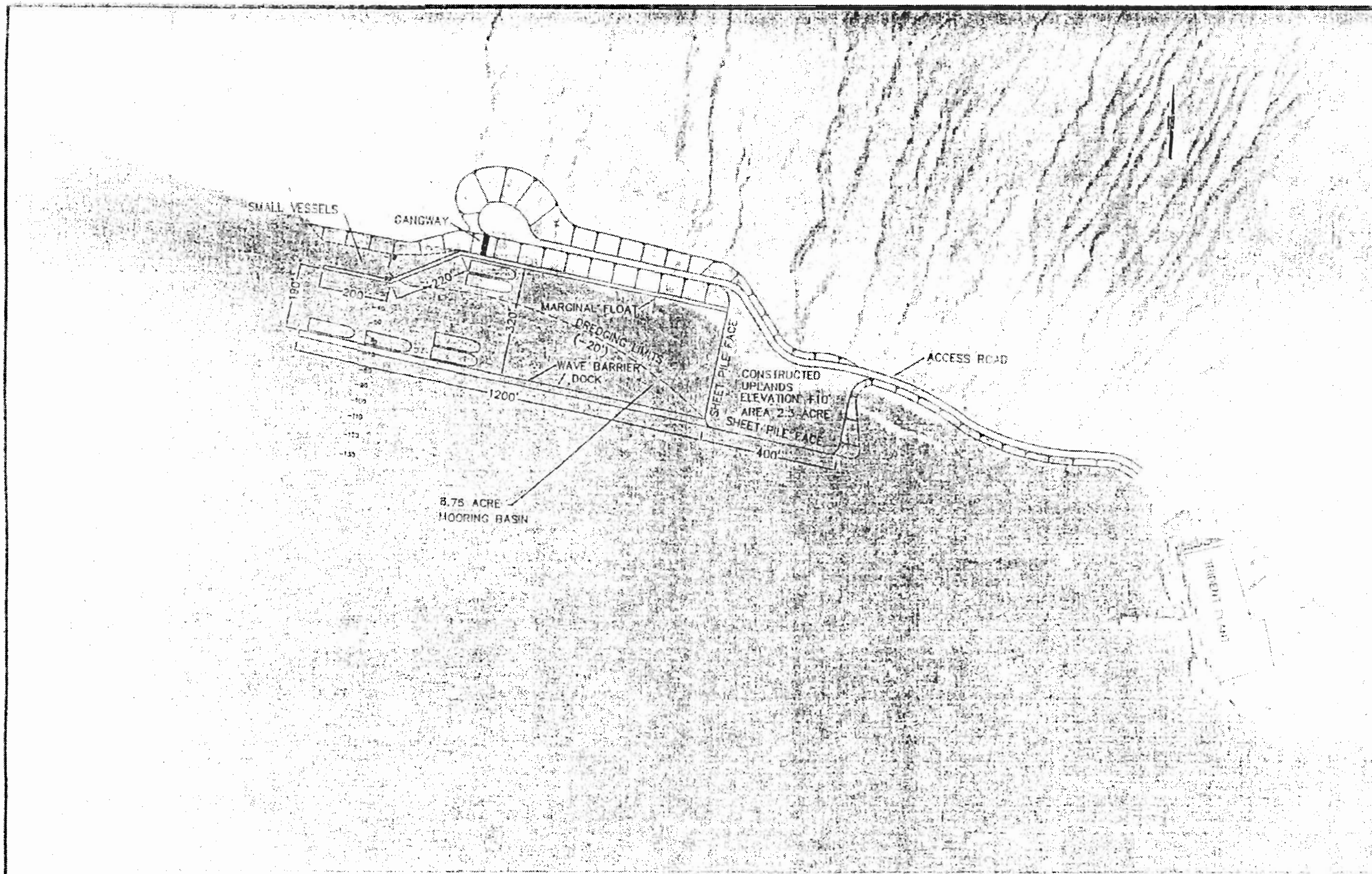
- Neither the mean number of petroleum compound spills nor the mean overall spill size exhibits a consistent pattern with time, suggesting that no increase in efficiency at reducing petroleum compound spills occurred during the 1990s.

- If there is a positive correlation between the ship traffic using an area and the number of petroleum compound spills there, more spills would be expected if Akutan Harbor experienced increased vessel traffic.

- Operator error was the leading cause of oil petroleum compound spills at Akutan Island. Mechanical failure is the second-leading cause of hazardous petroleum compound spills. When fishing is poor, overall maintenance and replacement of equipment suffers, resulting in an increased probability of equipment failure. Declining fisheries economics may result in increased spill rates.

We conclude that there is a documented history of problems in Akutan with releases of petroleum compounds and other hazardous materials under the No-Action alternative. While most of these reported spills are focused on the Trident seafood plant, the vessels involved in these mishaps (and many others) will be using the proposed mooring basin.

The most significant impacts of this project will likely occur to seaducks (including the threatened Steller's eider) and marine/freshwater fish (and the fish and wildlife resources that prey upon them).



GRAPHIC SCALE
400 0 200 400 800
(IN FEET)
SCALE: 1" = 400'

NORTH CREEK CONCEPT LAYOUT

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 5

Alternative 1: North Point

The North Point harbor design is shown in Figure 5. The majority of environmental impacts from this alternative are associated with chronic spills of petroleum compounds and other contaminants into the waters of Akutan Harbor, a loss of moderate-value intertidal habitats and limited displacement of seaducks due to increased vessel traffic/activity within Akutan Harbor. The benefits of this alternative compared to the others is that a much shorter road would be constructed along the north side of Akutan Harbor.

Water Quality Issues

Akutan would be expected to have a significant increase in vessel traffic beyond what already exists. Construction of a boat harbor would result in the presence of additional vessels and, consequently, additional contaminants entering the marine environment. Sources that can result in environmental contamination include copper from anti-fouling paints, sacrificial anodes on recreational and commercial vessels and other protectively coated marine hardware, lead from boat batteries, engine exhaust products, cleaning agents, grey water from holding tanks, and spills of petroleum compounds.

Of these sources, the chronic introduction of petroleum compounds appears to pose the greatest threat to seabirds at and near this alternative site. Impairment to water quality would also impact clam beds that may remain following the construction of the access road. Because the North Point site is closer to the entrance of Akutan Harbor, water circulation could be expected to be better than at the head of the bay.

Road Access and In-water Structures

Construction of an access road would directly impact marine habitats and traffic would displace seabirds from the immediate vicinity. Dabblers (mallards and green-winged teal) were found in relatively few sites around Akutan Harbor, typically where freshwater streams entered the Harbor. The access road would cross one of these sites. Mitigation for these impacts would be required.

The breakwaters, finger floats, and vessel hulls could provide some cover for juvenile salmon species, however they would also bring the young salmon in close proximity to sources of petroleum compounds and other contamination from vessels in the harbor. These effects are directly related to the number of vessels/floats in the harbor.

The structures included in this alternative would displace certain species from using the area, but as the area receives the least fish and wildlife use of the sites evaluated, this design would have the fewest direct impacts of the alternatives considered.

Dredging Issues

This alternative design would not include much dredging or disposal of dredged materials. Dredged materials could be incorporated into the access road or be disposed of onshore.

Displacement Issues

Activities associated with the harbor (including increased vessel traffic, noise, and shoreline activity) would extend beyond the immediate harbor vicinity. Based on survey work for this project, for example, Steller's eider flock sizes decreased and approach distance increased during consecutive surveys (LGL 2000b). This alternative site, however, had lower bird use than the other sites considered and approaching/departing vessels would traverse a relatively low-bird use area in front of the Trident seafood plant.

Harbor lighting could confuse and disorient migrating birds, including waterfowl such as Steller's eiders. Special care would be needed in shielding harbor lighting to prevent non-essential light from disorienting birds.

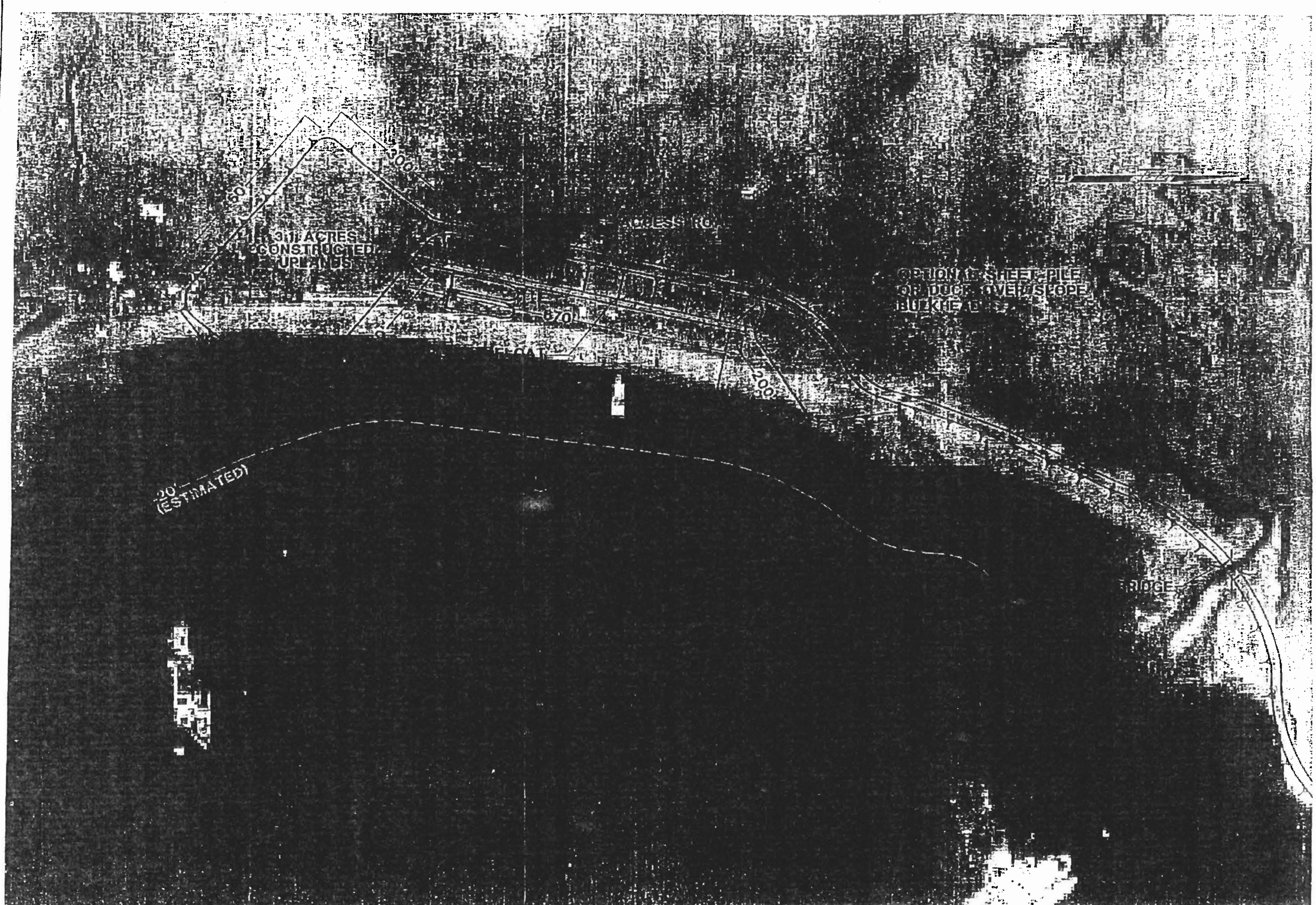
Cumulative Impacts

Akutan Harbor has a long history of industrial activity. A new harbor would likely attract facilities to service the vessels and crews using the harbor. As the North Point site appears to have a low-moderate value intertidal zone and an abundance of fish and wildlife species, the environmental impacts from additional support facilities would not be insignificant, but are collectively fewer than other alternative sites considered. There is a strong possibility that if a harbor were constructed at this location than the area between the new harbor and the Trident Seafood plant could be impacted by "infilling" development between the harbor and the plant for docks, additional slips, or other facilities. It is reasonable to assume that there will be proposals by Trident to do so.

Also, a harbor at this location would nearly guarantee that rat and fox populations would increase/spread unless special care and attention was given to handling of trash at the harbor.

Alternative 2: Head of the Bay – Offshore Basin

The Offshore Basin site is located at the head of Akutan Harbor (Fig. 6). The majority of environmental impacts from this alternative is associated with chronic spills of petroleum compounds and other contaminants, dredging or covering of intertidal habitats that support prey populations for important bird species, impacts to juvenile salmon and other important fish and shellfish species, effects on subsistence resources and harvest opportunity, and displacement of seaducks and/or waterfowl from increased traffic/activity within Akutan Harbor.



DESIGNED KDM DRAWN PCL CHECKED KDM DATE 07/10/98 JOB NO. 5642.9 SCALE HOR. AS SHOWN VER. N/A	TRYCK NYMAN HAYES, INC. 911 W. 8TH AVENUE, SUITE 300 ANCHORAGE, AK 99501	ALASKA, DISTRICT CORPS OF ENGINEERS ANCHORAGE, ALASKA	
	HARBOR FEASIBILTY STUDY CONCEPTUAL PLAN SITE 4 - HEAD OF BAY ALTERNATIVE B		FIG. 6

Water Quality Issues

A harbor constructed at the Offshore Basin site would be expected to have the same general level of source pollutants entering the marine environment as previously described for the North Point site.

Some water quality issues, however, are different than those identified for the North Point site because the Offshore Basin site is further from the entrance to Akutan Harbor and is located within the last of three circulation cells. This cell would have poor exchange with clean waters outside Akutan Harbor. It would be that much more difficult and/or take longer for pollutants released at the Offshore Basin site to move out of the vicinity. To evaluate this potential impact, it is important to understand water circulation patterns of Akutan Harbor.

Characterization of Akutan Harbor

Akutan Harbor is a connected sub-basin of the western half of Akutan Bay. It is barely separated from Akutan Bay by a low (6 m high) sill. This sill does not appear to substantially hinder the free exchange of water between respective water bodies, particularly the more exposed coastal waters outside Akutan Bay.

An assessment of oceanographic conditions in Akutan Harbor has been completed (Coastline Engineering 1998). Coastline Engineering reported that the water circulation within the bay and adjoining water bodies is primarily driven by winds, with a lesser extent (10%) by tides. If winds are primarily responsible for driving the circulation of Akutan Harbor, then it follows that the times of stagnation probably occur when winds are relatively weak.

Coastline Engineering has preliminarily modeled flushing times for Akutan Harbor. Flushing time is defined as the amount of time required to replace 95% of the water in a water body with fresh ocean water. Jones and Stokes Associates (1983) estimated that a volumetric tidal exchange was less than 5% on consecutive tides. This results in very little mixing in the bay and it follows that flushing times could be quite long. With little or no current, the flushing time for the Akutan Harbor could be measured in weeks or months.

As Akutan Harbor has relatively little circulation , concentration gradients through the bay are likely small and concentrations of petroleum compounds and other contaminant discharges from a new harbor at the head of the bay could remain relatively high. Furthermore, Coastal Engineering states that, "Since the exchange of water through the boat basin entrance is limited, it is likely that nearly any substance that is regulated by the state's water-quality program... has the potential to be in the basin at ... levels [that] could meet or exceed standards. A good deal of care will probably need to be exercised to keep materials from entering the basin waters."

Oil will accumulate around islands and against coastlines, especially at sheltered sites (Albers 1991). As Akutan Harbor is relatively protected and the harbor site was selected for its sheltered characteristics, these are the same qualities that would cause surface pollutants to linger. An oil spill risk analysis would likely indicate that marine and coastal bird populations and habitats in close proximity to the alternative harbor sites would have a relatively high probability of interaction with an oil spill.

Resource impacts could be much more severe if a spill occurred during the winter months when many birds species are overwintering in Akutan Harbor. Such an impact would temporarily reduce local populations of some species for 1-2 years (by which time recolonization from other areas or recruitment could restore pre-spill numbers), but may have greater impacts to larger concentrations of wintering species of limited number or distribution. For example, an acute petroleum spill at the head of the bay could immediately kill half (or more) of the Steller's eiders within the Akutan vicinity. Movement of the spilled materials or movement of Steller's eiders could kill or injure more eiders, displace them from important feeding areas, or eliminate preferred foods. Weakened or injured eiders may not successfully breed. Additional work is needed to understand what proportion of the entire Aleutian wintering population is represented by Steller's eiders using Akutan Harbor. Recent surveys indicate that Akutan Harbor is one of few winter concentration areas for Steller's eiders in the United States (Larned 2000). As the U.S. breeding population of Steller's eiders continues to decline, spill-related impacts could significantly hamper population recovery.

Water quality impacts to Steller's eiders and other seaducks

Impacts to seaducks have been previously described (see Potential Impacts to Significant Resources) but are more important at this site because of the presence of large flocks of Steller's eiders, harlequin ducks, scoters, and other seaducks. Small seaducks depend on foraging areas where they can consistently locate high-energy foods. Loss of seaducks due to oil pollution can be of greater significance when there are small populations of these species because small seaducks become geographically concentrated in winter (Clark 1984). Eradication of oil pollution would reduce the unnecessary mortality of seabirds, however, sources of oil pollution are so numerous and varied that a small quantity of oil in the wrong place at the wrong time may cause a disproportionately large mortality of seaducks, such as the Steller's eider (Clark 1984). While construction of a harbor at this site would have the same general amount of pollution sources as the other harbors, the poor circulation in Akutan Harbor and general sheltered location of this site, combined with the documented presence of large numbers of birds and juvenile fish dependent on the marine resources located at the site, would result in this site having the greatest level of water quality impacts of the alternative sites evaluated.

<u>Access Road and In-water Structures</u>

Access to the harbor at the head of the bay would be via a new road spur linking to another road going to the proposed Akutan Airport. This road would cross the lower portion of the north stream. In addition to the direct loss of wetland habitats, this road has the potential to impact wetland hydrology and could alter the dimension, pattern, and profile of the north stream. Every effort to avoid impacting the dimension, pattern, and profile of the north stream or its associated floodplain/wetland hydrology should be incorporated into the project.

The Offshore Basin has rubblemound breakwaters that extend out from the berm at the head of the bay. These extensions could alter water circulation patterns in the nearshore area that would lead to indirect impacts through stagnation or sediment deposition. Sediment movement (longshore transport) could alter the outlets of the north and south streams.

Floating finger floats and vessel hulls could provide some cover for juvenile salmon species, however they would also bring the young salmon in close proximity to sources of petroleum compounds and other contamination from vessels in the harbor. These effects are directly related to the number of vessels/floats in the harbor.

The natal streams for these salmon are north and south of the harbor. It would be expected that salmon smolts would migrate along the north or south shores of Akutan Harbor towards the open ocean. However, salmon smolts make extensive use of freshwater lenses at the sea water interface while their bodies adjust to higher salinity. Consequently, the smolts may enter the harbor while using these lenses as these lenses likely occurred in the vicinity of the middle stream outlet, near where the entrance channel would be constructed. Smolts will need to be able to migrate around the breakwaters without encountering deep waters.

Dredging Issues

Dredging for the Offshore Basin construction would likely create water quality problems. Dredging during construction would result in suspended sediments in the water column which could spread outside the dredged area. If construction occurred over a long period of time, sediments settling over undisturbed marine plants or sessile invertebrates offshore could inhibit growth or kill the organism. The loss of aquatic vegetation would impact bivalves, crabs, and small fish that use the aquatic vegetation as protection from predators. Intertidal habitats at and near this site appear to support prey populations for important bird species.

The principal potential near-field injury is to fish gills when fishes are present in high suspended sediment concentrations. This is also common to juvenile salmon migrating in naturally turbid estuaries (Servizi 1988). Experiments have revealed obvious evidence of stress in fish at sustained levels of suspended concentrations (>500 mg l^{-1}), but what is unknown is the actual extent and duration of exposure in the natural environment. The natural behavior of fish in estuaries, much less their avoidance of dredging plumes, is poorly understood. In the case of juvenile Pacific salmon, observations indicate that chum and chinook fry tend to move in shallow waters along the shoreline, juvenile pinks occupy surface waters and may venture further out in channels during low light periods, and larger fish (sockeye, coho and chinook salmon) occur in deeper water and throughout channels. Adult salmon do not appear to have clear migratory behavior; their movement is highly variable. Although delays in timing of adult movements may impair reproductive success in some stocks, there is no evidence to indicate that turbidity will induce such a delay. The literature tends to agree that juvenile salmon migration is more vulnerable to disruption than adult migration. Juvenile salmon growth is maximized in nearshore coastal waters before entering the open ocean. Impairing or influencing the rearing or migration of juvenile salmon could slow growth, decreasing survival. Larger salmon smolts experience increased survival in the open ocean.

After dredging, the dredged site would go through a successional process, with the more resilient organisms acting as the pioneer species. Most studies demonstrate a reduction in epi- and infaunal populations, and that, in most cases the recovery occurs over time (ranging from months to years). After construction is completed, benthic and non-motile marine organisms could be expected to re-colonize natural substrate around the basin and the perimeter of the breakwater within a few growing seasons, but there is little direct information to predict how long this would take, if it would occur at all. Species composition and density would not mirror pre-construction conditions since the water depth and substrate composition would be altered.

Displacement Issues

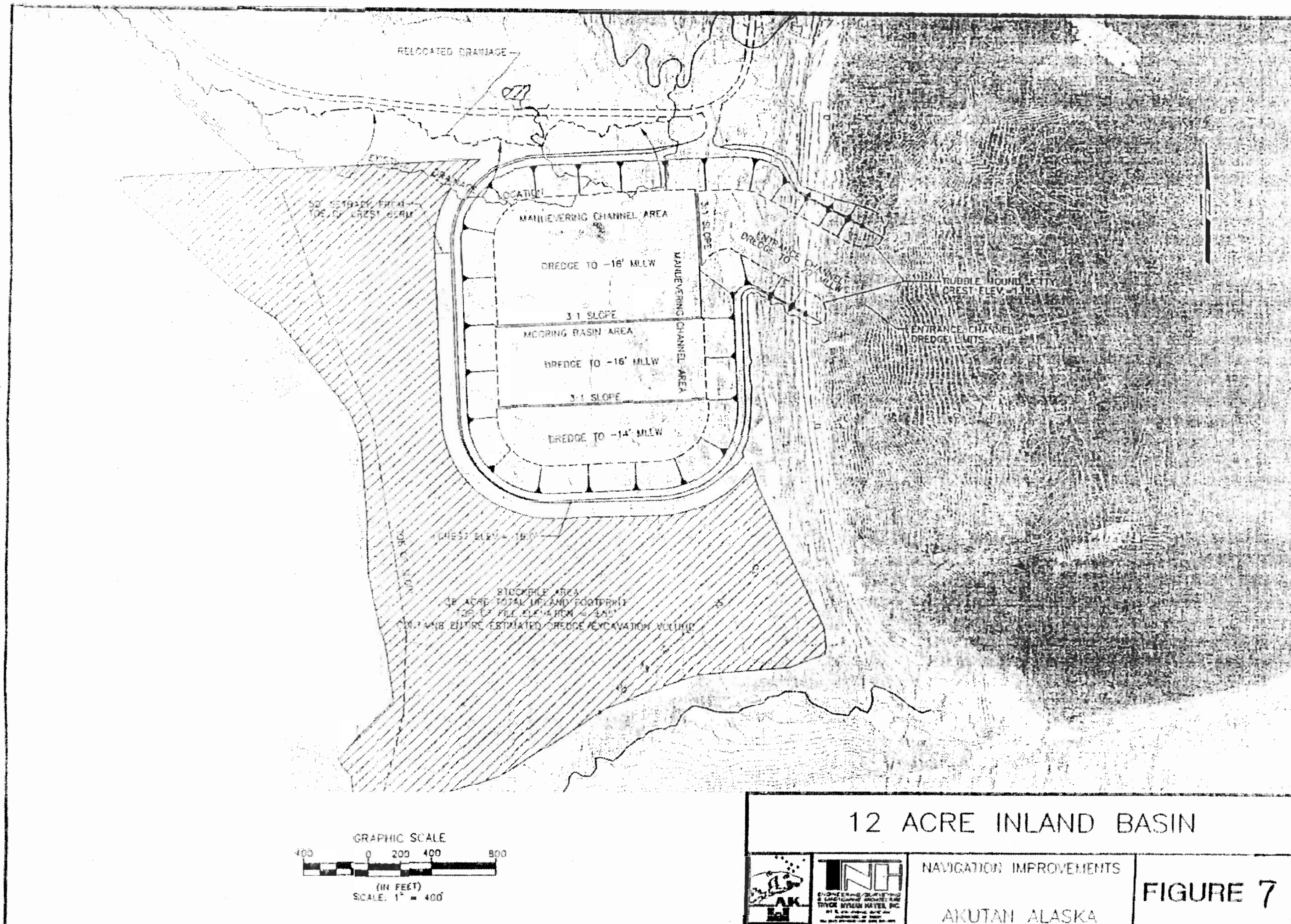
Birds currently using the marine areas of the harbor site would be directly displaced by the construction of breakwaters and increased vessel traffic. Vessel traffic to the harbor site would be expected to increase, extending further into areas currently receiving little traffic. Waterfowl would be disturbed and/or displaced by increased traffic to and from a mooring basin.

Fish and marine mammals would be expected to avoid the project site during periods of work if the harbor is constructed. Any dredging and breakwater construction would have to be carefully scheduled to minimize impacts to fish, marine mammals, and birds.

This alternative has the greatest level of unavoidable disturbance-related impacts to feeding and resting flocks of seaducks, the largest direct and indirect impacts to the marine environment, and the most potential for fisheries impacts of the alternatives considered.

Cumulative Impacts

Construction of the Offshore Basin proposal would likely result in additional pressure to fill many of the adjacent wetlands in the Middle Creek drainage. The availability of dredge spoils and other potential fill material coupled with the persistent desire of the local community and industrial complex to expand would likely result in this wetland being lost in a matter of years (ADCRA 1983). These developments could result in a myriad of predictable impacts to the adjacent freshwater stream systems at the head of the bay.



12 ACRE INLAND BASIN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 7

Alternative 3: Head of the Bay – Inland Basin

Water Quality Issues

A harbor constructed at the Inland Basin site (Figure 7) would be expected to have the same general level of source pollutants entering the marine environment as previously described for the North Point site.

Some water quality issues, however, are different than those identified for the North Point or Offshore Basin sites because the Inland Basin site is furthest from the entrance to Akutan Harbor and is located within the last of three circulation cells. This cell would have the least exchange with cleaner waters outside Akutan Harbor. It would be that much more difficult and/or take longer for pollutants released at the Inland Basin site to move out of the vicinity. The characteristics of Akutan Harbor water circulation were previously described under the Offshore Basin alternative.

Road Access and In-Water Structures

Access road impacts are the same as those described for the Offshore Basin alternative.

The Inland Basin has rubblemound breakwaters that extend out from the berm at the head of the bay. These extensions could alter water circulation patterns in the nearshore area that would lead to indirect impacts through stagnation or sediment deposition. Sediment movement (longshore transport) could alter the outlets of the north and south streams. Harbor design should consider the potential changes to the shoreline and mitigate to maintain the integrity of the streams and associated berm.

Floating finger floats and vessel hulls could provide some cover for juvenile salmon species, however they would also bring the young salmon in close proximity to sources of petroleum compounds and other contamination from vessels in the harbor. These effects are directly related to the number of vessels/floats in the harbor.

The natal streams for these salmon are north and south of the harbor. It would be expected that salmon smolts would migrate along the north or south shores of Akutan Harbor towards the open ocean. However, salmon smolts make extensive use of freshwater lenses at the sea water interface while their bodies adjust to higher salinity. Consequently, the smolts may enter the harbor while using these lenses as these lenses likely occurred in the vicinity of the middle stream outlet, near where the entrance channel would be constructed. Smolts will need to be able to migrate around the breakwaters without encountering deep waters.

The need to dredge the mooring basin will generate a tremendous amount of spoil material. This material will have to be stockpiled on site, de-watered, and then moved to other projects as needed. The spoil pile will alone take up over 15 acres of wetland habitats. Every effort should be made to contain this material on the watershed of the middle creek and not encroach upon the adjacent north or south stream systems.

Dredging Issues

Dredging for the Inland Basin construction would likely create water quality problems. Dredging during construction would result in suspended sediments in the water column which could spread outside the dredged area. If construction occurred over a long period of time, sediments settling over undisturbed marine plants or sessile invertebrates offshore could inhibit growth or kill the organism. The loss of aquatic vegetation would impact bivalves, crabs, and small fish that use the aquatic vegetation as protection from predators. Intertidal habitats at and near this site appear to support prey populations for important bird species.

Dredging impacts (damage to fish gills, disorientation of salmon, recolonization, etc.) would be the same as for the Offshore Basin alternative except that there would be much less marine habitat destroyed and containment of sediments appears more controllable.

Displacement Issues

Displacement issues would be the same as those for the Offshore Basin alternative except that most harbor activities that could displace birds using nearby marine areas would be screened by the vegetated berm at the head of the bay. Retention of this berm should be considered a harbor feature.

Cumulative Impacts

This harbor design should have the fewest cumulative impacts of all alternatives evaluated because it minimizes impacts to the marine environment to the maximum extent practicable and the harbor would be located in the lowest value wetland habitats in the project vicinity. This conclusion assumes that agency and local efforts to protect the integrity of the adjacent salmon streams on either side of the project would be successful.

POTENTIAL FISH AND WILDLIFE CONSERVATION MEASURES

We are concerned that a harbor will be placed in a productive marine area where harbor activities stand a predictably high risk of damaging important natural resources. Chronic petroleum compound and other contaminant pollution may have devastating effects on certain species if even a small spill occurs in the wrong place at the wrong time. Our conclusion is that the very "accidental" nature of spills, and a documented history of spills at Akutan Island, should guide harbor site selection as much, if not more than, general economic opportunity or benefit:cost ratios. We believe a zero-tolerance spill policy is a laudable goal for any harbor, including a new harbor on Akutan Island.

In terms of the Service Mitigation Policy (DOI 1981), perhaps Esler et al. (2000) said it best, "In the cases of either oil spills or chronic oil pollution, the primary management recommendation is prevention: oil that does not go into the water does not threaten marine bird populations." Similarly, there are potential impacts to fisheries and benthic invertebrates at Akutan Harbor, as well as complicating impacts to the food web of which all these resources are a part. In our view, there are two steps to take in evaluating the pollution risk for the alternative sites being considered for the proposed Akutan harbor improvements.

1) Ensure that no contaminants will enter the water where important concentrations of eiders, other seaducks, juvenile fish, marine mammals and benthic invertebrates occur.

While this is certainly the preferred course of action when dealing with fuel and oil around marine seabird, marine mammal, fish, and shellfish populations, history indicates that this is not always possible as accidents occur (and at Akutan Island, they occur with regularity). Faced with a poor history of minimizing the input of hazardous materials into coastal habitats, the next course of action to minimize the effects of chronic hazardous materials spills on seabirds would be to locate potential sources of fuel/oil pollution where spills would have the least environmental damage.

2) Site such a facility away from areas with important concentrations of eiders, other seaducks, marine mammals, and benthic invertebrates. Avoid sites where there are large numbers of juvenile salmon and other commercially-valuable fish.

To a certain extent this goal was pursued in project design, but the Corps of Engineers could not economically justify constructing the harbor closest to the least valuable habitats (those closest to the seafood processing plant). The area in the immediate vicinity of the Trident seafood processing plant likely has some of the lowest value habitats in Akutan Harbor due to a long history of seafood waste and sewer discharges, fuel spills, garbage dumping, and other deleterious habitat impacts.

The important concentration of Steller's eiders and other seaducks/waterfowl found at the head of Akutan Harbor were documented in the Description of Potential Impacts Section. Based on that information, limitations of deep, fjord-like waterbodies, and in comparison to fish and wildlife concentrations at the other sites, we believe that the Offshore Basin alternatives would result in the most direct and indirect impacts to fish and wildlife resources in the Akutan Harbor vicinity. As the North Point, Akutan Point, and Whaling Station sites do not appear to be feasible alternatives, we concur that the proposed alternative, Head of Bay – Inland Basin (12-acre), is the least environmentally-damaging alternative. We cannot, however, concur with larger project sizes for this alternative, as they would likely contribute to the encroachment upon the adjacent salmon streams.

RECOMMENDATIONS

Because the habitats which could be impacted by the preferred project alternative are of high value for wintering seabirds, juvenile fish, and benthic invertebrates and are not relatively abundant in the region, our mitigation goal is no net loss of habitat value while minimizing loss of in-kind habitat value. In order to meet this goal, we have the following recommendations to mitigate the potential adverse impacts of the project on fish and wildlife resources and the habitats on which they depend.

1) We recommend the project, to the extent practicable, adhere to the following Best Management Practices:

- Disposal of dredge spoils will occur only in uplands, wetlands of the middle creek watershed, or be incorporated into an approved marine restoration/enhancement project. Approval will be by the Corps of Engineers based on informal consultation and written concurrence of the resource agencies, including the Service.

- Include methods to filter or settle out silt-laden water (i.e., the use of silt curtains) prior to, during, and following the removal of dredge material.

- Properly install silt fences around the entire fill pads at the toe of the slope and maintain these fences until the fill slopes have become permanently stabilized with native vegetation.

- Prohibit any dredging of offshore material between November 15 and June 15, to minimize potential impacts to wintering seabirds and juvenile fish at the site. Offshore dredging and breakwater construction could occur after March 30 if it can be clearly demonstrated the work site can be completely isolated from the adjacent marine waters. The intent of this practice would be to avoid disturbances to wildlife using nearby waters and prevent sediments from harming juvenile fish.

- Design all rubblemound breakwaters to allow the free migration of juvenile fish during all tide stages without venturing out into waters over 1 foot deep. This may be best accomplished by incorporating a shallow shelf into the breakwater design.

Most of these water quality problems associated with the Inland Basin alternative could be further mitigated by:

- Breaching the entrance channel last, after a period of settling within the mooring basin. Breaching should occur when salmon smolts are not believed to be in nearshore waters (after June 15).

- ♦ Isolating the waters of the entrance channel from Akutan Harbor during dredging by installation of a silt curtain or similar material.
- ♦ Containing the waters leaving the dredge spoil pile and filtering/treating them prior to release. These should be treated on site and be released into the harbor instead of the adjacent freshwater streams unless they are treated to specific water quality standards.

2) Dredge spoil piles should be designed to later become harbor parking, staging, and storage areas. As dredge spoils are utilized for off-site projects, more and more useable uplands are made available. The size of these spoil piles and limited staging area for harbor construction should be made as small as practicable to avoid encroaching upon the adjacent watersheds that contain streams important to anadromous fish.

   If it is not practicable to contain the entire harbor within the (former) Middle Creek watershed, every effort should be made to minimize impacts to the adjacent stream systems, including provisions that any relocated stream segments be replaced with a constructed stream of the same dimension, pattern, and profile as the stream segment being impacted. Creation of the replacement segment should precede the loss of the original segment.

3) Every effort to avoid impacting the dimension, pattern, and profile of the north stream (and its associated floodplain/wetland hydrology) should be incorporated into the project. The access road should be limited to the minimum size necessary to accommodate the anticipated traffic and exclude dedicated pedestrian shoulders. A clear span bridge should be designed to cross the north stream at a reach where there is a transfer of energy from one side of the creek to the other (i.e., not at a meander) and as far from the stream mouth as practicable.

4) The new harbor should have an on-site waste oil and plastic/nylon mesh recovery system that is effectively maintained for the life of the project.

5) The harbor should be designed to effectively and rapidly contain a petroleum compound spill within the harbor by installing eye bolt anchors at the outer and inner ends of the breakwaters. Spill boom adequate for sealing off the harbor entrances should be installed at or very near the eye bolts so they do not have to be transported prior to deployment. The boom should be secured against theft. A team of at least 3 local personnel should be trained in responding to spills and complete drills every 6 months.

6) An approved harbor management plan should be written to include provisions to secure waste accepted from vessels using the harbor in order to prevent the generation of wastes that will attract and support artificial concentrations of foxes or allow rats to exist in the harbor vicinity. Harbor management will be strongly encouraged to cooperate with the Service on effective rat eradication programs.

7) Lighting for the harbor should be shielded from attracting or disorienting migrating birds.

8) The Corps of Engineers should monitor freshwater salinities in the lower reaches of the north and south streams to ensure that the construction of the harbor does not result in modifications of the saltwater/freshwater interface that could impact the plant and animals using the lower reaches of these streams. If substantial changes are observed, these impacts will be remediated by physically isolating the saltwater harbor from the adjacent freshwater streams and associated wetlands.

9) Six potential mitigation projects are recommended to compensate for unavoidable habitat impacts:

   a) Remove the waterfall barrier to allow anadromous fish access to the largest southern tributary to the north stream.

   b) Remove the abandoned freshwater lines that come off the northern hillside and are lying on the bottom of the seafloor where they used to be connected to fish processing vessels.

   c) Conduct a one-time clean-up of the beach areas between the Whaling Station and the Trident seafood plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, etc. and transport them to an approved landfill.

   d) Provide for the removal of what appears to be a holding tank from the shoreline of the head of the bay.

   e) Investigate and complete the remediation of several burn pits that were maintained by the seafood processors in the mid-1980s on top of the head of bay berm.

   f) As the Middle Creek wetlands at the head of the bay would be completely lost by the construction of the preferred alternative, compensatory mitigation to offset these losses could be in the form of a conservation easement to protect the north stream watershed, especially a 100-foot non-development setback from spawning and rearing habitats.

Additional measures necessary to ensure the proposed project does not adversely affect threatened Steller's eiders will be determined through the Endangered Species Act, Section 7 consultation process that is ongoing between the Corps and the Service.

LITERATURE CITED

Alaska Department of Community and Regional Affairs. 1983. Akutan: Prospects for Development. Prepared by the Division of Community Planning, Juneau.

Alaska Department of Fish and Game. 1984. Alaska Coastal Habitat Maps. Produced by Division of Habitat, Juneau, AK.

Alaska Department of Fish and Game. 1985. Alaska habitat management guide: Southwest Region, Map Atlas. Produced by Division of Habitat, Juneau, AK.

Albers, P. H. 1991. Oil spills and the environment: A review of chemical fate and biological effects of petroleum. In: The Effects of Oil on Wildlife, J. White, ed. International Wildlife Rehabilitation Council, Suisun, CA.

Bailey, E. P. 1993. Introduction of foxes to Alaskan islands - history, effects on avifauna, and eradication. Fish and Wildlife Service. Resource Publication 193. 54 pages.

Crayton, W. M. 1983. Planning Aid Report, Bottomfish Harbor Study, Akutan, Alaska. U. S. Fish and Wildlife Service, Ecological Services, Anchorage, Alaska. 30 pages.

Bellrose, F. C. 1976. Ducks, geese, and swans of North America. Stackpole Books, Harrisburg, PA.

Bourne, W. R. P. and C. J. Bibby. 1975. Temperature and the seasonal and geographical occurrence of oiled birds on West European beaches. Mar. Pollut. Bull. 6:77-80.

Burger, A. E. and D. M. Fry. 1993. Effects of oil pollution on seabirds in the northeast Pacific. Pages 254-263 *in* The status, ecology, and conservation of marine birds in the north Pacific. Special Publication. K. Vermeer, K. H. Morgan, and D. Siegel-Causey, eds. Can. Wildl. Serv.

Byrd, V. 2001. Wildlife observations at sites in the Krenitzin Islands on June 20, 2001. Memo to the Files of the Alaska Maritime NWR. 4 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, Technical Rept. No. 60. 31 pp.

Clark, R. B. 1984. Impact of Oil Pollution on Seabirds. Environmental Pollution (Series A) 33: 1-22.

Coastline Engineering. 1998. Oceanographic condtions (sic) at Akutan Harbor, Alaska. A report prepared for Tryck Nyman and Hayes.

Day, R. H. and A. K. Pritchard. 2000a. Draft Literature Search for Steller's Eiders: Task 2B. Review of Harbor Spills. Prepared by ABR, Inc. for the U.S. Army Engineer District, Alaska. Contract DACA85-00-D-0001.

Day, R. H. and A. K. Pritchard. 2000b. Draft Literature Search for Steller's Eiders: Task 2C. Estimated Future Spills. Prepared by ABR, Inc. for the U.S. Army Engineer District, Alaska. Contract DACA85-00-D-0001.

DeGange, A. R., D. H. Monson, D. B. Irons, C. M. Robins, and D. C. Douglas. 1990. Distribution and relative abundance of sea otters in south-central and southwestern Alaska before or at the time of the T/V *Exxon Valdez* oil spill. Pages 18-25 *in* K. Bayha and J. Kormendy, tech. Coords. Sea Otter Symposium: Proceedings of a symposium to evaluate the response effort on behalf of sea otters after the T/V Exxon Valdez oil spill into Prince William Sound, Anchorage, Alaska, 17-19 April 1990. U.S. Fish Wildl. Serv., Biol. Rep. 90(12).

Department of the Interior. 1981. U.S. Fish and Wildlife Service Mitigation Policy. Federal Register, Friday, January 23, 1981. Pages 7643-7663.

Doroff, A. M., J. A. Estes, M. T. Tinker, D. M. Burns, and T. J. Evans. In prep. Sea otter population declines in the Aleutian Archipelago.

Esler, D., J. A. Schmutz, R. L. Jarvis, and D. M. Mulcahy. 2000. Winter survival of adult female harlequin ducks in relation to history of contamination by the Exxon Valdez Oil Spill. J. Wildl. Manage. 64(3):839-847.

Estes, J. A., N. S. Smith, and J. F. Palmisano. 1983. Sea otter predation and community organization in western Aleutian Islands, Alaska. Ecology 59(4):822-833.

Evans, T. J., D. M. Burns, and A.R. DeGange. 1997. Distribution and relative abundance of sea otters in the Aleutian Archipelago. U.S. Fish and Wildlife Service Marine Mammals Management Tech. Rept. MMM97-5, Anchorage, Alaska.

Faris, T. 1996. Humpback whale species account *in* Alaska's threatened and endangered species. Produced by the Alaska Dept of Fish and Game, U.S. Fish and Wildl. Serv., Nat. Mar. Fish. Serv., Bur. Land Manage., and U.S.D.A. Forest Serv. 30pp.

Fischer, B. F. and C. R. Griffin. 2000. Feeding Behavior and food habits of wintering harlequin ducks at Shemya Island, Alaska. Wilson Bull. 112(3):319-326.

Fox, A.D. and C. Mitchell. 1996. Spring habitat use and feeding behavior of Steller's eider *Polysticta stelleri* in Varangerfjord, northern Norway. Ibis 139: 542-548.

Goudie, R. I. and C. D. Ankney. 1986. Body size, activity budgets, and diets of sea ducks wintering in Newfoundland. Ecology 67(6) pp 1475-1482.

Herter, D. R. 1990. Marine bird use of nearshore habitats in the Krenitzin Islands, Aleutian Islands, during the non-breeding season. (Abstract only). Pacific Seabird Group Bulletin. 17(1):23.

Jones and Stokes Associates. 1983. Draft water quality analysis report, Akutan Harbor, Alaska. Prepared for the Environmental Protection Agency, Region 10. 84 pp. + appendices.

Kasymov, A. G. and V. M. Gasanov. 1987. Effects of Oils and Oil-products on Crustaceans. Original reference being investigated.

Larned, W. W. 2000. Aerial surveys of Steller's eiders (*Polysticta stelleri*) and other waterbirds and marine mammals in southwest Alaska areas proposed for navigation improvements bu the U.S. Army Corps of Engineers, Alaska: February and March, 2000. U.S. Fish and Wildl. Serv., Mig. Bird Manage., Anchorage.

LGL. 2000a.. Freshwater fish surveys in upper Akutan Bay, Akutan Island, Alaska, May-October 2000. LGL Alaska Res. Assoc, Inc. Prepared under contract to the Aleutians East Borough.

LGL. 2000b. Steller's eider and other water birds numbers and distribution at Akutan Harbor, Alaska, winter of 1999/2000. LGL Alaska Res. Assoc, Inc. Prepared under contract to the Aleutians East Borough.

Nysewander, D. R., D. J. Forsell, P. A. Baird, D. J. Shields, G. J. Weller, and J. H. Kogan. 1982. Marine bird and mammal survey of the eastern Aleutian Islands, Summers of 1980-81. U. S. Fish and Wildlife Service, Alaska Regional Office. 134 pages.

Reeves, R. R., S. Leatherwood, S. A. Karl, and E. R. Yohe. 1985. Whaling results at Akutan (1912-39) and Port Hobron (1926-37), Alaska. Rep. Inter. Whal. Comm. Vol. 35.

Resource Analysts. 1990. Resource Inventory for the Aleutians West Coastal Resource Service Area. Volumes I , II, and III Eagle River, AK.

Robards, M. and M. T. Schroeder. 2000. Assessment of nearshore fish at Akutan Harbor using beach seines during June 2000. US Geological Survey - Biological Resources Division, Alaska Biological Sciences Center, Anchorage Alaska.

Sarokin, D. and J. Schulkin. 1992. The role of pollution in large-scale populations. Environ. Sci. Technol. 26(8):1477-1483.

Schroeder, M. T. 1998. Personal observations. Field notes from trip to Akutan Harbor, August 1998. U. S. Fish and Wildlife Service, Ecological Services, Anchorage, Alaska.

Schroeder, M. T. 1999. Personal observations. Field notes from trip to Akutan Harbor, March 1-5, 1999, primarily to assess relative abundance of wintering seabirds. U. S. Fish and Wildlife Service, Ecological Services, Anchorage, Alaska.

Schroeder, M. T. 2000. Personal observations. Field notes from trips to Akutan Harbor, June 4-11 and June 24 - July 1, 2000, primarily to collect fisheries and dive survey information. U. S. Fish and Wildlife Service, Ecological Services, Anchorage, Alaska.

Schroeder, M. T. 2001. Trip report: Wintering Wildlife Survey, Akutan Harbor, 22 January and 14-18 February 2001, with an emphasis on Steller's eiders. U. S. Fish and Wildlife Service, Ecological Services, Anchorage, Alaska.

Servizi, J. A. 1988. Effects of dredging on anadromous Pacific coast fishes: Sublethal effects of dredged sediments on juvenile salmon. Workshop proceedings, Seattle, September 8-9, 1988. C. A. Simenstad, ed..

Shaul, A. R. and J. J. Dinnocenzo. 2000. Aleutian Islands and Atka-Amlia Islands Management Areas Salmon Management Report, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak Alaska.

Stewart, R. B. R. M. Gerson, and J. W. Bottini. 1991. Summary of effects of Exxon Valdez oil spill on natural resources and archaeological resources. Document filed with U.S. District Court, District of Alaska. As cited in Burger, A. E. and D. M. Fry. 1993. Effects of oil pollution on seabirds in the northeast Pacific, pages 254-263 *in* The status, ecology, and conservation of marine birds in the north Pacific. Special Publication. (K. Vermeer, K. H. Morgan, and D. Siegel-Causey, eds. Can. Wildl. Serv.

Stewart, R. K. and D. R. Tangarone. 1977. Water quality investigation related to seafood processing wastewater discharges at Dutch Harbor, Alaska. October 1975, 1976. Working Paper EPA910/8-77-100, Environmental Protection Agency, Region X. 78 pp.

Tester, P. A. and B. Mahoney. 1995. Implication of the diatom, *Chaetoceros convolutus*, in the death of red king crabs, *Paralithoides camtschatica*, Captains Bay, Unalaska Island, Alaska. Harmful Marine Algal Blooms - P. Lassus, G. Arzul, E. Erard, P. Gentien, and C. Marcaillou, eds., pp.507-513.

Veltre, D. W. and M. J. Veltre. 1982. Resource Utilization in Unalaska, Aleutian Islands, Alaska. Contract # 82-0790 to the Alaska Department of Fish and Game, Division of Subsistence.

Zimmerman, S. 1996. Fin Whale species account *in* Alaska's threatened and endangered species. Produced by the Alaska Dept of Fish and Game, U.S. Fish and Wildl. Serv., Nat. Mar. Fish. Serv., Bur. Land Manage., and U.S.D.A. Forest Serv. 30pp.

Appendix 1: List of plant and animal species observed along underwater marine transects at North Point (■) and Water Source Point (●) (Fig. 3), June 2000. Transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S,1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+).

	Station (meters from OHW)									
	10	20	30	40	50	60	70	80	90	100
DEPTH in feet (below MLLW) ■:●	0 :1.5	1.5:4	4:6	5:6	8:8	11:9	19:9	30:9	42:9	53:11
SUBSTRATE ■:● (Shore was C/P:B/C)	C/P: C/B	G:S/B	S:S/B	S:S/B	S:S/G	S:S/G	S:S/G	S:S/G	S:S	S:S
Aquatic Plants										
Agarum fimbriatum, Fringed Sieve Kelp		■	■							■
Ulva fenestrata, Sea Lettuce	●	■●	■●	■●!	■●	■●	●	●	●	●
Fucus gardneri, Rockweed		■●								
Enteromorpha intestinalis, Filamentous green algae	●		■!	■!	■!	■				
Alaria sp., Ribbon Kelp		■●	■!●	■!●	■!●	■!●	■●	■●!	■	■●
Laminaria saccharina, Sugar Kelp		■	■!	■!		●	■●		●	■
Desmarestia sp. Acid Kelp		●	●		■●		●	●	●	
Porphyra sp., Red Laver			●	●	●	■●	■●	●		
Palmeria sp, Red Algae		■	■		■					
Costaria costata, Seersucker Kelp				●	●					●
Aquatic Invertebrates										
Acmaea mitra, White Cap Limpet	■	■								
Balanus nubilus, Acorn Barnacle	■●	■				■	■			
Balanus cariosus, Thatched Barnacle	■	■								
Littorina sitkana, Sitka Periwinkle	■●	■●	●							
Mytilus trossulus, Pacific Blue Mussel	■●	■	■							
Elassochirus spp, Widehand Hermit Crab		■	■	■●	■●	■●		■	■	■
Telmessus cheiragonus, Helmet Crab				■●	■		■●		●	■●
Amphipods	■				●!					●
Boccardia spp./allies, Spinoid Polychaetes (Carpet worms)							■			■!
Nucella sp., Dogwinkle	■●	■●								
Telia crassicornus, Christmas Anemone		●		●						

Appendix 1 (continued): List of plant and animal species observed along underwater marine transects at North Point (■) and Water Source Point (●) (Fig. 3), June 2000. Transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S, 1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+).

	Station (meters from OHW)									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Metridium giganteum, Plumose Anemone		■●	■●	■	■	■!	■!●	■!●	■	■
Cribinopsis fernaldi, Crimson Anemone							■			
Natica clausa, Arctic Moon Snail				■	●				●	
Margarites pupillus, Margarite Snail				●						
Clinocardium nutalli, Nutall's Cockle			●		●	■●	■●	●	●	
Saxidomus giganteus, Butter Clam			■	■!●	■!●	■!●	■●	■●	■●	■
Mya truncata, Truncated mya				●						
Prototheca staminea, Littleneck Clam									●	
Pectinaria granulata, Tusk Worm			■					■	■	■
Strongylocentrotus droebachiensis, Green Sea Urchin			●	■	■●					
Evasterias troschelii, Mottled Star		●	■●	■●	■●	■●	●	●	●	
Pycnopodia helianthoides, Sunflower Star		●		■!●	■!●	■!	■!●	■●	■	■
Haliclystus stejnegeri, Stalked Jellyfish				■						
Marine Fish										
Lepidopsetta bilineata., Rock Sole		■!	■!	■!●	■!●	■	■	■●	■●	■
Hexagrammus sp., Greenling		●		■						
Myoxocephalus spp., (Great?) Sculpin			■●	●	●	■	●	●	■	
Unidentified fish, (eel blenny?)										■

Appendix 2: List of plant and animal species observed along underwater marine transects at the head of Akutan Harbor, offshore of north stream (■) and south stream (●) (Fig. 3), June 2000. Transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S,1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+).

	Station (meters from OHW)									
	10	20	30	40	50	60	70	80	90	100
DEPTH in feet (below MLLW) ■:●	0 :0	1.5:.5	3:4	5:4	5:7	5:21	6:36	6:51	6:63	8:69
SUBSTRATE ■:● (Shore was S/C:B/C)	G/S: G/S	G: G/P	G/S: G/S	G/S: S/G	G/S: S/G	S:S/G	S:G/S	S/G: G/S	S:G/S Silt	S: Silt
Aquatic Plants										
Ulva fenestrata, Sea Lettuce		■●	■!	■●	■!●	■	■!	■	■	■
Fucus gardneri, Rockweed		●	●							
Enteromorpha intestinalis, Filamentous green algae			■		■		■!	■	■	■
Alaria sp., Ribbon Kelp		■!●	■!●	■●	■!●	■!	■!	■	■	
Laminaria saccharina, Sugar Kelp				●				●		
Desmarestia sp. Acid Kelp		●	■	■	●	●	■			
Porphyra pseudolinearis, Long Laver		■	■!	■	■	■	■			
Palmeria sp, Red Ribbon			■				■	■	■	
Costaria costata, Seersucker Kelp		●	●	●						
Aquatic Invertebrates										
Balanus nubilus, Acorn Barnacle	■●	■●	■	■●	■●		■	■	■	■
Amphipods			■!	■!	■!		■			
Euphausiids					●		●!	●!		●!
Clinocardium nuttallii, Nuttall Cockle					●		■	■		
Littorina sitkana, Sitka Periwinkle		●								
Elassochirus tenuimanus, Widehand Hermit Crab					●	■●		●	●	●
Pagurus sp., Hermit Crab				■	■	■	■	■		
Cancer sp., Crab				■						
Dermasterias imbricata, Leather Star						■				

Appendix 2 (continued): List of plant and animal species observed along underwater marine transects at the head of Akutan Harbor, offshore of north stream (■) and south stream (●) (Fig. 3). Transects were completed at each alternative site vicinity by running a 100-meter-long fiberglass tape perpendicular from shore. Substrate, depth, plants and animals were recorded every 10 meters, with notes on organisms being found between stations. Substrates were classified using a code according to grain size (code, grain size): silt (SL), sand (S,1/16-2mm), granule (G, 2-4mm), pebble (P, 4-64 mm), cobble (C, 64-256 mm), and boulder (B, 256 mm+).

	Station (meters from OHW)									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Evasterias troschelii, Mottled Star				■	■			■		
Cribinopsis fernaldi, Crimson Anemone								Clown shrimp on ->		●
Metridium giganteum, Plumose Anemone							■	●	■●!	■●!
Mya truncata, Truncated Mya				●						
Mytilus trossulus, Pacific Blue Mussel	●	■●	■							
Natica clausa, Arctic Moon Snail			■	●				●	●	
Pycnopodia helianthoides, Sunflower Star					■●	●	■●	■	■●	
Saxidomus giganteus, Butter Clam					●	●	■	■	■	
Boccardia sp., Spinoid Polychaetes										●!
Telmessus cheiragonus, Horse Crab				●						
Marine Fish										
Lepidopsetta bilineata., Rock Sole				■	■●	●	■●	■●	●	!■●!
Myoxocephalus spp., Sculpin			■	■	■●	■●	■●	■●		
Hexagrammus stelleri, White-spotted Greenling			■							
Hexagrammus octogrammus, Masked Greenling						■				
Ammodytes hexapterus, Pacific Sandlance								■		

Addendum
to the

FISH AND WILDLIFE COORDINATION ACT REPORT

for

AKUTAN NAVIGATION IMPROVEMENTS

Submitted to Alaska District
U.S. Army Corps of Engineers
Anchorage, Alaska

Prepared by Mark Schroeder, Fish and Wildlife Biologist

Approved by: Ann G. Rappoport, Field Supervisor

Ecological Services, Anchorage Fish and Wildlife Field Office
U.S. Fish and Wildlife Service
Anchorage, Alaska

December 2003

T:\CORPS\AKUTAN\Final 2003 addendum CAR akutan.wpd

DESCRIPTION OF PROJECT

The Head of Bay - Inland Basin alternative has been modified since preparation of the U.S. Fish and Wildlife 2001 Fish and Wildlife Coordination Act Report (CAR).

The basin size was increased from previous designs to improve water circulation within the harbor. The final design (Figure 1) would include a 14.9-acre basin and a 1.3-acre entrance channel area (16.2-acre total basin area measured from toe of excavation). The perimeter road and slopes would add another 12.5 acres to the project footprint. A 20.5-acre stockpile and an 8-acre staging area would bring the total project footprint size to 57.2 acres.

Increasing the basin side slopes, increasing the stock pile elevation, and decreasing the entrance channel width resulted in an overall <1% reduction (843,000cy vs. 850,000cy) in the amount of dredge spoil generated. The overall stockpile footprint was reduced from former designs, but part of this acreage was used to accommodate the larger basin. The proposed plan is to dewater the dredge spoils (primarily clean sands) for use on other, unspecified projects around Akutan.

The project would likely impact Rust Creek, a tributary to the North Creek. This creek would be relocated to the north, out of the project footprint (Figure 1).

PROJECT ALTERNATIVES

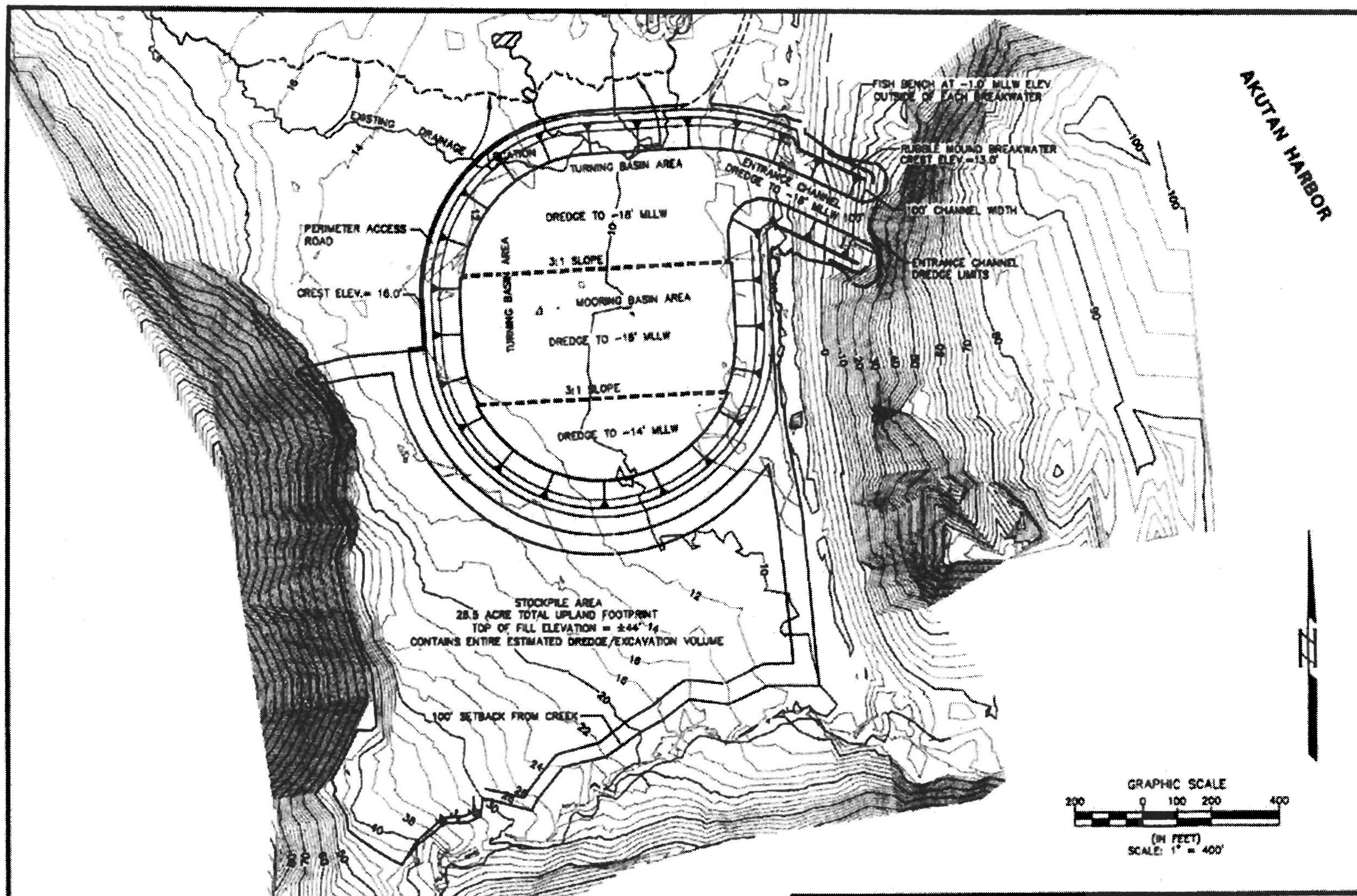
No changes were proposed for the other alternatives.

FISH AND WILDLIFE RESOURCES

The Corps of Engineers completed a functional analysis for wetlands in the project area that corresponds with our finding that the Central/Middle Creek watershed did not support nesting birds or anadromous fish. While resident populations of Dolly Varden do have intrinsic value, we believe that the adjacent wetlands/streams provide greater bio-diversity, productivity, and serve more recreational, subsistence, and commercial purposes. As such we believe this wetland has lower functions and values than the adjacent North and South creeks. Similarly, this wetland, although the largest of the three, has lower habitat value to fish and wildlife than nearby marine waters. This contradicted initial conclusions of other agency representatives who believed the wetland complex to be a vast high value salt marsh/estuary.

SIGNIFICANT RESOURCES LIKELY TO BE AFFECTED BY THE PROJECT

Marine surveys were completed in Akutan in 2000. Given subsequent extensive dive experience in the Aleutians and elsewhere, and upon reviewing the tapes from those initial dives , we need to correct and clarify some of the biological observations reported in the 2001 CAR, as follows.



NOTES
TOTAL DREDGE VOLUME = 843,000 CY
BASIN AREA = 14.9 ACRES
ENTRANCE CHANNEL AREA = 1.3 ACRES
(BASIN AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR BASIN PROJECT AREA = 16.1 ACRES
TOTAL HARBOR PROJECT AREA (INCLUDES PERIMETER ROAD AND SLOPES) = 28.7 ACRES
TOTAL HARBOR PROJECT AREA (INCLUDES STOCKPILE FOOTPRINT) = 57.2 ACRES

12 – ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 1

One of the tanner crabs reported from the 2000 dive at the Whaling Station was dead. This would support the explanation provided by the City of Akutan that crabbers often discard unmarketable crabs over the side of their vessels. Not reported in the 2001 CAR was the observation that up to 200 dead red king crabs were observed on June 7, 2000, along the inner shoreline of Akutan Point; another possible example of commercial vessels discarding unmarketable product overboard when docked or moored.

The 2001 CAR reported the observation of *Boccardia* sp., a spinoid polychaete worm, at the deeper depths (~-55 to -70 feet) of dives at the South Stream and North Point. With over 1,500 species of polychaete worms, few useable keys for Alaska, and no live specimens collected, we attempted to identify the worms based on the size and shape of their tubes. The tubes were vertical, dirt-encrusted, black and membranous (Figure 2). As these worms are highly sensitive to movement and retract in advance of divers, we cannot say for certain that the tubes were inhabited, but were assumed to be so.

We are now more convinced that these worms were *Capitella capitata* (a deposit-feeding burrowing worm) or closely related species. According to USFWS (1983) this worm is mud-dwelling but can be found in fish wastes and sulfurous sediments where it can be a pollution indicator (if found in great numbers and in the absence of other invertebrate species). This type of observation was made in 1975 and 1976 at seafood outfalls within Dutch Harbor where "...soft,

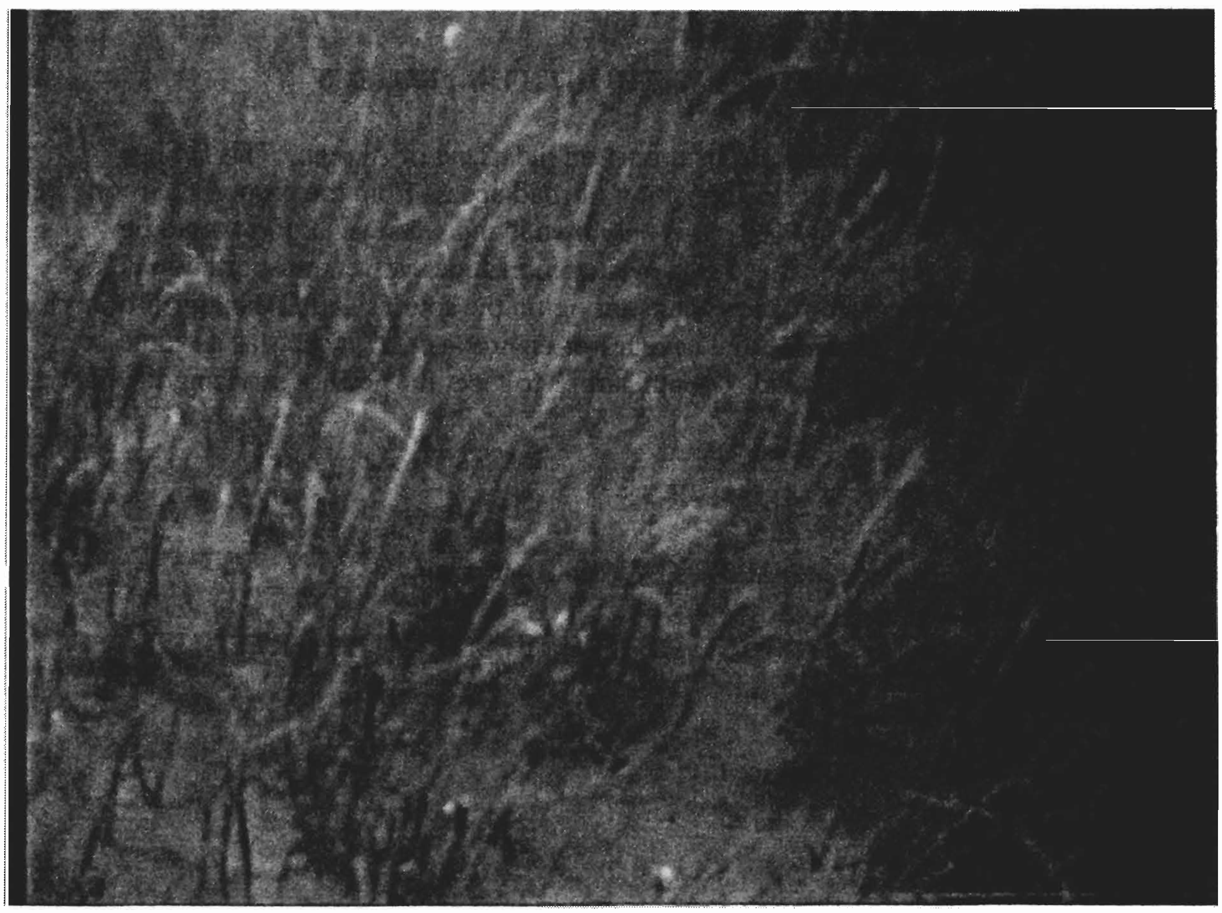


Figure 2: Marine worms observed at -55 feet, Head of Bay, Akutan Harbor, June 2000.

foul-smelling sludge ... supported primarily pollution-tolerant polychaete worms" (EPA 1977). The distribution of the worms was abundant in Akutan Harbor where "carpets" of worm-tubes were found with other invertebrate species (e.g., shrimp, hermit crabs, anemones) and fish, particularly snake pricklebacks (*Lumpenus sagitta*).

The presence of such dense concentrations of *Capitella capitata* indicated that they were one of the few organisms to proliferate in the impaired waters left behind by local seafood processors at the head of Akutan Harbor until the 1980s. Since that time, and as indicated by the presence of other species that would not likely persist on or near seafood waste piles, the substrate conditions have changed and are becoming more biologically diverse and productive. A review of our dive transects (October 2003) indicated several areas where the sediment has become more stable and firm.

The review of the 2000 dive tapes also indicated the presence of an algal bloom during June 2000. This was evidenced by clear nearshore waters that would turn to a greenish-tinted haze at about 10-15 feet water depth. This haze persisted for another 10-15 feet before diminishing. The waters below the haze were clear, but received little natural light.

Additional information regarding Steller's eiders was addressed during formal consultation under Section 7 of the Endangered Species Act. The Biological Opinion was completed in October 2003.

FUTURE RESOURCE CONDITIONS WITHOUT THE PROJECT

There have been recent efforts to locate an airport on the island of Akutan. This facility theoretically includes the "pre-existing" condition of road access from the proposed airport site to the city of Akutan and the Trident Plant. It is unknown if and when an airport would be constructed in Akutan. One alternative being evaluated includes vessel transportation across Akutan Harbor to a disconnected road system starting on the south side of Akutan Harbor. This alternative would prove more feasible and have fewer environmental impacts as it would not necessitate a much longer road around Akutan Harbor to meet the need of servicing the boat harbor.

DESCRIPTION OF POTENTIAL IMPACTS

The potential impacts described in the 2001 CAR remain unchanged.

RESOURCE PROBLEMS, PLANNING OBJECTIVES, AND OPPORTUNITIES

Resource Problems

The resource problems remain the same.

Planning Objectives

The Services planning objectives for the 2001 CAR were as follows:

> "Our planning objective for this project is to conserve the habitat values associated with the Akutan Harbor marine ecosystem and the fish and wildlife that are a part of the ecosystem. Specifically, for this project, our primary mitigation goal is to minimize loss or degradation of important fish and wildlife habitats from direct and secondary habitat loss, contamination of coastal waters and food chain organisms, displacement or diminishment of subsistence opportunity, and disturbance of wintering birds from increased vessel and human activity. We also have a goal to maintain, if not improve, the water quality of Akutan Harbor."

While the previous planning objective of minimizing impacts to the marine environment was largely achieved in the proposed design, secondary planning objectives would be to: 1) avoid impacts to fishery resources, 2) minimize impacts to wetlands, and 3) improve water (habitat) quality. Within this context, any project changes that would reduce the size of the stockpile footprint could result in shifting the harbor basin and associated road away from Rust Creek, perhaps to the point of not requiring its relocation.

Opportunities

We support the effort of the Corps to design a project that minimizes impacts to wintering seabird and fishery resources within Akutan Harbor. The inland basin alternative generally satisfies this objective. This alternative, however, has the unfortunate drawback of generating a tremendous amount of dredge spoil. The stockpile and staging areas would be nearly twice the size of the harbor basin and would be in great excess of what is typically desired for similar projects in Alaska. The proposed stockpile footprint will impact wetlands in the project area and will necessitate the relocation/reconstruction of a tributary stream that will be made available to rearing salmon.

The 2001 CAR indicated that the harbor engineers were challenged to refrain from impacting Rust Creek, and this challenge remains. One means of meeting this challenge would be to modify the proposed location of the spoil pile so that adjustments in harbor positioning could avoid impacting Rust Creek. This opportunity becomes possible if spoils can be placed further northwest of the existing harbor basin.

In addition to modifying the location of the stockpile, a reduction in the stockpile footprint could occur if some level of offshore disposal of clean dredge spoils is feasible. Discharging dredge spoils to marine waters is commonly undertaken on similar projects as the most economical and least environmentally adverse option . This disposal method was recommended by the USEPA on page 7 of their DEIS comment letter (undated). We support the evaluation of offshore disposal as an alternative to spoil disposal in wetlands, thus alleviating the need to reconstruct a portion of Rust Creek.

Reductions in stockpile footprint could also occur if part of the 8-acre staging area were temporarily reduced in size. The John Daley memorandum (2003) states that, "A general rule of thumb for harbors is that 60% of the developed area is the harbor basins and 40% is the related uplands. These uplands are typically used for parking, restrooms, harbor maintenance facilities, etc.)." We question whether the full staging area is needed at the beginning of the project as some portions of the staging area could be used for stockpiling dredge spoil until the material is needed for another project. In our view, upland areas for parking, for example, would not be needed until there was a road connection to Akutan. This would be consistent with the following conservation measures.

POTENTIAL FISH AND WILDLIFE CONSERVATION MEASURES

Our understanding of the configuration of the harbor/stockpile included 1) the sequential use of the stockpile footprint for future upland site needs and, 2) surface waters from the upper Middle (Central) Creek drainage would be redirected into the North Creek watershed. The first concept would preclude further destruction of wetlands until the stockpile footprint is completely utilized. The surface waters of the Middle Creek watershed would augment flows from North Creek via Rust Creek, which would likely support anadromous fish (primarily juvenile salmon) following removal of a migration barrier. Additional flows to Rust Creek could help ameliorate the potential for salt water intrusion to this (future) salmon stream from the mooring basin.

The 2001 CAR stated that the Service could not concur with a larger project (15-acre and 20-acre basin). In response to water quality concerns with the original proposal, the project basin size has been increased has now been increased. The increased basin size has been largely accommodated by decreasing the stockpile footprint (piling the sand higher), decreasing the entrance channel, and making the basin side slopes steeper. Despite these project changes there are still impacts to the freshwater resources of Rust Creek. Conservation measures to relocate/reduce the stockpile footprint towards the purpose of avoiding the reconstruction of Rust Creek seem appropriate. We have identified three opportunities to adjust the project footprint so that the relocation of Rust Creek is not necessary. The feasibility of these three actions (whether separate or in combination) needs to be assessed.

RECOMMENDATIONS

The original recommendations from the 2001 CAR are restated here for clarity and annotated as appropriate, to account for additional recommendations needed in response to the additional information and design changes that have become available since that earlier report.

Because the habitats which could be impacted by the preferred project alternative are of high value for wintering seabirds, juvenile fish, and benthic invertebrates and are not relatively abundant in the region, our mitigation goal is no net loss of habitat value while minimizing loss of in-kind habitat value. In order to meet this goal, we have the following recommendations to mitigate the potential adverse impacts of the project on fish and wildlife resources and the habitats on which they depend.

1) We recommend the project, to the extent practicable, adhere to the following Best Management Practices:

- Disposal of dredge spoils will occur only in uplands, wetlands of the Middle/Central Creek watershed, or be incorporated into an approved marine restoration/enhancement project. Approval will be by the Corps of Engineers based on informal consultation and written concurrence of the resource agencies, including the Service.

- Include methods to filter or settle out silt-laden water (i.e., the use of silt curtains) prior to, during, and following the removal of dredge material.

- Properly install silt fences around the entire fill pads at the toe of the slope and maintain these fences until the fill slopes have become permanently stabilized with native vegetation.

- Prohibit any dredging of offshore material between November 15 and June 15, to minimize potential impacts to wintering seabirds and juvenile fish at the site. Offshore dredging and breakwater construction could occur after March 30 if it can be clearly demonstrated the work site can be completely isolated from the adjacent marine waters. The intent of this practice would be to avoid disturbances to wildlife using nearby waters and prevent sediments from harming juvenile fish.

*Note: Part of this condition is also one of the Terms and Conditions under the recently completed section 7 Consultation, (USFWS 2003).

- Design all rubblemound breakwaters to allow the free migration of juvenile fish during all tide stages without venturing out into waters over 1 foot deep. This may be best accomplished by incorporating a shallow shelf into the breakwater design.

Most of the anticipated water quality problems from silt associated with the Inland Basin alternative could be further mitigated by:

- Breaching the entrance channel last, after a period of settling within the mooring basin. Breaching should occur when salmon smolts are not believed to be in nearshore waters (after June 15).

- ♦ Isolating the waters of the entrance channel from Akutan Harbor during dredging by installation of a silt curtain or similar material.

*Note: This condition is also now one of the Terms and Conditions under the recently completed section 7 Consultation.

- ♦ Containing the waters leaving the dredge spoil pile and filtering/treating them prior to release. These should be treated on site and be released into the harbor instead of the adjacent freshwater streams unless they are treated to specific water quality standards.

2) Dredge spoil piles should be designed to later allow their use for harbor parking, staging, and storage areas. As dredge spoils are utilized for off-site projects, more and more useable uplands are made available in the project area. The size of these spoil piles and limited staging area for harbor construction should be made as small as practicable to avoid encroaching upon the adjacent watersheds that contain streams important to anadromous fish.

   If it is not practicable to contain the entire harbor within the (former) Middle/Central Creek watershed, every effort should be made to minimize impacts to the adjacent stream systems, including provisions that any relocated stream segments be replaced with a constructed stream of the same dimension, pattern, and profile as the stream segment being impacted. Creation of the replacement segment should precede the loss of the original segment.

3) Every effort to avoid impacting the dimension, pattern, and profile of the north stream (and its associated floodplain/wetland hydrology) should be incorporated into the project. The access road should be limited to the minimum size necessary to accommodate the anticipated traffic and exclude dedicated pedestrian shoulders. A clear span bridge should be designed to cross the north stream at a reach where there is a transfer of energy from one side of the creek to the other (i.e., not at a meander) and as far from the stream mouth as practicable.

   *Note: The location of this spur road may need to be designed in the absence of a future access road to the community and seafood plant. The Service is available to assist in determining the least environmentally-damaging access road/bridge crossing.

4) The new harbor should have an on-site waste oil and plastic/nylon mesh recovery system that is effectively maintained for the life of the project.

   *Note: This condition is also now one of the Terms and Conditions under the recently completed section 7 Consultation.

5) The harbor should be designed to allow effective and rapid containment of any petroleum compound spills within the harbor by installing eye bolt anchors at the outer and inner ends of the breakwaters. Spill boom adequate for sealing off the harbor entrances should be installed at or very near the eye bolts so they do not have to be transported prior to deployment. The

boom should be secured against theft. A team of at least three local personnel should be trained in responding to spills and complete drills every 6 months.

*Note: The intent of this condition is also now covered by Terms and Conditions under the recently completed section 7 Consultation.

6) An approved harbor management plan should be written to include provisions to secure waste accepted from vessels using the harbor in order to prevent the generation of wastes that will attract and support artificial concentrations of foxes or allow rats to exist in the harbor vicinity. Harbor management will be strongly encouraged to cooperate with the Service on effective rat eradication programs.

*Note: We would welcome recommendations from the local sponsor and the Corps on how to evaluate the success of rat prevention at the harbor. Efforts to eradicate rats from the plant and community appear unsuccessful. The Service has a cadre of rat eradication specialists that could be made available to assist in an eradication or monitoring plan for Akutan/Trident Seafoods.

7) Lighting for the harbor should be shielded from attracting or disorienting migrating birds.

*Note: This condition is also now one of the Terms and Conditions under the recently completed section 7 Consultation.

8) The Corps of Engineers should monitor freshwater salinities in the lower reaches of the north and south streams to ensure that the construction of the harbor does not result in modifications of the saltwater/freshwater interface that could impact plants and animals using the lower reaches of these streams. If substantial salinity changes are observed, these impacts will be remediated by physically isolating the saltwater harbor from the adjacent freshwater streams and associated wetlands.

*Note: This may be an inevitable impact from the creation of an inland basin that would be difficult to monitor and, if necessary, expensive to ameliorate. Our intent of this recommendation was to assess the potential for this impact as a means to better design and evaluate inland basins in the future. We are concerned that resultant vegetation changes could affect the stability of the outer beach berm, which could eventually affect access road stability.

9) Six potential mitigation projects are recommended to compensate for unavoidable habitat impacts:

a) Remove the waterfall barrier to allow anadromous fish access to the largest southern tributary to the north stream.

*Note: This tributary is now commonly referred to as Rust Creek.

b) Remove the abandoned freshwater lines that come off the northern hillside and are lying on the bottom of the seafloor where they used to be connected to fish processing vessels.

c) Conduct a one-time clean-up of the beach areas between the Whaling Station and the Trident seafood plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, etc. and transport them to an approved landfill.

*Note: Part of this condition is also now one of the Terms and Conditions under the recently completed section 7 Consultation.

d) Provide for the removal of what appears to be a holding tank from the shoreline of the head of the bay.

*Note: This recommendation is also now a Conservation Recommendation under the recently completed section 7 Consultation.

e) Investigate and complete the remediation of several burn pits that were maintained by the seafood processors in the mid-1980s on top of the berm at the head of bay.

*Note: We have previously clarified that the remediation of the burn pits was intended to remove hazards to wildlife that are on the surface. No digging or similar surface disturbance was intended. This is intended to be similar to a beach clean-up, but is to be located on a few upland sites on the beach berm.

f) As the Middle Creek wetlands at the head of the bay would be completely lost by the construction of the preferred alternative, compensatory mitigation to offset these habitat losses could be in the form of a conservation easement to protect the north stream watershed, especially a 100-foot, non-development setback from spawning and rearing habitats.

*Note: We largely agree with comments made by the City of Akutan that the abandoned freshwater lines (item b) and other trash and hazardous waste remnants (burn pits, item e, and possibly items c and d) were the responsibility of others. However we reiterate that there are substantial economic and other benefits to the commercial fishing industry and the community of Akutan through harbor construction and operation. Therefore we believe the local sponsor, the City, should have sufficient influence to work with the fishing industry and community to effect the recommendation in items, b, c, d, and e, in order to better effect an offset of project impacts and generally make Akutan Harbor a nicer, safer place for people, fish, and wildlife.

Literature Cited

Daley, John, 2003. Memorandum to Clarke Hemphill (USACE) regarding: Dredging Issues, Akutan Harbor. Tryck, Nyman, and Hayes, Inc. August 20, 2003.

U.S. Environmental Protection Agency. 1977. Water quality investigation related to seafood processing wastewater discharges at Dutch Harbor, Alaska: October 1975, October 1976. Working Paper No. EPA-910-8-77-100. EPA Surveillance and Analysis Division, Seattle, WA.

U.S. Fish and Wildlife Service. 2003. Biological Opinion on the Effects of Harbor Improvements at Akutan, Alaska, on the Threatened Steller's Eider (*Polysticta stelleri).* September 3, 2003. USFWS. 52 pp.

U.S. Fish and Wildlife Service. 2002. Final Fish and Wildlife Coordination Act Report for Akutan Navigation Improvements. USFWS. 56 pp.

U.S. Fish and Wildlife Service. 1983. Oregon Estuary Invertebrates – An illustrated guide to the common and important invertebrate animals. Biological Services Program, FWS/OBS-83-16. 225 pages.

For more information about the Fish and Wildlife Service in Alaska, call 888-262-6719/TDD or see our web site: http://www.r7.fws.gov

FEIS-APPENDIX 4

STELLER'S EIDER BIOLOGICAL OPINION
PREPARED BY
U.S. FISH AND WILDLIFE SERVICE
WESTERN ALASKA ECOLOGICAL SERVICES OFFICE
ANCHORAGE, ALASKA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish & Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

In reply, refer to:
WAES2002-0004

September 2, 2003

Mr. Guy McConnell
Environmental Resources Section
U.S. Army Engineer District, Alaska
P.O. Box 898
Anchorage, Alaska 99506-0898

Re: Biological Opinion Regarding the Effects of Harbor Improvements at Akutan, Alaska, on the Threatened Steller's Eider (*Polysticta stelleri*) (*endangered species consultation number 2002-0004)*

Dear Mr. McConnell

The enclosed document transmits the Fish and Wildlife Server's biological opinion based on our review of the proposed construction of a new mooring basin at the head of Akutan Harbor and its effects on the Steller's eider (*Polysticta stelleri*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). This letter provides only a summary of the findings included in the Biological Opinion. A complete discussion of the effects analysis is provided in the Biological Opinion.

This Biological Opinion is based on information provided in the Biological Assessment for the proposed project (U.S. Army Corps. of Engineers (USACOE) 2001), your September 19, 2001 response to our July 23, 2001 request for additional information, Steller's eider January and February 2000 surveys at Akutan (Lanctot and King 2000a and Lanctot and King 2000b), USFWS aerial survey data of southwest Alaska (Larned 2000), and the Fish and Wildlife Coordination Act Report for the proposed project (Schroeder 2001). In addition, other sources of information were also used in formulating this biological opinion. The complete administrative record for this consultation is on file at the Ecological Services Anchorage Field Office.

Following is a summary of the consultation history for this project:

- On February 20, 2001, we received your request for informal consultation on the proposed navigation improvements in Akutan Harbor.

- On March 30, 2001, we responded to your request by recommending that you request initiation of formal consultation.
- On June 15, 2001, we received your June 12, 2001 Biological Assessments for potential impacts on Steller's eiders and short-tailed albatross at Akutan, Alaska (USACOE 2001 and USACOE 2001a).
- On July 23, 2001, we acknowledged receipt of your biological assessment and requested additional information regarding project design, anticipated use, anticipated effects of spilled petroleum on the benthic community as well as on the Steller's eider, and a characterization of seafood processing wastes currently being discharged into Akutan Harbor.
- On July 23, 2001, we concurred with your determination that the proposed project was not likely to adversely affect the short-tailed albatross and concluded informal consultation on the Akutan mooring basin for this species.
- On September 20, 2001, we received your response to our request for additional information.
- On December 18, 2001 we acknowledged the receipt of the requested additional information, and requested a 30-day extension to the formal consultation period citing staffing shortages and increasing workloads. We initiated formal consultation for the proposed project on September 20, 2001.
- On December 26, 2001, we received your agreement to extend the formal consultation period by 30 days.
- On March 23, 2002, we provided a Draft Biological Opinion to the COE and Aleutians East Borough for review.
- On May 2, 2002, we received comments from the COE on the Draft Biological Opinion.
- On May 10, 2002, we hosted an interagency meeting attended by the COE staff, USCG staff, Aleutians East Borough representative, and Service staff to discuss the Terms and Conditions for the Sand Point Biological Opinion, which are very similar to those required in the Akutan Biological Opinion. As a result of this meeting Service personnel recommended that the COE and Aleutians East Borough re-evaluate the Terms and Conditions presented in the Akutan Biological Opinion.
- On June 20, 2002, we received comments from the COE regarding your re-evaluation of the Akutan mooring basin BO.
- On April 14, 2003, the Service initiated discussion with the COE regarding the Term and Condition requiring the COE and the Aleutians East Borough to participate in the development of a Geographic Response Strategy (GRS) for Akutan Harbor.
- On August 12, 2003, we received a response from the COE legal department on the "GRS Term and Condition".
- On August 26, 2003, the COE, Aleutians East Borough, and Service agreed on language requiring the COE and the local project sponsor (Aleutians East Borough and the City of Akutan) to participate in the development of a GRS for Akutan Harbor.

After reviewing all the available information on the location, timing of construction, and facility operation, along with the anticipated effects of the proposed action and the best available information on the status, distribution, and life history of the Steller's eider, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species.

Evaluation of prevailing climatic and marine conditions in Akutan Harbor indicates that acute and chronic exposure to petroleum compounds and collisions with harbor-related facilities and vessels would be unlikely to result in a take that exceeds 228 Steller's eiders, or 10 individuals of the Alaska breeding population. This Biological Opinion includes Reasonable and Prudent Measures and Terms and Conditions that the Service believes will minimize the impacts of incidental take of Steller's eiders resulting from the proposed project. We expect that adequate spill response, natural spill dispersal and evaporation of spilled products, and proper shielding and orientation of harbor-related and vessel lighting would preclude take beyond the level anticipated by our analysis. In order to be exempt from the prohibitions of section 9 of the ESA, the ACOE must require the applicant to comply with the terms and conditions, which implement the reasonable and prudent measures.

If you have any questions concerning this biological opinion, please contact Field Supervisor Ann Rappoport at (907) 271-2787, or Endangered Species Biologist Charla Sterne at (907) 271-2781.

Sincerely,

Ann G. Rappoport
Field Supervisor

Enclosure

cc: City of Akutan, Erika Tritremmel
Aleutians East Borough, Robert Juettner

TABLE OF CONTENTS

BIOLOGICAL OPINION
on the Effects of Harbor Improvements at Akutan, Alaska, on the Threatened Steller's Eider (*Polysticta stelleri*)

DESCRIPTION OF PROPOSED ACTION

A 57-vessel mooring basin and entrance channel are proposed for construction at the head of Akutan Harbor, Alaska, at 54°08' north latitude, 165°46' west longitude. Akutan Harbor is located on Akutan Island in the Fox Island Group of the Aleutian Archipelago. Currently, there is no protected moorage at Akutan forcing vessels using the Harbor to seek moorage and provisions at other locations.

The proposed mooring basin would be designed to accommodate the larger Bering Sea commercial fishing vessels consisting of trawlers and catch processors ranging in size from 80 to 160 feet in length currently using Akutan Harbor. A core fleet of approximately 76 vessels of this size class is associated with the Trident Seafoods plant in Akutan. Those vessels, of which there are approximately 19, unable to moor at the proposed mooring basin would have to seek moorage at other Aleutian and southwest Alaska harbors or travel to Pacific Northwest harbors. Future harbor expansions designed to accommodate these or additional vessels are precluded by environmental and engineering constraints and exorbitant construction costs.

Construction of the proposed mooring basin involves creating an inland basin by dredging approximately 750,000 cubic yards of material from a large wetland complex located behind a large vegetated berm at the head of the bay. A portion of the berm would be breached for the construction of an entrance channel. Proposed navigation improvements at Akutan would have a footprint of 65 acres of wetland habitat. Following are the main harbor project features and their approximate acreages:

- A 12-acre, 57-vessel mooring basin dredged to between 14 and 18 feet mean lower low water (MLLW).
- A 4.2-acre (200-foot-wide, 300-foot-long) entrance channel dredged to a depth of 20 feet MLLW.
- Two, 500-foot-long rubble mound jetties (8-acre total) along the entrance channel.
- Approximately 40 acres of uplands constructed from about 750,000 cubic yards of dredged disposal material.
- A 2-acre spur road connecting the harbor to a proposed road connecting the community of Akutan to a proposed airport site.
- Approximately 3 acres of the upland area would be available for equipment storage and other harbor-support-related facilities.

STATUS OF THE SPECIES

Species Description

The Steller's eider was listed as a threatened species on June 11, 1997 (62 FR 31748). Critical habitat was designated for the Steller's eider on February 6, 2001 (65 FR 13262). The Steller's eider is the smallest of the eiders. The average weight of adult male and female Steller's eiders is 1.94 pounds (Bellrose 1980). Adult male Steller's eiders in breeding plumage have a black back, white shoulders, and a chestnut brown breast and belly. The males have a white head with black eye patches; they also have a black chin patch and a small greenish patch on the back of the head. Females and juveniles are mottled dark brown.

Life History

Longevity

Steller's eiders are long lived, with individuals known to have lived at least as long as 21 years and 4 months in the wild (Chris Dau, pers. comm. 2000).

Energetics

Goudie and Ankney (1986) suggest that small bodied sea ducks such as harlequin (*Histrionicus histrionicus*) and long-tailed ducks (*Clangula hyemalis*) that winter at northern latitudes do so near the limits of their energetic threshold. These species have little flexibility in regards to caloric consumption or on reliance of caloric reserves. Under this life history strategy, the species are vulnerable to perturbations within their winter habitat. Because the Steller's eider is relatively small-bodied, being intermediate in size to the harlequin and long-tailed ducks (Bellrose 1980), and because it overlaps with harlequins and long-tailed ducks in its choice of foraging areas and prey items, the species may, like the harlequin and long-tailed ducks, exist near its energetic limits. We note that unlike other larger eiders, Steller's eiders must continue to feed upon reaching their nesting areas to build up enough energy reserves to breed (D. Solovieva, pers. comm. 2000). In addition, female Steller's eiders must continue to feed during incubation. In contrast, spectacled eiders, a larger bodied sea duck, apparently do not exist so close to their energetic threshold; they arrive on the nesting grounds fit enough to fast through egg laying and incubation.

Age to Maturity

Sexual maturity is believed to be deferred to the second year (Bellrose 1980).

Reproductive Strategy

Johnsgard (1994) indicated that pair formation for most sea ducks occurs in fall and spring. Metzner (1993) hypothesized that Steller's eiders at Izembek Lagoon and Cold Bay pair in the spring because they were apparently too preoccupied with feeding during the fall and winter to form pair bonds. The length of time that Steller's eiders remain paired is unknown. However, long-term pair bonds have been documented in other ducks (Bengtson 1972, Savard 1985, as in Cooke et al. 2000).

Pairs of Steller's eiders arrive at Point Barrow as early as June 5 (Bent 1987). While nesting, Steller's eiders often occupy shallow coastal wetlands in association with tundra (Bent 1987, Quakenbush et al. 1995, Solovieva 1997), although we have records of aerial observations of Steller's eider pairs well inland on the Arctic Coastal Plain. This species establishes nests near shallow ponds or lakes, usually close to water. Clutch size has been reported to range from 2 to 10 eggs (Bent 1987, Bellrose 1980, Quakenbush et al. 1995). The average clutch size of successful nests near Barrow is reported as 5.5. Solovieva (1997), found that clutch size for Steller's eiders on the Lena Delta varied between 5 and 8 eggs with an average of 6.1 (n = 32). Nesting success near Barrow (percent of nests with at least one egg hatching) is variable, ranging from 8.8% (Obritschkewitsch et al. 2001) to 29% (Quakenbush et al. 2001).

Near Barrow, Steller's eiders occur regularly, although abundance and breeding effort vary widely from year to year. Between 1991 and 1999, Steller's eiders nested in only six years (1991, 1993, 1995, 1996, 1997 and 1999) (Quakenbush et al. 2001). Periodic nonbreeding of Steller's eiders may be related to the response of predators to fluctuations in brown lemming (*Lemmus trimucronatus*) abundance (Quakenbush et al. 2001). Five of the six nesting years in that study coincided with lemming populations high enough to support nesting snowy owls and pomarine jaegers, the one exception being 1997. None of the four nests found in 1997, a low lemming year, were successful. Behavior of Steller's eiders is less predictable in non-nesting years when birds may disappear from terrestrial (non-marine) sites in early June (1998), or may remain grouped in terrestrial habitats for several weeks (1994) (Quakenbush et al. 2001). The degree to which these reproductive parameters are representative of what occurs elsewhere in Alaska (outside of the Barrow Area) is not known.

Hatching Success

Near Barrow, 83.3% (5 of 6) of Steller's eiders nests with eggs hatched in 1991, 20.0% (4 of 20) hatched in 1993 (Quakenbush et al. 1995), and 15% (3 of 20) hatched in 2000 (Philip Martin, Service, pers. comm., 2000). In other years, Steller's eiders did not even attempt to breed near Barrow (Quakenbush et al. 1995).

Fledging Rate

Of the 15% of nests that produce at least one chick, 7% (1 in 14) had chicks survive to an age at which fledging appeared likely (Phillip Martin, USFWS, pers. comm. 2003).

Consequently, only about 1 in 100 Steller's eider nests from the Barrow area have produced fledging-aged young in recent years.

Recruitment

Steller's eider recruitment rate (the percentage of fledged birds that reach sexual maturity) is unknown, but has been low in recent times, owing to low fledging rates.

Seasonal Distribution Patterns

Banded and Satellite-Tagged Alaskan Breeding Birds
Little is known of the distribution of Alaska breeding Steller's eiders outside of the breeding season. A few band recoveries indicate that birds that breed near Barrow undergo molt in Izembek Lagoon. A satellite telemetry study was initiated in 2000 to investigate the molting and wintering locations of the Alaskan population of Steller's eiders. Satellite transmitters were placed on four Steller's eiders captured in Barrow. Two Steller's eiders (one male and one female) spent the molting season on the Kuskokwim Shoals, while a third (a male) molted near the Seal Islands (Philip Martin, Service, pers. comm.). Both birds that molted at Kuskokwim Shoals moved on to the Hook Bay portion of Bechevin Bay in November. The male remained in Hook Bay at least until late December when his transmitter stopped working. The female remained at Hook Bay until early February, at which time she returned to Izembek Lagoon and remained there into spring. The bird that molted near the Seal Islands moved west to Nelson Lagoon in October. After spending approximately 3 weeks at Nelson Lagoon, this bird moved west to Sanak Island at the end of November. The bird remained at Sanak Island for 3 months. During this time his use area was small, only a few square kilometers. By March 4, he had moved back to Izembek Lagoon in the vicinity of his November locations (Philip Martin, Service, pers. comm.).

Breeding Distribution
Three breeding populations of Steller's eiders are recognized, two in Arctic Russia and one in Alaska. The Russian Atlantic population breeds in western Russia and winters in the north Atlantic Ocean while the Russian Pacific population nests in eastern Russia and winters in the southern Bering Sea, including southwest Alaska. The exact historical breeding range of the Alaska-breeding population of Steller's eiders is not clear. The historical breeding range may have extended discontinuously from the eastern Aleutian Islands to the western and northern Alaska coasts, possibly as far east as the Canadian border. In more recent times, breeding occurred in two general areas, the Arctic Coastal Plain, and western Alaska, primarily on the Y-K Delta. Currently, Steller's eiders breed on the western Arctic Coastal Plain in northern Alaska, from approximately Point Lay east to Prudhoe Bay, and in extremely low numbers on the Y-K Delta.

On the Arctic Coastal Plain, anecdotal historical records indicate that the species occurred from Wainwright east, nearly to the Alaska-Canada border (Anderson 1913; Brooks 1915). There are very few nesting records from the eastern Arctic Coastal Plain, however, so it is unknown if the species commonly nested there or not. Currently, the species predominantly breeds on the western Arctic Coastal Plain, in the northern half of the National Petroleum Reserve - Alaska (NPR-A). The majority of sightings in the last decade have occurred east of the mouth of the Utukok River, west of the Colville River, and within 90 km (56 mi) of the coast. Within this extensive area, Steller's eiders generally breed at very low densities.

The Steller's eider was considered a locally "common" breeder in the intertidal, central Y-K Delta by naturalists early in the 1900s (Murie 1924; Conover 1926; Gillham 1941; Brandt 1943), but the bird was reported to breed in only a few locations. By the 1960s or 70s, the species had become extremely rare on the Y-K Delta, and only six nests have been found in the 1990s (Flint and Herzog 1999). Given the paucity of early-recorded observations, only subjective estimates can be made of the Steller's eider's historical abundance or distribution on the Y-K Delta.

A few Steller's eiders were reportedly found nesting in other locations in western Alaska, including the Aleutian Islands in the 1870s and 80s (Gabrielson and Lincoln 1959), Alaska Peninsula in the 1880s or 90s (Murie and Scheffer 1959), Seward Peninsula in the 1870s (Portenko 1989), and on Saint Lawrence Island as recently as the 1950s (Fay and Cade 1959). It is unknown how regularly these areas were used or whether the species ever nested in intervening areas.

<u>Post-Breeding Distribution and Fall Migration</u>

Following breeding, males and some females with failed nests depart their Russian nesting area and return to marine waters (Solovieva 1997). We know little of Steller's eiders use of marine waters adjacent to Alaska's Arctic Coastal Plain and along the west and southwest coast of Alaska during late summer and fall migration. Historical observations made by Murdoch (1885 as in Bent 1987) indicate that birds that have bred near Point Barrow begin to return to the coast from the first to the middle of July. In addition, he indicated that they disappear from the Barrow area from the first to the middle of August. Steller's eiders arrived at St. Michael around 21 September (Bent 1987). Late date of departure was as follows: Point Barrow, September 17; St. Michael, October 5; and Ugashik, November 28 (Bent 1987).

Over 15,000 Steller's eiders were observed on September 27, 1996, in Kuskokwim Bay (Larned and Tiplady 1996). Most (nearly 14,000) were located along the mainland side of barrier islands while about 1,100 were detected further offshore. Despite this species' apparent preference for near shore habitats, several groups were detected over 10 kilometers (km) from shore and two groups were over 30 km from shore.

In late summer and fall, large numbers of Steller's eiders molt in a few lagoons located on the north side of the Alaska Peninsula (i.e., Izembek and Nelson Lagoon/Port Moller Complex, Seal Islands) (Petersen 1980 & 1981). Recent observations of over 15,000 Steller's eiders in Kuskokwim Bay, and the observation of two out of three satellite-tagged birds from Barrow molting there suggests that Kuskokwim Bay may also be a notable molting area for this species and for the listed entity (Larned and Tiplady 1996; Philip Martin, Service, pers. comm. 2000). Following the molt, large numbers of

Steller's eiders are known to over winter in near shore marine waters of the Alaska Peninsula, Aleutian Islands, Kodiak Archipelago, and the Kenai Peninsula (e.g., within Kachemak Bay).

Molt Distribution

After breeding, Steller's eiders move to marine waters where they undergo a flightless molt for about 3 weeks. The majority of Steller's eiders are thought to molt in four areas along the Alaska Peninsula: Izembek Lagoon (Metzner 1993; Dau 1987; Laubhan and Metzner 1999), Nelson Lagoon, Herendeen Bay, and Port Moller (Gill et al. 1981; Petersen 1981; Dau 1999). Additionally, smaller numbers are known or thought to molt in a number of other locations along the western Alaska coast, around islands in the Bering Sea, along the coast of Bristol Bay, and in smaller lagoons along the Alaska Peninsula (Swarth 1934; Dick and Dick 1971; Petersen and Sigman 1977; Wilk et al. 1986; Dau 1987; Petersen et al. 1991).

Winter Distribution

Following the molt many, but not all, Steller's eiders disperse from major molting areas to other portions of the Alaska Peninsula and Aleutian Islands. Winter ice formation often temporarily forces birds out of shallow protected areas such as Izembek and Nelson Lagoons. During the winter, this species congregates in select near shore waters throughout the Alaska Peninsula and the Aleutian Islands, around Nunivak Island, the Pribilof Islands, the Kodiak Archipelago, and in Kachemak Bay (Larned 2000a, Bent 1987, Agler et al. 1994, Larned and Zwiefelhofer 1995).

Larned (2000b) did not see Steller's eiders along most of the surveyed Alaska Peninsula coastline during winter 2002. Most of the birds were concentrated within relatively small portions of the coastal waters. Much of the population that is detected during spring migration was not detected on this survey. We conclude that either the survey failed to detect many birds in the survey area, or many Steller's eiders are wintering further west in the Aleutian Islands and/or along the south side of the Alaska Peninsula. We suspect the latter.

Spring Migration

In the spring, Steller's eiders form large flocks along the north side of the Alaska Peninsula and move east and north (Larned et al. 1993, Larned 1998, Larned 2000b). Spring migration usually includes movement along the coast, although birds may take shortcuts across water bodies such as Bristol Bay (William Larned, Service, pers. com. 2000). Interestingly, despite many daytime aerial surveys, Steller's eiders have never been observed during migratory flights (William Larned pers. com. 2000). Larned (1998) concluded that Steller's eiders show strong site fidelity to "favored" habitats during migration, where they congregate in large numbers to feed before continuing their northward migration.

The number of Steller's eiders observed in each site during migration surveys should be considered a minimum estimate of the number of eiders that actually use these sites during migration. These data represent eider use during a snapshot in time, when in reality, a stream of eiders likely flows into and out of these sites throughout the migration season. The spring migration survey was not intended to document the intensity of use of any particular site by Steller's eiders, but was designed to monitor the entire population of Steller's eiders and other sea ducks during the spring migration.

Because the spring Steller's eider aerial survey was not intended to quantify use of any particular area by Steller's eiders during spring migration, care must be taken in interpreting the results with this purpose in mind. For example, Steller's eider use of habitat near Ugashik and Egegik Bays was documented in 1992, 1993, 1997, and 1998 (Larned et al. 1993, Larned 1998). However, in 2000, no Steller's eiders were observed there (Larned 2000b). In fact, no Steller's eiders were observed from the Cinder River Sanctuary to Cape Constantine; an expanse of approximately 110 miles of coastline which encompasses these bays and which has had several thousand Steller's eiders documented in previous years (Larned et al. 1993, Larned 1998). However, 15,000 Steller's eiders were observed south of this area and were distributed between Port Heiden and Port Moller (Larned 2000b). Three days later, about 43,000 Steller's eiders were observed south of Port Moller (Larned 2000b). The birds were, in essence, stacking up behind Port Moller, or were otherwise phenologically late in their migration relative to the previous few years. Regardless, survey results from that year suggested low use of habitats north of Port Moller, even though the birds that were counted south of Port Moller presumably used those more northerly habitats following the conclusion of the spring aerial survey.

Several areas receive consistent use by Steller's eiders during spring migration, including Bechevin Bay, Morzhovoi Bay, Izembek Lagoon, Nelson Lagoon/Port Moller Complex, Cape Seniavin, Seal Islands, Port Heiden, Cinder River State Critical Habitat Area, Ugashik Bay, Egegik Bay, Kulukak Bay, Togiak Bay, Nanwak Bay, Kuskokwim Bay, Goodnews Bay, and the south side of Nunivak Island (Larned et al. 1993, Larned 1998, and Larned 2000b).

Summer Distribution in Southern Alaska

A small number of Steller's eiders are known to remain along the Alaska Peninsula and Kachemak Bay during the summer; approximately 100 have been observed in Kachemak Bay while a few may spend the summer at Izembek Lagoon (Chris Dau, Service, pers. comm. 2000).

Site Fidelity

Steller's eiders appear to show site fidelity at different spatial scales during different times of the year. There is good evidence of fidelity to molting sites in this species. About 95 percent of recaptured molting Steller's eiders are recaptured at the same site at which they were banded (Flint et al. 2000). Flocks of Steller's eiders make repeated use of certain areas between years (Larned 1998), although it is unknown to what extent individuals display repeated use of these areas.

Female philopatry to breeding grounds in waterfowl species is high. Female waterfowl tend to return to the area where they hatched for their first nesting effort, and subsequently tend to return to the same area to breed in the following years (Anderson et al. 1992). Despite having had only a few opportunities to observe Steller's eiders breeding on the Y-K Delta, we have observed philopatry displayed by a female Steller's eider there; one individual chose nest sites in two consecutive years that were about 124 m apart (Paul Flint, U. S. Geological Service, Biological Resource Division, pers. comm. 1999). Banding data from the Barrow area suggests some level of site fidelity for Steller's eiders breeding there as well (Quakenbush et al. 1995; Martin, FWS, pers. comm. 2000). Interestingly, natal philopatry has not been observed in Steller's eiders nesting in Russia (D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm. 2000).

Further evidence of breeding site fidelity is found in other sea ducks. Female spectacled eiders did not move between general nesting areas (coastal versus interior) between years (Scribner et al. 2000). In addition, mitochondrial DNA analysis indicates that female spectacled eiders tend to return to their natal breeding area once they are recruited to the breeding population (Scribner et al. 2000). Natal, breeding, and winter philopatry in other sea ducks has also been documented (Dow and Fredga 1983, Savard and Eadie 1989, Robertsen 1997, Robertson et al. 1999).

Preliminary evidence suggests that Steller's eiders also show fidelity for over wintering sites. Satellite transmitters were placed on four Steller's eiders captured in Barrow, Alaska in the summer of 2000. The transmitters ceased functioning for two of these birds prior to the over wintering season. Of the remaining two eiders with transmitters, one over wintered in the Sanak Islands and the other over wintered in the Hook Bay portion of Bechevin Bay. Although these two birds over wintered in different locations, both eiders remained in their respective locations from November 2000 through February 2001. Their use area was small, only a few square kilometers (Philip Martin, FWS, pers.comm., 2001).

Preliminary data from radio transmitters placed on 23 Steller's eiders captured in Captain's Bay and around Amaknak Island (near Dutch Harbor) in spring 2001 also reveal that eiders show site fidelity to general wintering areas (USGS April 2001 trip report). Steller's eiders remained in the general vicinity from which they were initially captured from mid-February to mid-March 2001 when the radio transmitters stopped working (Paul Flint, USGS, pers. comm.). The birds marked in Captain's Bay were never detected outside of the area that the flock was observed using. Birds marked around Amaknak Island remained in that general area, but appeared to use a larger home range. Although further investigation is needed, preliminary studies suggest that Steller's eiders show high site fidelity at over wintering sites, at least within one winter season. Whether Steller's eiders show fidelity to over wintering sites between years remains unknown.

We note that site fidelity has been observed in wintering harlequin ducks; they showed strong site fidelity for short stretches (5 km) of coastline (Cooke et al. 2000). Robertson et al. (1999) concluded that strong site tenacity suggests that local knowledge of an area is valuable and may help ensure high survival of individuals remaining in a familiar site. They suggest that site fidelity would be expected of long-lived species that are sensitive to adult mortality and depend, at least in part, upon habitat stability for survival.

Population Structure

While Steller's eiders exhibit strong fidelity to their molting grounds (Flint et al. 2000), nest site fidelity is not similarly displayed (Dearing 2003). Using DNA fingerprinting techniques to individually identify female Steller's eiders nesting in the Barrow area between 1991 and 1999, Dearing (2003) was unable to detect subsequent renesting of "marked" individuals within the area sampled. However, Dearing (2003) found genetic similarities among nests sampled year after year, and concluded the relatedness was due to offspring, siblings or otherwise closely-related individuals nesting in the Barrow area. Moreover, Dearing (2003) concluded that different groups of Steller's eiders arrive to nest in Barrow from year to year, and that Steller's eiders nesting in the Barrow area are not likely to comprise a single population, but may represent a nesting location on the periphery of the main breeding grounds in Siberia.

Preliminary results of a population genetics study, using microsatellite and mtDNA, found no evidence for population structure among Pacific breeding Steller's eiders (Pearce et al. 2003). Similar nuclear allele and mtDNA haplotype frequencies were observed among all sampling areas within the Pacific population. Lack of population structure between these areas suggests gene flow, but it could also reflect common ancestry and insufficient time since divergence for genetic differences to be detected with the markers used (J. Pearce, Alaska Science Center, pers. comm.). These hypothesized causations can be tested statistically, and the results of these tests are expected in the final report for this study.

No significant inbreeding was detected among Steller's eiders from four breeding populations: Western arctic, Indigirka River, Lena River, and Alaska (Pearce et al. 2003). Steller's eiders collected on wintering grounds in Norway are assumed to represent breeding birds from the Western arctic breeding population. This assumption is supported by satellite telemetry data (M. Petersen, Alaska Science Center, unpublished data). Significant genetic differentiation between the Western arctic and Alaskan breeding populations was detected using nuclear loci ($\theta_{ST} = 0.01$, $P < 0.001$) and mtDNA ($\Phi_{ST} = 0.131$, $P < 0.05$), suggesting that the populations at the extreme ends of the breeding range are likely reproductively isolated or, alternatively, that gene flow does not occur at a level that homogenizes gene frequencies between these distant populations (Pearce et al. 2003).

Food Habits

Steller's eiders employ a variety of foraging strategies that include diving to a maximum depth of at least 9 meters (30 feet), bill dipping, body tipping, and gleaning from the surface of water, plants, and mud. During the fall and winter, Steller's eiders forage on a variety of invertebrates that are found in near-shore marine waters (Metzner 1993, Petersen 1981, Bustnes et al. 2000). Esophageal contents from 152 Steller's eiders collected at Izembek Lagoon, Kinzarof Lagoon, and Cold Bay, Alaska, indicate Steller's eiders forage on a wide variety of invertebrates (Metzner 1993). According to Metzner (1993), marine invertebrates accounted for the majority of the Steller's eider diet (92%, aggregate dry weight). In addition, occurrence of shell-free prey (e.g., Crustacea, Polychaeta) predominated, compared to that of food items with shells (Metzner 1993). Metzner (1993) concluded that Steller's eiders were opportunistic generalists, foraging primarily on fauna associated with eelgrass beds in Izembek Lagoon and Kinzarof Lagoon, and infauna, epibenthos, and highly mobile fauna. During molt, Steller's eiders were found to have consumed blue mussel (*Mytilus edulis*), other bivalves (e.g., *Macoma balthca*), and amphipods (a small crustacean). They were also found to have consumed more blue mussels while growing wing-feathers (Petersen 1981).

In northern Norway, 31 species were identified as Steller's eider winter food items: 13 species of gastropods (68.4% of total number of items); 4 species of bivalves (18.5%); 12 species of crustaceans (13%); and 2 species of echinoderms (0.1%) (Bustnes et al. 2000). Juveniles sampled in this study fed more on crustaceans (x = 61% aggregate wet weight) than did adults (x = 26% aggregate wet weight). Examination of female Steller's eiders found dead near Barrow had consumed mostly Chironomid larvae, which are the predominant macrobenthic invertebrate in arctic tundra ponds (Quakenbush et al. 1995).

Predators

Predators of Steller's eiders include snowy owls (*Nyctea scandiaca*), short-eared owls (*Asio flammeus*), peregrine falcons (*Falco peregrinus*), gyrfalcon (*Falco rusticolus*), pomarine jaegers (*Stercorarius pomarinus*), rough-legged hawks (*Buteo lagopus*), common raven (*Corvus corax*), glaucous gulls (*Larus hyperboreus*), arctic fox (*Alopex lagopus*), and red fox (*Vulpes vulpes*). Quackenbush et al. (1995) reported five adult male and three adult female Steller's eiders taken by avian predators in 4 years near Barrow. Predators included peregrine falcons, gyrfalcons, and snowy owls. In addition, pomarine jaegers preyed on Steller's eider eggs. On the Y-K Delta, Steller's eider nests have been destroyed by gulls (Paul Flint, USGS, pers. comm., 1999). In fall and winter, bald eagles (*Haliaeetus leucocephalus*) are important predators of Steller's eiders (McKinney 1965).

Population Dynamics

Population Size

Population sizes are only imprecisely known. The Russian Atlantic population is estimated at 30,000 to 50,000 individuals, and the Russian Pacific population likely numbers 50,000 to 60,000. The threatened Alaska-breeding population is thought to include hundreds or low thousands on the Arctic Coastal Plain, and possibly tens or hundreds on the Yukon-Kuskokwim Delta.

Yukon-Kuskokwim Delta

Estimating the size of the Steller's eider breeding population in Alaska has proved difficult. Due to the low counts and high variation in counts between years during systematic surveys, an accurate/precise statistical estimate is unavailable. Aerial surveys that included the Y-K Delta but did not include the Arctic Coastal Plain indicate that the population sizes of eiders (*Polysticta stelleri* and *Somateria* spp.) had declined by 90% since 1957 (Hodges et al. 1996). For the 1950s and early 1960s, the upper limit of the population, excluding the North Slope, had been estimated to be approximately 3,500 pairs (Kertell 1991). Kertell noted, however, that the population might have been smaller due to the potential restriction of nesting Steller's eiders to specific habitats. Kertell (1991) concluded that the Steller's eider had been extirpated from the Y-K Delta prior to 1990.

Since publication of Kertell (1991), a few pairs of Steller's eiders have nested on the Y-K Delta (Table 1) (Paul Flint, USGS, pers. comm. 1999). In no single year have biologists found more than three nests there, despite extensive ground-based nest search efforts throughout nearly all of the Steller's eider critical habitat area.

Because extensive ground investigations occur over at least 1.4% of Steller's eider critical habitat on the Y-K Deltaelta each year (Tim Bowman, Service, Anchorage, 2003, pers. comm), with additional searching occurring by crews walking to and from study sites, and because these searches have not revealed more than two Steller's eider nest in any given year, we believe the estimate of hundreds of Steller's eiders on the Y-K Delta is optimistic.

Table 1. Recent sightings of Steller's eiders on the Y-K Delta (Paul Flint pers. comm. 1999)

Year	General Location	Number of Pairs	Nest Detected	Number of Eggs	Fate of Nest
1994	Kashunuk River near Hock Slough	1	1	7	Destroyed by Gulls
1996	Tutakoke River	1	1	6	Unknown
1997	Tutakoke River	2	0	NA	NA
1997	Kashunuk River	1	1	6	Hatched
1998	Tutakoke River; Kashunuk River	2;1	2; 1	Unk.; 7	Destroyed; Hatched

Arctic Coastal Plain/North Slope

Aerial surveys provide the best estimate of Steller's eider population size in northern Alaska. The Arctic Coastal Plain Breeding Bird Survey point estimate for Steller's eiders reported by Mallek et al. (2003) from 1989 to 2002 ranged from 0 to 2,543 (Table 2), with a 14-year average of 1,106. The North Slope Eider Surveys, timed to be flown during the spectacled (and Steller's) eider early nesting period (the best time to detect waterfowl breeding population), indicates a smaller Steller's eider breeding population, averaging 168 birds from 1992-2002 (Larned et al. 2003) (Table 2). Caution must be used when interpreting these survey results. Actual population sizes may be underestimated if an unknown proportion of birds are missed during the survey. Conversely, the data may overestimate population size due to the periodic presence of non-breeding birds or failed breeders from other areas. For example, the second highest count from the Arctic Coastal Plain Breeding Bird Survey from 1989-2002 (2,524) occurred in 1994 when the species failed to nest in the Barrow area and remained in terrestrial (non-marine) habitats until mid-July (Quakenbush et al. 2001).

Table 2. Aerial population estimates from aerial breeding pair surveys (Mallek and King 1999).

Year	Population Estimate 1989 – 2002 (Mallek et al. 2003)	Population Estimate 1992 – 2002 (Larned et al. 2003)	Nesting Status Near Barrow 1991 – 1999 (Quakenbush et al. 2001)
1989	2002		
1990	534		
1991	1118		Nesting
1992	954	0	Non-nesting
1993	1313	262	Nesting
1994	2524	47	Non-nesting
1995	931	281	Nesting
1996	2543	0	Nesting
1997	1295	189	Nesting
1998	281	0	Non-nesting
1999	1250	785	Nesting
2000	563	0	Nesting[1]
2001	176	288	Non-nesting[1]
2002	0	0	Non-nesting[1]

[1](Nora Rojek, USFWS, pers. comm. 28 April 2003)

The problem of Steller's eider population estimation results from the species dispersal across a huge landscape at very low densities. In addition, the number of Steller's eiders present on the Arctic Coastal Plain may fluctuate dramatically from year to year. However, it is the opinion of the biologists most familiar with the species on its Arctic Coastal Plain nesting grounds that the breeding population there is best described as numbering in the hundreds, or perhaps in the very low thousands.

Population Variability

Variability in the abundance of the Alaska breeding population of Steller's eiders is not well understood. The sampling errors around population estimates are large enough to obscure relatively large annual population fluctuations. However, ground-based efforts in the Barrow area suggest that local breeding populations there fluctuate dramatically (Quakenbush et al. 1995).

Population Stability

Long life spans, multiple reproductive periods, high reproductive rates, and even-age distributions all have stabilizing affects on populations. The Steller's eider is a relatively long-lived species with low and variable nest success, low duckling survival, and poor overall productivity (Quakenbush et al. 2001, Phillip Martin, pers. comm. 17 April 2003). Although periodic non-breeding is consistent with the reproductive strategy for a long-lived species (Begon and Mortimer 1986), such species do not typically display the high variability measured for North Slope Steller's eiders populations.

The high degree of variability in aerial survey data make detecting anything but the most dramatic trends in the breeding population difficult. Population modeling based on parameters derived from birds breeding in the Barrow area indicates annual declines of 15 to 25% in the Alaska breeding population (Paul Flint, pers. comm. 21 April 2003). However, additional data are needed to develop a predictive model of the North Slope Steller's eider population, as Barrow-area observations may not apply across the species range in northern Alaska, and birds that forego breeding in the Barrow area may attempt to breed elsewhere in some years.

Long term spring survey data suggests a 6.1% annual decline in migrating Steller's eiders ($R^2 = 0.72$; Larned 2003). If a marine-based threat is causing a decline in the Pacific population of Steller's eiders, then it is reasonable to conclude that the Alaska breeding population may also be affected by such a threat.

Status and Distribution

Reasons for Listing

The Alaska breeding population of Steller's eiders was listed as a threatened species on June 11, 1997 (Service 1997). It was listed due to (1) its recognition as a distinct vertebrate population segment, (2) a substantial decrease in the species' nesting range in Alaska, (3) a reduction in the number of Steller's eiders nesting in Alaska, and (4) the vulnerability of the remaining breeding population to extirpation (Service 1997).

Habitat Loss

The direct and indirect effects of future gas/oil development within the National Petroleum Reserve-Alaska, and future village expansion (e.g., at Barrow), were cited as potential threats to the Steller's eider (Service 1997). Within the marine distribution of

Steller's eiders, perceived threats include marine transport, commercial fishing, and environmental pollutants (Service 1997).

Hunting

Although not cited as a cause in the decline of Steller's eiders, the take of this species by subsistence hunters was cited as a threat to the population of Steller's eiders near Barrow in the final rule (Service 1997). However, the gathering of subsistence harvest information similar to that collected from Natives on the Y-K Delta has met with resistance from Natives on the Arctic Coastal Plain.

Predation

Increased predation by arctic foxes (*Alopex lagopus*) upon eider nests resulting from the early to mid-1980's crash of goose populations is cited as a possible contributing factor to the decline of the Steller's eider on the Y-K Delta (Service 1997). In addition, a decline in fox trapping concurrent with the decline in fur prices may result in at least temporary fox population increases. The potential for increased predation near villages resulting from the associated gull and raven populations was also cited as a potential threat to this species (Service 1997). Research has shown that expanding predatory gull populations take a heavy toll on waterfowl eggs and young (Bowman et al. 1997), although spectacled eider ducklings were not detected as gull prey in this study.

Lead Poisoning

The presence of lead shot in the nesting environment on the Y-K Delta was cited as a continuing potential threat to the Steller's eider. The Service is progressing in its efforts to enforce a nationwide ban on lead shot on the Arctic Coastal Plain (Service 1997) and throughout Alaska.

Ecosystem Change

Direct and indirect changes in the marine ecosystem caused by increasing populations of Pacific walrus (*Odobenus rosmarus*), gray whale (*Eschrichtius robustus*), and sea otter (*Enhydras lutris*), were cited as potential causes of the decline of Steller's eiders. Subsequent declines in sea otter populations (65 FR 67343) and continuing declines in Steller's eider populations suggest that otters were not responsible for a decline in eider numbers. In addition, changes in the commercial fishing industry were also cited as perhaps causing a change in the marine ecosystem with possible effects upon eiders (Service 1997). However, we are unaware of any link between changes in the marine environment and contraction of the eider's breeding range in Alaska (Service 1997).

Range-wide Trend

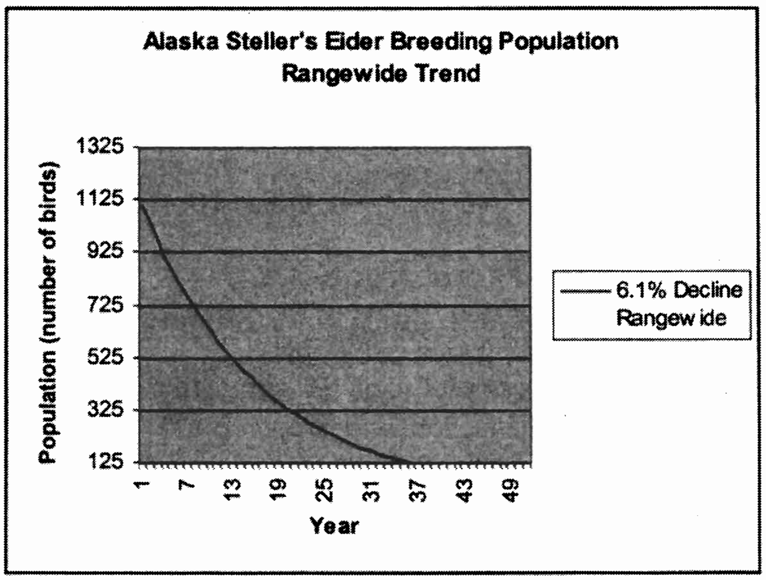
Populations of Steller's eiders molting and wintering along the Alaska Peninsula have declined since the 1960s (Kertell 1991), and appear to be in continued decline (Flint et al. 2000, Larned 2002). Annual spring aerial surveys provide an index of the Pacific Steller's eider population. These long-term survey data suggest a 6.1% annual decline in migrating Steller's eiders ($R^2 = 0.72$; Larned 2003). In addition, comparison of banding data from 1975 -1981 to 1991-1997 indicates a reduction in Steller's eider survival over time (Flint et al, 2000).

The Steller's Eider Recovery Plan (2002) establishes criteria for reclassifying the species from threatened to endangered as follows:

> "The Alaska-breeding population will be considered for reclassification from Threatened to Endangered when:
>
> > The population has ≥ 20% probability of extinction in the next 100 years for 3 consecutive years; OR
> >
> > The population has ≥ 20% probability of extinction in the next 100 years and is decreasing in abundance."

A population viability model is being developed that will be used to estimate the population size corresponding to specific probabilities of extinction. Lacking this more complex stochastic model, we developed a simple deterministic model based on observed annual declines and estimated breeding population size to project population longevity (Figure 1). Based on a 6.1% annual decline (from Larned's spring surveys) and a starting population of 1,106 (the average population point estimate reported by Mallek et al. (2003)), the Alaska breeding population of Steller's eider is expected to reach functional extinction (125 birds) in 35 years.

Figure 1. Projected population size of Steller's eider Alaska breeding population based on range wide 6.1% decline.



<u>IUCN status</u>

Based on the IUCN 2001 Categories and Criteria (version 3.1), the North American breeding population of Steller's eiders belong in the category of Endangered (EN). In the nomenclature used by IUCN, the following is the justification for this categorization: EN A1b+A2+B1b(v)c(iv)+C1.

EN

A. Reduction in population size based on any of the following:
   1. An estimated population size reduction of ≥ 70% over the last three generations (for Steller's eiders, three generations equals about 25.5 years).
      b. an index of abundance appropriate to the taxon.
         Evidence: Larned (2003) reported a 61% decline over 10 years in the wintering population of Steller's eiders. Extrapolating this 10 year / 61% decline back in time would imply that the population declined by at least 70% in the past 25.5 years. We believe recent survey data suggests that this criterion for classification as endangered is satisfied.

A. Reduction in population size based on any of the following:
   2. An observed, estimated, inferred or suspected population size reduction of ≥ 50% over the last three generations.
      Evidence: Based on population models (Service, unpublished data 2003), and using a beginning population of 1106 Steller's eiders (mean of past 10 years breeding surveys) and a population decline of 6.1% annually (Larned 2002), we expect an 86% decline in the next 25 years. We believe recent survey data suggests that this criterion for classification as endangered is satisfied. If current population trends hold, Steller's eiders will have exceeded the 50% loss criterion in 10 years.

B. Geographic range in the form of either extent of occurrence or area of occupancy.
   1. Extent of occurrence estimated to be less than 5000 km^2 and at least two of a – c:
      b. Continuing decline, observed, inferred or projected in any of the following:
         v. number of mature individuals
      c. Extreme fluctuations in any of the following:
         iv. number of mature individuals
         Evidence: Because of the large geographic extent over which this species breeds, it is unlikely that the North American breeding population of Steller's eiders will satisfy this classification criterion unless their breeding range becomes or is determined to be restricted to the "Barrow Triangle". Ritchie and King (2002) reported that the area of the Barrow Triangle is approximately 2757 km^2. We believe that available evidence suggests that the majority of Alaska breeding Steller's eiders do nest within the Barrow Triangle. However, we also acknowledge occasional nesting records outside this area.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years of 2 generations (17 years).

> Evidence: The current population estimate for Alaska breeding Steller's eiders (1106) is an average of counts from the last 10 years of surveys of the Arctic Coastal Plain during the nesting season. In the past 10 years there has been a 55% decline in wintering Steller's eiders (Larned 2002). We believe recent survey data suggests that this criterion for classification as endangered is satisfied.

It is our opinion that this survey provides the best estimate for trend; moreover, we do not have any information indicating that this negative trend does not apply to the Alaska breeding population of Steller's eiders.

New Threats

Chronic Petroleum Spills

The chronic release of petroleum products near large concentrations of Steller's eiders is not a new threat as much as it is a newly realized threat. The gregarious behavior of Steller's eiders during a spill event may result in acute and/or chronic toxicity in large numbers of birds. Indeed, Larned (2000b), expressed concern for the survival and reproductive success of large number of Steller's eiders observed in harbors.

A life-history strategy of long life and low annual reproductive effort would be expected to evolve under conditions of predictable and stable non-breeding environments (Sterns 1992). The life history strategy of the Steller's eider seems to fit this model. That is, the Steller's eider is long-lived, has low annual recruitment, and winters in apparently productive and reasonably stable near-shore marine environments. Because the Steller's eider is relatively small bodied and winters at northern latitudes, it may do so near the limits of its energetic threshold. Harlequin ducks and long-tailed ducks exist near their energetic limit in such climates (Goudie and Ankney 1986), and the Steller's eider is intermediate in size to these two species. Therefore, environmental perturbations that reduce prey availability or increase the species energetic needs may result in harm. Fuels and oils are toxic to Steller's eiders' prey (e.g., amphipods and snails) (Newey and Seed 1995 as in Glegg et al. 1999, Finley et al. 1999), and to the species itself (Holmes et al. 1978, Holmes et al. 1979, McEwan and Whitehead 1980, Leighton et al. 1983, Holmes 1984, Leighton 1993, Rocke et al. 1984, Yamato et al. 1996, Glegg et al. 1999, Trust et al. 2000, Esler et al. 2000). Therefore, we believe that spilled petroleum is likely to adversely affect Steller's eiders.

Seafood Processor Organic Waste

Discharge from seafood processors may affect the water column, sea floor, or shore directly or indirectly through burial and smothering, putrification and decay, deoxygenation, nutrient loading and alteration of habitats, aquatic communities and food webs. Although wave action in shallow, near shore habitat may keep particles suspended and prevent waste deposition, contaminants, parasites, viruses, and other pathogens may be present and/or concentrated in these wastes and may bioaccumulate in prey items consumed by eiders.

Increased Risk of Lead Poisoning

Because this species continues feeding near the nesting site before and during incubation (D. Solovieva pers. comm. 2000), it may be subjected to an increased risk of exposure to lead shot over other waterfowl species that largely forego feeding at this time. Spectacled eiders do not seem to engage in feeding activities as much as Steller's eiders once breeding has commenced, however, spectacled eiders have been observed to have higher rates of exposure to lead than any species sampled on the Y-K Delta (Flint et al. 1997). The proportion of spectacled eiders on the Y-K Delta's lower Kashunuk River drainage that contained lead shot in their gizzards was high (11.6%, N = 112) compared to other waterfowl in the lower 48 states from 1938-1954 (8.7%, N = 5,088) and from 1977-1979 (8.0%, N = 12,880). Blood analyses of spectacled eiders indicated elevated levels of lead in 13% of pre-nesting females, 25.3% of females during hatch, and 35.8% of females during brood rearing. Nine of 43 spectacled eider broods (20.9%) contained one or more ducklings exposed to lead by 30 days after hatch (Flint et al. 1997). Thus, if spectacled eiders have experienced population level effects on the Y-K Delta due to lead poisoning, then Steller's eiders may have experienced similar, or even greater lead-induced effects.

Collisions with Manmade Structures

Steller's eiders have been documented to collide with wires, communication towers, boats, and other structures. During a 4-year period near Barrow, one adult Steller's eider female died from striking a wire and another adult Steller's eider was suspected to have died from striking a radio tower (Quakenbush et al., 1995). In addition, large numbers of Steller's eiders are known to have collided with communication towers in the wintering area along the Alaska Peninsula. "Bird storms" are a well-documented occurrence within the commercial crab fishery fleet, a result of their use of bright lights during inclement nighttime weather. In December 1980 or 1981, "at least 150" dead eiders (species unknown) were reported to be on the deck of the M/V *Northern Endeavor* the morning after the vessel, with crab lights illuminated, anchored on the Bering Sea side of False Pass one night in a storm (Day 2001). Based on the time of year and location, we assume that these birds were Steller's eiders. Two Steller's eiders died after striking the crab lights of the P/V *Wolstad* on February 15, 1994; no additional information was provided with this report. One male Steller's eider landed on the deck of the *Elizabeth F* on February 14, 1997 at 11:36 pm; another male Steller's eider struck the vessel and died the following day at 5:00pm. In mid-April of 2003, a Steller's eider struck power lines about 20 miles from the Bristol Bay Coast near the intersection of the road to Lake Camp and the road to Rapids Camp. The ceiling was low (close to fog) and it was rainy. Local biologists believe that this happens often, but has simply not been reported in the past (Susan Savage, Alaska Peninsula Becharof NWR, 2003, pers. comm.). Between September 26, 2001, and October 29, 2001, the Northstar facility on the North Slope of Alaska experienced 18 sea duck mortalities and 1 sea duck injury due to collisions with facility infrastructure. Sixteen dead eiders of unknown species were found on October 28, 2001, on the Endicott spur drilling island. Three spectacled eiders died after striking a Coast Guard cutter conducting sampling in the Bering Sea in March 2001. A complete search of fishery observer logbooks for addition data on collisions has not yet been completed.

A complete search of fishery observer logbooks for additional data on collisions has not yet been completed. The actual number of birds injured and killed through collisions with manmade structures is likely higher; many injured and killed birds are believed to go undetected, unreported, or become scavenged before humans detect them.

Stochastic Events

The small population size of the Steller's eiders on the Y-K Delta and the Arctic Coastal Plain may put them at risk of the deleterious effects of demographic and environmental stochasticity. Demographic stochasticity refers to random events that effect the survival and reproduction of individuals (Goodman 1987) (e.g., shifts in sex ratios, striking wires, being shot, oil/fuel spills). Environmental stochasticity is due to random, or at least unpredictable, changes in factors such as weather, food supply, and populations of predators (Shaffer 1987). As discussed by Gilpen (1987), small populations will have difficulty surviving the combined effects of demographic and environmental stochasticity. The risk of local extirpation is probably highest for Steller's eiders nesting on the Y-K Delta due to the low number of birds that breed there.

The world population of Steller's eiders is probably not at high risk of extinction due to environmental stochasticity alone, but local groups of wintering birds may be vulnerable to starvation due to stochastic events (e.g., unusually heavy ice cover in their feeding habitats).

Allee Effect

"Allee effect" refers to the destabilizing tendency associated with inverse density-dependence as it relates to population size and birth rate. One form of this occurs when the ability to find a mate is diminished (Begon and Mortimer 1986). For example, if the sex ratio of a population significantly shifts from a normal condition for a species, the ability of adults to produce young may diminish. For the Steller's eider, the higher mortality rate of males (Flint et al. 2000) may result in a lower number of pairs returning to nest (i.e., adult females unable to find a mate are effectively removed from the breeding population).

The annual survival rate for Steller's eiders molting and wintering in Alaska is estimated to be 0.899 ± 0.032 for females and 0.765 ± 0.044 for males (Flint et al. 2000). At this estimated annual survival rate, about 39 percent of the females of a cohort will reach 10 years of age, while only about 7% of the males will survive for 10 years.

The observed difference in annual survival between sexes may be manifested in a skewed sex ratio. Female Steller's eiders notably out-numbered male eiders on winter surveys of three areas during January, February, and March (LGL 2000; Lanctot and King 2000). In waters off Unalaska and False Pass, female Steller's eiders comprised 63 and 69 percent, respectively, of Steller's eiders observed (N = 2,053 and 114 respectively) (John Burns, U.S. Corp of Engineers, pers. comm.; Lanctot and King 2000). At Akutan Harbor, the combined female to male sex ratio for all surveys was approximately 3 to 1 (n = 590) (Lanctot and King 2000). Band recoveries reported by Dau et al. (2000) also suggest a shift in Steller's eider sex ratios through time (Table 3), however, in photographs taken of over 13,000 Steller's eiders at Izembek Lagoon in January 2002, 61% were classified as males (Chris Dau, Service, pers. comm.). Furthermore, females represented only 38% and 21% of Steller's eiders captured at Nelson Lagoon over a 3-year period (Flint et al. 2000). This suggests that spatial segregation among sexes, during winter, may lead to assumptions of skewed sex ratio depending on areas surveyed.

Table 3. Shifting sex ratio of Steller's eiders at sample area No. 1 in Izembek Lagoon. Data used are from Dau et al. (2000).

Years	Female	Male	Sample Size	Percent Male
1961-1966	271	566	837	68%
1968	60	85	145	59%
1974-1981	3576	2197	5773	38%
1991-1997	5971	708	6679	11%

Observations of a skewed sex ratio in Steller's eiders are inconsistent across the range of the species (Table 4). However, if Dau's time series data from Izembek Lagoon are correct, then the skew towards females are in stark contrast to that which is typical for many other Anatinae, where an excess of males is the norm (Johnsgard 1994). If an excess of females does exists throughout the species range (as opposed to just at some locations) then the biased sex ratio may have implications regarding reproductive potential. Although our limited observations and Dau et al.'s (2000) banding data suggest that a biased sex ratio exists for this species, we do not know if this biased sex ratio exists range wide, nor do we know what may be causing it.

Table 4. Observed sex ratios of Steller's eiders in their fall and winter range.

Location	n	Female	Male	Year
Unalaska	2,053	63	37	2000
False Pass	114	69	31	2000
Akutan	590	67	33	2000
Izembek	52 flocks	39	61	2002
Nelson Lagoon	11,961	38	62	1995 – 1997
Nelson Lagoon	14,940	21	79	1995 - 1997

Analysis of the Species Likely to be Affected

In summary, decreasing numbers range wide, highly variable reproductive success, winter distribution patterns, suggested fidelity for wintering habitats, and toxic effects to waterfowl from exposure to petroleum compounds all combine to make the Steller's eider vulnerable to the effects of the proposed construction and operation of a mooring basin at the head of Akutan Harbor. Construction of a mooring basin at this location will adversely affect the Steller's eider due to the release of petroleum products into the marine environment resulting in reduced survivorship, direct mortality and subsequent population declines. In addition, Steller's eiders are vulnerable to injury and mortality due to collisions with vessels and infrastructure associated with the new mooring basin.

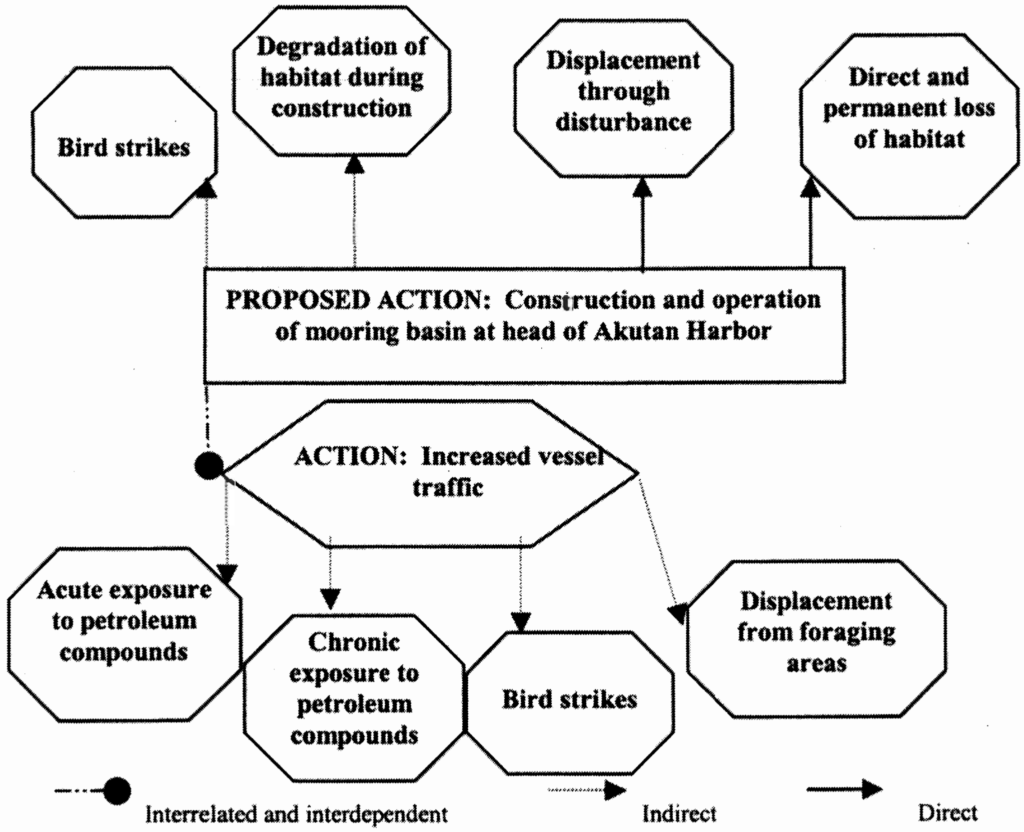
ENVIRONMENTAL BASELINE

The "environmental baseline" section summarizes the effects of past and present human and natural phenomena on the current status of threatened and endangered species and their habitat in the action area. The information presented here establishes the baseline condition for natural resources, human usage, and species usage in the action area that will be used as a point of comparison for evaluating the effects of the proposed action.

Defining the action area of the proposed action is integral to analyzing the effects of past, present, and future actions as well as the proposed action. The action area should be determined based on consideration of all direct and indirect effects of the proposed action, and other activities that are interrelated or interdependent with that action, on the species and/or its critical habitat. Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur.

Anticipated increases in the number of vessels present in Akutan Harbor throughout the year as a result of the proposed action represent actions that are interrelated or interdependent with the construction of the proposed mooring basin. Consequently, the action area includes all areas that may be affected directly or indirectly by the activities associated with construction of the proposed mooring basin as well as those areas directly or indirectly affected by the increased vessel traffic within Akutan Harbor (Figure 2).

Figure 2. Potential direct and indirect effects of proposed construction of mooring basin and interrelated and interdependent actions at Akutan Harbor, Alaska.



Assumptions Used in Analysis of Past, Present and Future Effects

Proportion of Wintering Birds from Listed Population

We are assuming that 4.2 percent of all Steller's eiders observed on the wintering grounds in Alaska are from the listed Alaska breeding population. This estimate derives from an average of the three most recent spring migration surveys for a total population estimate of 60,459 birds (Larned 2000b, 2001, 2002), and the highest point estimate of nesting Alaskan birds (2,543 birds; Table 2).

Rate of Decline for Steller's Eider Populations Wintering in Alaska

For our analysis we are assuming that Steller's eider populations are and will continue to decline annually at a rate of 6.1%. This assumption is based on long-term survey data of migrating Steller's eiders (R^2 = 0.86; Larned 2002).

Patterns of Petroleum Releases

Patterns and conclusions suggested by Day's and Pritchard's (2000) summary of existing information on fuel spills in or near 10 harbors between January 1990 and November 1999 provide basis for the following assumptions regarding future patterns of petroleum releases within the action area.

Spill reporting during the 1990s revealed that the number of reported spills varied dramatically among locations. Spills were most often reported at larger harbors and boat moorages such as Akutan Harbor, Dutch Harbor/Unalaska, and St. Paul Island. In contrast, spills were rarely reported at locations such as Chignik Bay and Perryville; however, when they occurred they were substantial in size. Considering that an estimated 65% of petroleum released into marine waters is due to chronic discharges, and the remaining 35% to massive spills (Maccarone and Brzorad 1994), we assume that some underreporting occurs at all locations, and that petroleum releases are reasonably certain to occur.

Both the number of spills and the amount of material spilled was greatest at the three harbors with greatest ship traffic (Akutan, Dutch Harbor/Unalaska, St. Paul Island); this led the authors to conclude that expansions to the 10 harbors included in the review would result in increased inputs of petroleum hydrocarbons. Consequently, we assume that expansions to existing harbors that will result in an increase in vessel traffic in the action area will lead to an increase of petroleum releases into the environment.

Ninety-seven percent of all reported spills affected water, leading to our assumption that when material is spilled into the environment, marine waters will be most affected.

Both the highest number of spills and the greatest amount of material spilled resulted first from operator error (49% of all spills with known cause) and second from equipment failure (34%). Additionally, most releases appeared to occur during refueling operations. These facts led to the following three assumptions: first, that fueling stations represent a significant source of chronic petroleum contamination; second, that improved fueling standards and institution of best management practices may decrease rates of product loss; and third, that equipment failure and operator error will cause product losses from tank farm infrastructure located outside secondary containment.

Comprising only 2% of all measured material spilled, bilge and waste oil was only a minor component of reported spills. However, it represented 6% of all spills of known type. As a result, we assume that contaminated bilge water discharge represents a potential source of chronic exposure to petroleum compounds.

Diesel fuel accounted for 89% of all measured material spilled and 68% of all spills of known type; thus, we assume that diesel fuel will constitute the majority of material likely to be spilled at harbors and associated facilities.

The frequency of spills according to spill-size category, in descending order, was 1.1 to 15 gallons (42% of all spills), 15.1 – 499 gallons (30% of all spills), trace to 1 gallon (25% of all spills), and spills in excess of 499 gallons (1% of all spills). Therefore, we assume that large spills are rare and sporadic, and that most discharges will be less than 500 gallons.

Affect of Chronic Oiling on Steller's Eiders

For modeling effects, we are assuming that survivorship is reduced annually by 5.7% as a result of chronic petroleum exposure resulting from small, but consistent oil spills, that are reasonably certain to occur. This assumption is based on results from a study comparing harlequin ducks inhabiting oiled verses unoiled bays, more than 6 years after a large oil spill (Esler et al. 2000). Due to the physiological and ecological similarities with harlequin ducks, Steller's eiders are assumed to respond to chronic oiling in a similar way. Moreover, periodic releases of hydrocarbons from oiled beaches in Prince William Sound are assumed to be similar, in effect, to periodic releases of hydrocarbons from fishing vessels and refueling spills. Based on data from Day and Pritchard (2000), diesel and gasoline spills are likely to occur where refueling operations take place over water. It is assumed that the reduced survivorship due to chronic oiling is additive to the annual rate of decline of Steller's eiders wintering in Alaska due to unknown reasons (i.e., 6.1% as described above). For modeling purposes, population growth rates (represented elsewhere by lambda) are assumed equally sensitive to changes in the survival rates of juveniles and adults (Morrison and Pollock 2000, Morrison et al. 1998).

Boundaries of Action Area

In a 15-knot wind and water temperatures of 40 degrees Fahrenheit, only 35% of spilled fuel will evaporate in 4 hours, the duration of tidal movement between high and low tide. Sixty-five percent of the spilled fuel will remain through the entire cycle. Therefore, we assume that maximum potential drift of oil during one tidal cycle from contamination source defines the action area.

Life of the Project

We are assuming the life of the project is 50 years.

Determination of Action Area

Because the number of vessels is not expected to increase in the fishing areas from which fish are typically caught and delivered to Akutan (USACOE 2001), these areas are not included in the action area. However, the number of vessels using Akutan Harbor year round for re-provisioning in addition to temporary and seasonal moorage is expected to increase as a result of the proposed project (USACOE 2001).

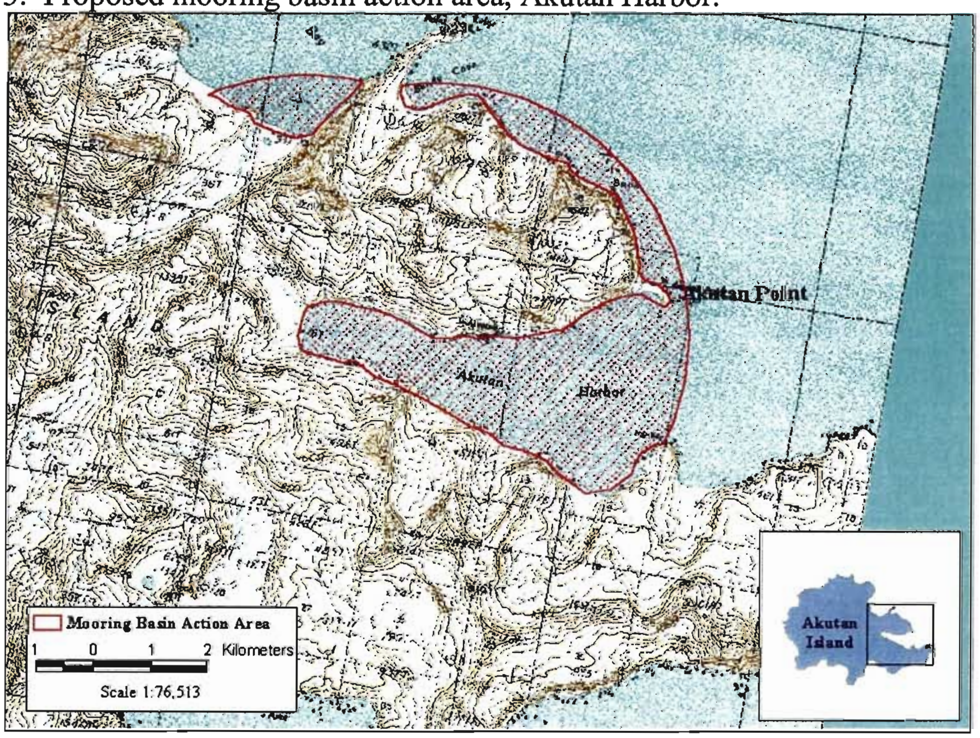
The action area for this project was defined based on the distance an oil spill may travel using the following calculation (John Whitney, NOAA, pers. comm.):

$$D_{nm} = (t_h(C_{nm/h} \pm (W_{nm/h} * 0.03))$$

Where D_{nm}, the linear distance of the spill trajectory (in nautical miles), equals t_h, the duration of oil movement (assumed to be 4 hours) multiplied by the velocity of the oil (the velocity of the current ($C_{nm/h}$) plus/minus the velocity of the wind ($W_{nm/h}$) pushing the oil at the surface (assumed to be 3% of the wind speed)).

Currents and prevailing winds must both be considered when determining the area at risk due to petroleum spills. Oceanographic and meteorological information provided with the biological assessment indicates that tidal currents in Akutan are weak, 1 to 2 cm per second, with winds being the primary force generating surface currents in Akutan Harbor. Currents generated at the water surface from wind are approximately 3 percent of the wind speed (U.S. Fish and Wildlife Service, unpub. info.). USEPA wind roses provided indicate that between October and December west-northwest winds prevail between one and >21 knots. However, winds appear to be much more variable between January and March, including a substantial component of east-southeast winds. Based on a 20-knot wind, the maximum potential drift of oil due to wind-generated currents alone during one tidal cycle in Akutan Harbor would be 2.4 nm [(4h(20nm/h*0.03))]. Therefore, the action area is comprised of the proposed mooring basin and the Trident seafood facility and all marine waters within a 2.4 nm radius of each (Figure 3). However, for the purposes of this analysis, we are limiting our discussion to areas within Akutan Harbor west and south of Akutan Point for two reasons: we determined that this is the area most likely within the travel distance of surface fuel, and we have no data indicating that Steller's eiders utilize the outlying areas circumscribed by the indicated criteria.

Figure 3. Proposed mooring basin action area, Akutan Harbor.



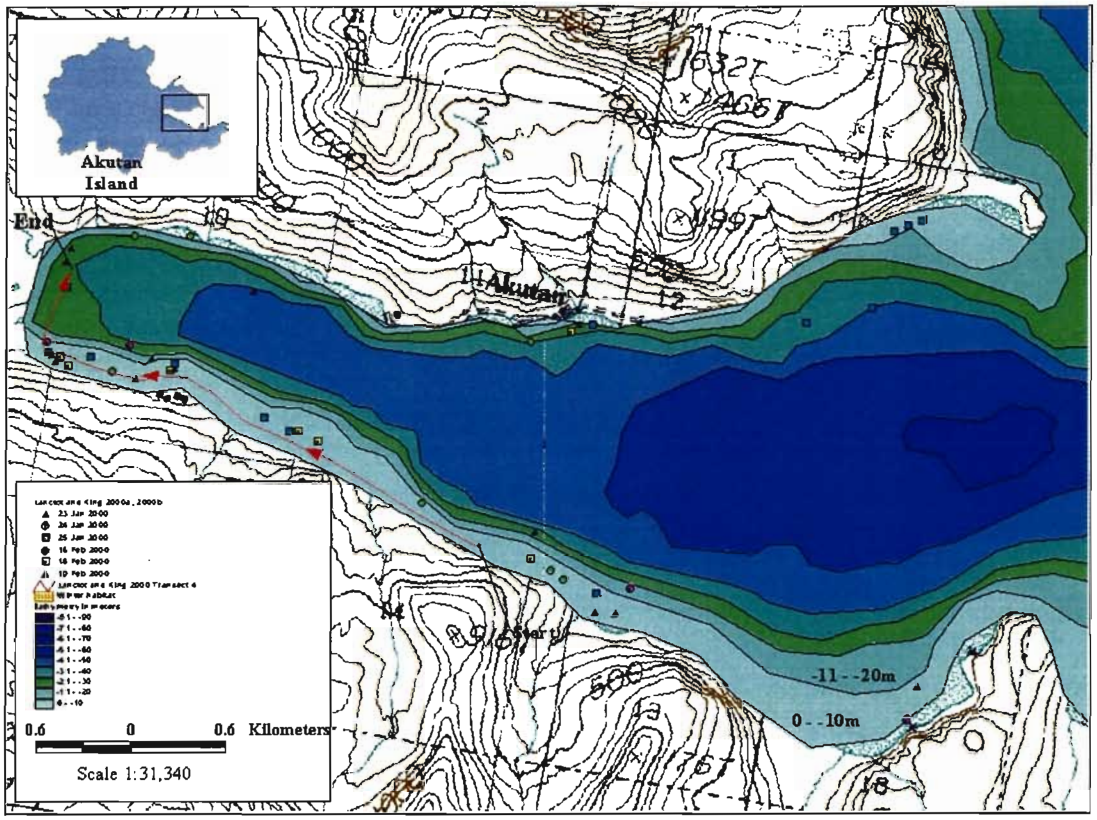
Status of the Species Within the Action Area

Steller's eider surveys by land, skiff, and air were conducted in March 1999 (Schroeder 2001), January and February 2000 (Lanctot and King 2000a, Lanctot and King 2000b), February and March 2000 (Larned 2000), and January and February 2001 (Schroeder 2001a).

Service biologists recorded as many as 358 Steller's eiders in the western half of Akutan Harbor in March 1999 with the largest flocks concentrated near the entrance to the south stream at the head of the bay and smaller flocks observed along the southern shoreline. Additionally, flocks were observed in nearshore waters between Salthouse Cove and the eastern edge of the city of Akutan. Subsequent surveys of Akutan Harbor revealed similar distribution patterns.

A total of 453, 451 and 461 Steller's eiders were observed in Akutan Harbor on 23, 24 and 25 January 2000, respectively (Lanctot and King 2000a). During these surveys, eiders were consistently found in the southeast corner of Akutan Harbor and along the south side of the Harbor (Figure 4). Overall density of Steller's eiders in Akutan Harbor ranged from 69 to 71 birds/km^2, with the highest densities (average 174.6 birds/km^2; range 154.76 to 202.98) always recorded in transect 4 (Figure 4). On 23 January, 57.4% of all birds observed were in transect 4. Most eiders were found within 15 to 25 m of shore. As many as 125 eiders were observed in nearshore waters immediately off the community. These surveys were repeated in February and March 2000 (Lanctot and King 2000b). Total numbers of Steller's eiders were 321, 336 and 252 on 16, 18 and 19 February 2000 respectively. Distribution patterns mirrored those observed during the January 2000 surveys with additional observations recorded in nearshore waters at Water Source Point and the shoreline east of the city of Akutan. Overall densities ranged from 38.5 to 51.5 birds/km^2, and highest densities (average 156 birds/km^2; range 134.5 to 186.3) were again observed in transect 4 (Figure 4). The majority of eiders during each survey day in February were recorded in transect 4 (77%, 93.2%, 89.7%, 16, 18, and 19 February respectively). Most eiders were found within 50 m of shore.

Figure 4. Steller's eider observations, Akutan Harbor, January and February 2000.



The Service conducted aerial shoreline surveys of areas in the vicinity of six proposed harbor projects including Akutan in 2000 (Larned 2000b). The total estimates for all project survey areas were 6,988 and 2,749 in February and March, respectively. A total of 647 Steller's eiders were observed in the action area of the proposed project on 13 February 2000, and 290 were observed on 9 March 2000.

Similar distribution patterns were observed during shoreline surveys conducted in January and February 2001 (Schroeder 2001a). A minimum of 252 and 199 Steller's eiders were observed in the western half of Akutan Harbor on 22 January 2001 and in mid-February 2001, respectively. As in previous surveys, most eiders were observed along the southern shoreline from its midpoint west, and off the community of Akutan/Salthouse Cove in the morning and evening. A total of 262 Steller's eiders were counted on 18 February 2001, with 80 percent of all eiders observed within Lanctot's and King's (2000a and 2000b) transect 4.

Based on the high estimate of 647 (Larned 2000) Steller's eiders in Akutan Harbor, we estimate that at least 27 birds of the listed population are present in the action area of the proposed project.

Although not designated as critical habitat, Akutan Harbor contains habitat features determined to be essential for the conservation of the species. Wintering Steller's eiders occupy shallow, near-shore marine waters, usually within 400 m of shore and in water less than 10 m (30 ft) deep, where they feed on the associated invertebrate fauna and underlying benthic organisms. Of approximately 9.84 miles of coastline within the action area, roughly 8.52 miles are adjacent to suitable Steller's eider winter habitat. Eider winter habitat within the project action area is discontinuous. A total of 682 acres of wintering habitat is distributed over 8 distinct units, with the majority (608 acres) extending eastward from South Creek along the southern coastline of the Harbor (Figure 4).

Factors Affecting Species' Environment Within the Action Area

Seafood Processor Organic Waste

Past and present impacts to Steller's eiders resulting from the seafood industry infrastructure at Akutan may be associated with: 1) the degradation of habitat due to the release of organic waste into near shore marine waters; 2) the loss of gill nets in near shore waters; 3) the accidental release of fuels into the marine environment during refueling operations; 4) the accidental release of petroleum through the release of contaminated bilge water or from grounded/sunk vessels; and 5) collisions with lighted fishing vessels.

The Alaska Department of Environmental Conservation declared Akutan Harbor an impaired water body in 1999. The primary source of water quality degradation in the harbor is related to the discharge and accumulation of seafood processing wastes (USACOE 2001). Accumulations of seafood waste particulates have been observed along the shoreline east and west of the Trident facility. The USEPA has divided Akutan Harbor into two areas: the outer harbor (waters east of longitude 165°46' West) and the inner harbor (waters west of same longitude) (USACOE 2001b). The inner harbor is listed on the USEPA's impaired water body list for total maximum daily load dissolved oxygen. Trident Seafoods usually operates 6 months a year: August, September, October, January, February, and March. By Consent Decree, Trident is required to reduce BOD 12% at their Akutan facility from 0.0937 to 0.0825 lbs BOD/lb raw pollock. Trident has four discharge lines, three of which discharge seafood-processing wastes into Akutan Harbor. Arctic Enterprise and Arctic Five are processing vessels that operate in the outer harbor under the conditions of the general permit (AKP520000). Arctic Five barges its seafood waste to the Trident facility for processing into fish meal and Arctic Enterprise barges its waste out of Akutan Harbor and discharges it according to general permit conditions.

Schroeder (2001) characterized degradation of habitat due to the release of organic waste into the near shore marine environment as including poorer water quality and decreased biological productivity, especially at the head of the bay where circulation is poor. According to dive surveys conducted in June 2000, conditions have improved since the 1980s, indicated by abundant marine organisms up to the anoxic seafood waste deposits. Additionally, spinoid polychaete worms (*Boccardia spp*) occurred in dense concentrations indicating that the site remains disturbed, but that new organic material is readily available. Schroeder (2001) concluded that sufficient oxygen was available for decomposition of the current waste input but not sufficient to aid in the decomposition of historic waste piles that remain on the Akutan Harbor seafloor.

Petroleum Spills

According to a summary by Day and Pritchard (2000) of existing information on releases of petroleum compounds in or near 10 harbors along the Alaska Peninsula and Aleutians, both the number of spills and the amount of material spilled is greatest at the three harbors involved in the Bering Sea bottom fish fishery, including Akutan Harbor. Between 1990 and 1999, a total of 11,444.5 gallons were spilled at Akutan Harbor in 35 separate spills. Akutan Harbor had the second highest mean spill size, 346.8 gallons, of the 10 harbors included in the study; in an average year, 7.4% of all spills occur at Akutan Harbor. Average size per spill in Akutan Harbor was 212.2 gallons and an average of 6.5 spills occurred annually over the 10-year study period. Based on the historical record, Day and Pritchard (2000) estimated a future release of 357.6 gallons of petroleum product annually at Akutan Harbor. At this time, we do not know what effect the spills at Akutan Harbor have had on Steller's eiders.

Collisions with Vessels and Harbor-Related Structures

See "Life History – New Threats" for a discussion of the potential for Steller's eiders to collide with lighted vessels and harbor infrastructure.

Incidental Take From Other Federal Actions

Harbor Construction and Improvements

Construction of new, or improvements to existing, harbor facilities are associated with an increase in acute and chronic exposure to spilled petroleum compounds, and with an increase in collisions with associated infrastructure. The Service has consulted on four harbor construction or improvement projects since 2000. Over the 50-year life of these projects, we estimate lethal and sub-lethal take of 29 listed Steller's eiders. We estimate take in the form of displacement of one listed Steller's eider. Yearly lethal take of listed birds is estimated to be 0.58 individuals (Table 5).

Seafood Processing

The operation of seafood processing facilities is associated with habitat degradation, changes in prey abundance and availability, exposure to contaminants including petroleum compounds, and increased risk of collision with associated infrastructure. The Service has consulted on one Statewide General Permit and four individual National Pollutant Discharge Elimination System permits for seafood processing since 2000. We estimated lethal take of 1 listed Steller's eider due to strikes with infrastructure, and take in the form of displacement of 25 listed Steller's eiders. Yearly lethal take of listed birds is estimated to be 0.2 individuals for the 5-year life of the permit (Table 5).

Bulk Fuel Facilities

While upgrades to bulk fuel facilities greatly decrease the likelihood of catastrophic spills and reduce chronic contamination originating at bulk fuel storage facilities, Steller's eiders occupying habitat in the vicinity of these facilities are at continued risk of acute and chronic exposure to spilled petroleum compounds. Facilities with associated marine fueling stations pose a greater risk of discharging oil into marine waters. We estimate take in the form of harm of 33 listed Steller's eiders, and lethal take of one listed Steller's eider as a result of three bulk fuel facility upgrades consulted on since 2001. Yearly lethal take of listed birds is estimated to be 0.85 birds for the 40-year life of these projects (Table 5).

Spring Subsistence Waterfowl Harvest

In 2002, the Service proposed to open a spring/summer harvest of migratory birds which has been allowed under the amended treaty protocols with Canada and the United Mexican States. The harvest would occur within the constraints imposed by the treaties and to the extent possible, legalize the customary and traditional subsistence harvest practices of Alaskan indigenous inhabitants. The term "indigenous" has been interpreted to mean all permanent rural inhabitants regardless of race. Subsistence harvest areas have been defined to include most village areas within the Alaska Peninsula, Kodiak Archipelago, the Aleutian Islands, and areas north and west of the Alaska Range. Accidental take of adult breeding and non-breeding Steller's eiders by subsistence hunters is anticipated as a result of this action. Approximately seven listed Steller's eiders are anticipated to be taken annually as a result of the legalization of a spring subsistence migratory bird harvest (Table 5).

Research

We estimate that two listed Steller's eiders will be lethally taken per year as a result of research activities (Table 5).

Take resulting from these activities is approximately 10 listed Steller's eiders per year, or 0.9% (10/1106) of the Alaska breeding population. When this additional level of take is incorporated into our population model in an additive fashion above the current annual decline of 6.1% range wide, functional extinction (125 birds) is reached by year 30, approximately 5 years prior to that predicted by a 6.1% annual decline alone (Figure 5).

Figure 5. Steller's eider breeding population prediction with 0.41% additional baseline take annually.

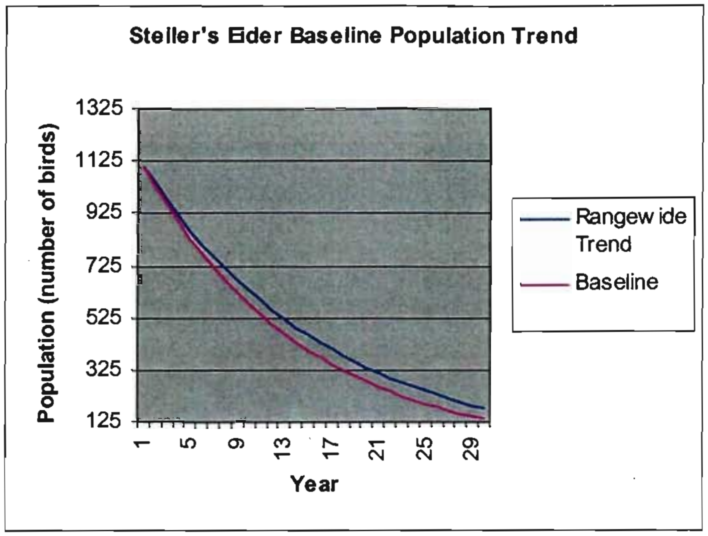


Table 5. Take of Steller's eiders anticipated from actions for which formal Section 7 consultation has been completed.

ACTION	YEAR	PROJECT LIFE	TAKE TYPE	TAKE LISTED	TAKE TOTAL
False Pass Harbor	2000	50	Petroleum-sublethal	4	146
NPDES-GP	2000	5	Strikes-lethal	1	33
Chignik Lagoon Tank Farm	2001	40	Petroleum-sublethal	8	264
Sandpoint Harbor	2002	50	Strikes-lethal	1	30
			Petroleum-sublethal	367	11
			Displacement	1	30
Chignik Dock	2002	35	Petroleum-sublethal	4	150
Chignik Tank Farm	2002	30	Petroleum	5	170
Fairweather	2003		Disturbance	66	1570
Nelson Lagoon Tank Farm	2003	40	Petroleum	20	476
			Strikes	1	24
Spring Subsistence	2003	annually	Lethal	7	17
Research		annually	Lethal	2	2

EFFECTS OF THE ACTION

"Effects of the action" refers to the direct and indirect effects of the action on the species or its critical habitat. The effects of the action will be evaluated together with the effects of other activities that are interrelated or interdependent with the action. These effects will then be added to the environmental baseline in determining the proposed action's effects to the species or its critical habitat (50 CFR Part 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

Factors to be Considered

The probability of Steller's eiders being taken or harmed as a result of the construction of the mooring basin in Akutan Harbor is a function of many factors, including: temporal and spatial overlap of Steller's eider distribution with the area affected by disturbances associated with harbor construction and operation, the nature and duration of effects, and the frequency, intensity, and severity of disturbances.

Temporal and Spatial Overlap

At least 647 (Larned 2000) Steller's eiders, and their winter foraging and resting habitat, occur within the action area of the proposed project. No designated critical habitat is located within the action area of the proposed project.

Within the action area, distribution of disturbances resulting from the proposed activities may be localized, as in the direct loss of foraging habitat, or may be diffuse resulting from the dispersal of oil within the marine environment.

Steller's eiders are not present in the action area during the summer when construction of the proposed harbor is anticipated to occur. However, once completed, the new mooring basin will be operated while Steller's eiders are present (November through March). Although the new mooring basin is designed for vessels of the size class participating in the Bering Sea bottom fish fishery, which occurs during the winter, it is also expected to increase year round vessel traffic in Akutan Harbor.

Nature and Duration of Effects

Potential direct and indirect effects of the proposed action considered in this Biological Opinion include: direct and permanent loss of habitat, displacement from foraging habitat through disturbance, degradation of foraging habitat and reduced survivorship due to exposure to petroleum compounds, and injury or mortality resulting from collisions with vessels or infrastructure associated with the new mooring basin.

Based on the criteria used to define Steller's eider winter habitat, the construction of the harbor is not anticipated to result in a direct and permanent loss of such habitat.

Evidence suggests that Steller's eiders exhibit high wintering site fidelity (Philip Martin, Service, pers. comm.; Paul Flint, USGS, pers. comm.). Eiders displaced from foraging habitat by disturbance may not be able to relocate to alternative foraging areas of sufficient quality if these areas are limited in availability.

According to Day and Pritchard (2000), operator error and equipment failure accounted for 49% and 34%, respectively, of all spills with known cause. Additionally, about 90% of all spills reported in the 1990s occurred at the three harbors involved in the Bering Sea bottomfish fisheries, including Akutan Harbor. The probability of accidental releases of petroleum will increase with each increase in number of vessels transiting the area. Thus, the accidental release of fuels into Akutan Harbor from vessels associated with the new mooring basin is anticipated to increase. Accidental petroleum releases can adversely affect the Steller's eider through either contamination of feathers, direct consumption of petroleum (e.g., during preening), contamination of food resources, or reduction in prey availability, and can result in reduced survivorship and subsequent population declines. Degradation of habitat due to chronic exposure to petroleum compounds may be difficult to quantify.

The potential for petroleum to adversely affect Steller's eiders represents a chronic event that is anticipated to exist for as long as the harbor is in operation (50-year project life). The accidental release of petroleum into the habitat of Steller's eiders may have both an immediate and lingering adverse effect. The oiling of a bird may result in sickness or death, depending on the degree of exposure. Petroleum products released into the marine environment can also have adverse effects that last from several months to several years. Anticipated adverse effects range from changes in prey abundance, distribution, and diversity, to the ingestion of chronic toxic levels of petroleum.

Disturbance Frequency, Intensity and Severity

According to Day and Pritchard (2000), an average of 6.5 petroleum spills (average size 212.2 gallons) per year were reported for Akutan Harbor in the 1990s. Data on vessel traffic levels and corresponding spill rates are not available; however, release of petroleum products into the marine environment via contaminated bilge water is believed to be a chronic source of contamination. We have limited information on Steller's eiders recovery rate. However, decreasing numbers range wide and poor overall productivity suggest this species may be highly sensitive to frequent disturbances.

The intensity of the disturbance is a function of the species' status both before and after the disturbance. Currently, limited information makes effects resulting from habitat degradation or physiological effects of chronic exposure to oil difficult to quantify and predict. Acute effects resulting from direct external contact with oil can be more easily estimated by the application of spill trajectory analysis and known eider distribution; predictions of these events may be based on historical data. The gregarious behavior of Steller's eiders may result in large numbers of birds being affected by relatively small spills.

The severity of the disturbance is a function of the species' recovery rate. Any disturbance event that affects the species' ability to recover through decreased reproductive potential would be considered severe. Not only do Steller's eiders show high fidelity for specific molting sites within lagoons (Flint et al. 2000), but preliminary evidence also suggests that Steller's eiders show high within season wintering site fidelity (Philip Martin, FWS, pers. comm., Paul Flint, USGS, pers. comm.). Such life history characteristics place Steller's eiders at increased risk of chronic and acute exposure to petroleum compounds where their wintering habitat and industrial developments overlap. Once oiled, feathers lose their water repellency, reducing the ability of eiders to maintain body heat. Immune defenses, survival and almost all aspects of reproduction may be affected by the ingestion of petroleum, either while preening or through consumption of contaminated food resources. Moreover, the availability of prey may be reduced by the introduction of petroleum products into the marine environment.

Analyses for Effects of the Action

This section analyses the direct and indirect effects of the proposed and all interrelated and interdependent actions identified in the Environmental Baseline section. This includes a discussion of any beneficial effects anticipated to occur as a result of the proposed action.

Interrelated and Interdependent Actions

Actions that are interrelated and interdependent with the proposed construction and operation of a mooring basin in Akutan Harbor include the increase in the number of vessels present in the action area on an annual basis. With this increase in harbor traffic comes an elevated risk of fuel spills resulting from operator error and equipment failure, as well as an increased risk of contamination resulting from release of petroleum-contaminated bilge water.

Direct Effects

Based on the criteria used to define Steller's eider winter habitat, the construction of the harbor is not anticipated to result in a direct and permanent loss of such habitat. Additionally, most harbor activities that could displace birds using nearby marine areas would be screened by the vegetated berm at the head of the bay; therefore, **no take is anticipated to occur due to displacement of birds from foraging habitat during the construction of the mooring basin.**

Indirect Effects

Collisions with Lighted Vessels and Harbor-Related Structures

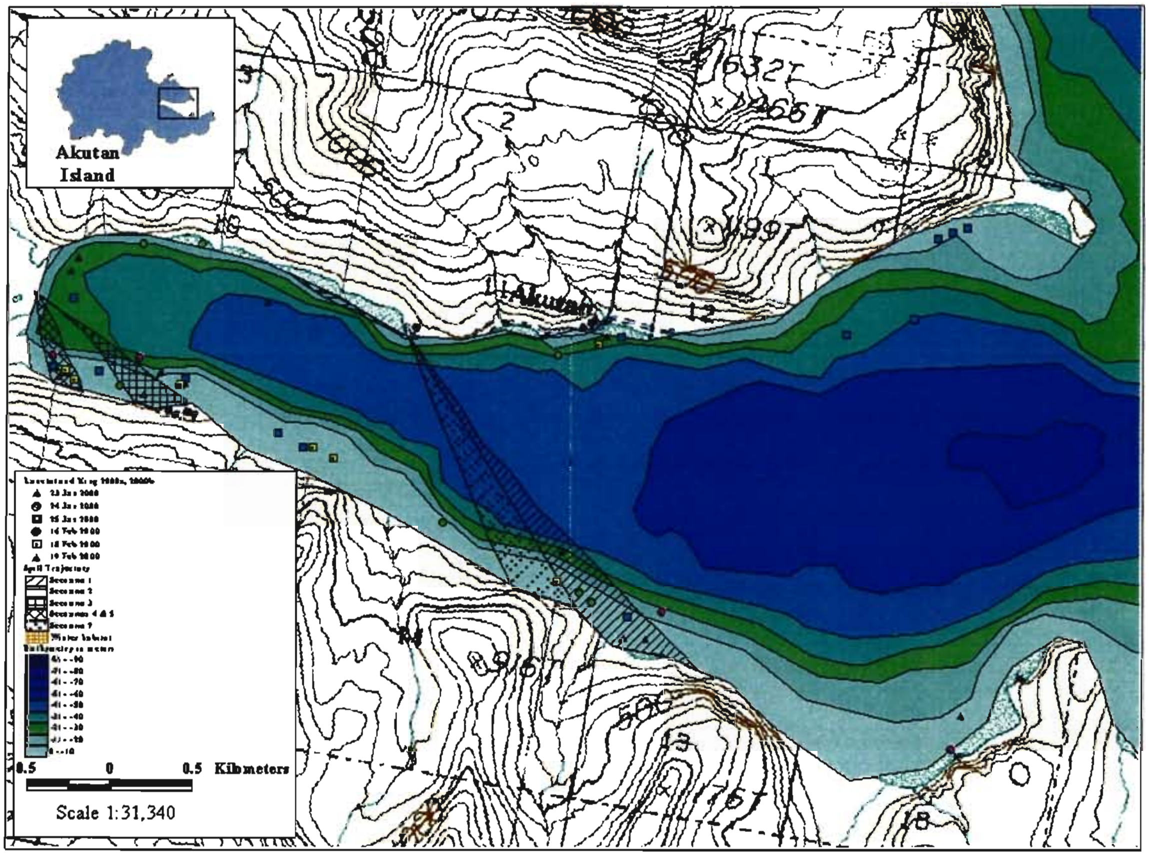
Anecdotal evidence that eiders and other sea ducks may become disoriented and strike vessels and other lighted structures in adverse weather conditions supports the assumption that Steller's eiders wintering in close proximity to the proposed mooring basin and related facilities and to areas likely to be used by vessels seeking safe temporary moorage in the harbor are at increased risk of similar collisions. **It is estimated that one Steller's eider belonging to the listed Alaska breeding population will be injured or killed in this manner over the 50-year life of the project.**

Acute and Chronic Exposure to Petroleum Compounds

Due to anticipated increases in vessel traffic, particularly at the head of the harbor which heretofore has received little traffic and where the highest densities of Steller's eiders were recorded in January and February 2000 (Lanctot and King 2000a and 2000b), an increase in exposure, both acute and chronic, to petroleum compounds is anticipated to result. Additional contaminants which may be expected to be released into the marine environment as a result of the presence of these vessels include: copper from anti-fouling paints, sacrificial anodes on vessels and other protectively coated marine hardware, lead from boat batteries, engine exhaust products, cleaning agents, and grey water from holding tanks. It is known that petroleum products released into the marine environment cause adverse effects on eiders (Stout 1998), other marine birds (Yamato et al. 1996; Trust et al. 2000; Esler et al. 2000; Custer et al. 2000) and their prey (Glegg et al. 1999), and that those effects can remain for years (Hayes and Michel 1999). Moreover, Esler et al. (2000) found that during winter, harlequin duck survival was 5.7% lower in oiled areas compared to unoiled areas. We consider harlequin ducks, such as those studied by Esler et al. (2000) in Prince William Sound, to be suitable surrogate species for Steller's eiders due to similarities in size and life history traits. Furthermore, the periodic release of hydrocarbons, due to tidal and storm wave action, responsible for the 5.7% reduction in survivorship of harlequin ducks in oiled bays of Prince William Sound, may be comparable, in effect, to the periodic release of hydrocarbons from fishing vessels.

To determine specific areas most likely to be directly affected by fuel discharges and, thus, the minimum number of eiders at risk to spilled petroleum products, we modeled likely spill trajectories for seven spill scenarios representing both sudden bulk releases into the environment (due to equipment failure or operator error) and chronic discharges (due to contaminated bilge water), using the Akutan Spill Model (Pearce and Jones 2001). Results were consistent regardless of volume or type of discharge (Figure 6). Prevailing west-northwest winds drove fuel released at the Trident facility southeast, intersecting the southern shore at approximately 165°45'41" West. The same winds deposited fuel originating at the proposed mooring basin near South Creek at approximately 165°49'3" West. Northwest winds expanded the area affected by discharges from the mooring basin to approximately 165°48'11" West. Discharges from the Trident facility in east-southeast winds impacted shoreline between approximately 165°47'11" West and 165°48'1" West. Releases originating from the project site during east-southeast and due east wind conditions were driven ashore at the head of the harbor.

Figure 6. Predicted spill trajectories for seven spill scenarios, Akutan Harbor.



Based on this analysis, 505 Steller's eiders were determined to be at risk to spilled petroleum products originating at the new mooring basin and at the Trident facilities (Table 6). These estimates are based on distribution of Steller's eiders and their wintering habitat in Akutan Harbor and on predicted spill trajectories.

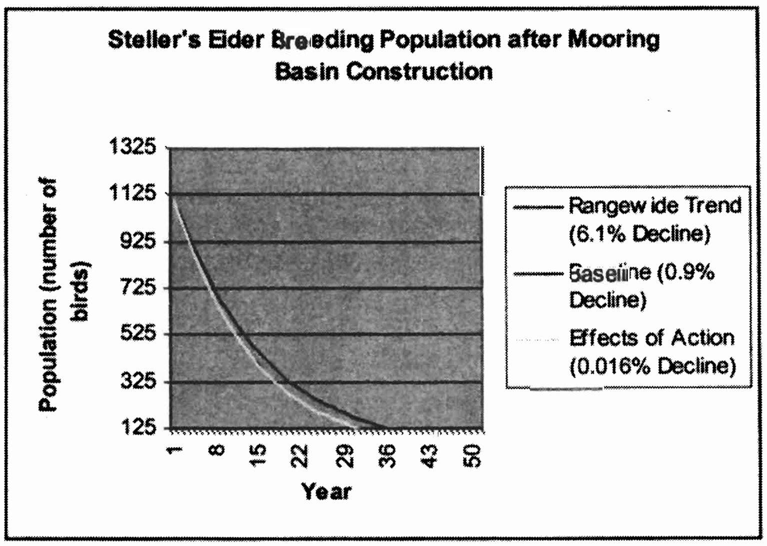
Table 6. Estimates of take anticipated to occur due to acute and chronic exposure to petroleum compounds as a result of the proposed action.

	SCENARIO DESCRIPTION	HIGH COUNT WITHIN PREDICTED TRAJECTORY (Lanctot and King 2000a, 2000b)
1	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Flood stage Wind: 20 knot northwest (315°)	175 (23 January 2000)
2	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Flood stage Wind: 20 knot east-southeast (112°)	<1 bird
3	Source: New basin Amount: 25.5 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot northwest (315°)	175 (23 January 2000)
4	Source: New basin Amount: 250 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot northwest (315°)	153 (19 February 2000)
5	Source: New basin Amount: 25.5 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot west-northwest (337°)	153 (19 February 2000)
6	Source: New basin Amount: 250 gallons Discharge type: Continuous Tide: Flood stage Wind: 20 knot east-southeast (112°)	No trajectory into the harbor was produced
7	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Ebb stage Wind: North-northwest (337°)	2 (18 February 2000)

To quantify effects of chronic oil exposure on Steller's eiders, we created a simple model using the following assumptions: 1) 4.2 percent of the Steller's eiders in the wintering population belong to the Alaska breeding population, 2) the breeding population is declining at the same rate as the overall population (6.1% annually), 3) reduced survivorship, due to chronic petroleum releases, occurs at a rate of 5.6% annually where chronic releases occur, 4) the life of the project is 50 years, and 5) population growth rates (represented elsewhere by lambda) are equally sensitive to changes in the survival rates of juveniles and adults (Morrison and Pollock 2000, Morrison et al. 1998).

To model the potential effects of chronic oiling, we used 505 to represent the number of Steller's eiders in Akutan Harbor in year one of the model. We applied the population reduction factor of 5.7% for chronic oiling in an additive fashion to the assumed overall population decline of 6.1% annually (Appendix I). **Based on the calculations using these assumptions, we estimate approximately 9 Steller's eiders of the listed entity will be at risk of harm or death due to chronic exposure to petroleum as a result of this project.** This represents approximately 0.8% (9/1106) of the Alaska breeding population, and when amortized over the life of the project represents an additional 0.016% annual decline in the listed population. Based on this level of take, functional extinction of the Alaska breeding population is predicted to occur by year 30 as was predicted by the baseline model, and 2.5 years earlier than predicted by the range wide trend alone (Figure 7).

Figure 7. Steller's eider breeding population projection after construction of Akutan mooring basin.



Displacement from Foraging Areas by Vessels Traversing the Harbor

Lanctot and King (2000a and 2000b) observed that Steller's eiders within Akutan Harbor were exposed to a large number of vessels, including large and small fishing vessels, small skiffs, and barges, on a daily basis. During January, they recorded 16, 21 and 25 large fishing boats during their survey periods, and in February they recorded 12, 15 and 17 vessels. In both cases, they indicated that interactions between these vessels and Steller's eiders were rarely observed as the larger vessels traveled predominantly via the middle of the harbor. When approached too closely (within 100 meters) by the survey boat (a 17 – 18 ft skiff), Steller's eiders typically responded by swimming then flying from the area. On one occasion in January, a large vessel approached to within 100 yards of a group of eiders that responded by swimming towards the head of the harbor although remaining within 200 yards of the vessel. Based on this information, **we do not anticipate that Steller's eiders will be displaced from foraging habitat by increased vessel traffic within the harbor.**

Species' Response to Proposed Action

Numbers of Individuals in the Action Area Affected

Limited surveys indicated that at least 647 Steller's eiders use waters within the action area that is likely to be affected by the proposed project. Current winter population estimates do not include birds that occur here during spring and fall migration. Thus, it is unlikely that our limited observations represent the maximum number of eiders that use Akutan Harbor. Steller's eiders at Akutan Harbor represent 1.0% of the Alaska population of Steller's eiders. This value was derived by dividing the maximum number of birds seen within the action area that are believed to be from the Alaska population (647*0.042=27) by the most current population estimate for the Alaskan population of this species (2,543).

Sensitivity to Change

Steller's eiders' behavior changes with changing environmental conditions. They have been observed foraging in close proximity to human structures, including docks, and habitation. However, it has also been reported that they maintain a distance of at least 100 meters from humans themselves. We do not anticipate total abandonment of areas due to the physical presence of structures associated with the proposed project, but anticipate some level of disturbance due to the human activity associated with the proposed project.

Resilience

Little information exists regarding the resilience of this species to perturbations. The world population has declined by 80% from 1,000,000 in the 1940's, (Tugarinov 1941 as in Solovieva 1997) to 200,000 in 1994 (Solovieva 1997). Extensive banding efforts and aerial survey efforts over the past decade indicate that the trend for the world population continues to be negative (Flint et al. 2000, Larned 2000b). Lack of resilience due to low fecundity, low recruitment, high breeding adult mortality, and other unknown causes may be contributing to their continued decline.

Recovery Rate

The natural recovery rate of Steller's eiders is not known. Long-lived species with low annual fecundity have a relatively slow recovery rate compared to short-lived species with high annual fecundity. Given the Steller's eider's observed low fecundity (i.e., small clutch sizes, high variability in nesting attempts, and generally low nest success) (Quakenbush et al. 1995, D. Solovieva pers. com. 2000), the recovery rate for this species is believed to be quite slow.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

According to the biological assessment (USACOE 2001), construction of the proposed mooring basin would likely stimulate additional harbor-related development including fueling stations, vessel repair shops, vessel storage, grocery and supply stores, and equipment storage areas. Additional seafood processing facilities may become established in the area, and the community of Akutan would likely expand utility and other services to the harbor. Although most development is anticipated to occur on upland areas, some developments may affect Steller's eiders, particularly fueling stations, seafood processing facilities, expansion of community infrastructure, and any activities directly impacting intertidal habitats such as the proposed airport access road. Affects to eiders of these projects may include direct habitat loss, increased risk of acute and chronic exposure to environmental contaminants, increased risk of bird strikes, and habitat degradation. Additionally, activities that increase foot traffic access to nearshore environments may result in displacement of Steller's eiders from foraging habitat.

CONCLUSION

This biological opinion assesses the effects of the construction of a new mooring basin at the head of Akutan Harbor on the Steller's eider. Based on this effects analysis and an analysis of the cumulative effects, the Service determines whether this proposed action is likely to jeopardize the continued existence of this species, or destroy or adversely modify designated critical habitat. A conclusion of "jeopardy" for an action means that the action could reasonably be expected to reduce appreciably the likelihood of both the survival and recovery of the Steller's eider. A conclusion of "adverse modification" means that the action could reasonably be expected to appreciably diminish the value of critical habitat for both the survival and recovery of this species. These conclusions are based on a synthesis of information provided in previous sections of this document.

Summary

The world population of Steller's eider has declined by 90%; from 1,000,000 in the 1940's, (Tugarinov 1941 as in Solovieva 1997) to 200,000 in 1994, (Solovieva 1997) to about 104,000 in 2003 (Atlantic and Pacific populations combined). The Steller's eider Alaska-breeding population is thought to number in the hundreds or low thousands on the Arctic Coastal Plain, and possibly tens or hundreds on the Yukon-Kuskokwim Delta. Population size point estimates from aerial surveys from 1989 to 2002 indicate an average population size of 1,106. Smaller population sizes, averaging 168, are indicated by a second set of aerial surveys between 1992 and 2002. The high degree of variability in aerial survey data makes detecting anything but the most dramatic trends in the breeding population difficult. The Steller's eider is a relatively long-lived, period non-breeder with low and variable nest success, low duckling survival, poor overall productivity, and variable annual recruitment. Reproductive parameters estimated from birds breeding in the Barrow area appear insufficient to maintain the population at current levels.

The Pacific population of Steller's eiders likely numbers 50,000 to 60,000. Populations of Steller's eiders molting and wintering along the Alaska Peninsula have declined since the 1960's. At 54,191, the 2002 Pacific population estimate by Larned et al. (2002) was the lowest recorded since aerial surveys were initiated in 1992. Long-term spring survey data suggests a 6.1% annual decline in migrating Steller's eiders, and banding data from 1975 -1981 and 1991-1997 indicates a reduction in Steller's eider survival over time. At this rate of decline, the Steller's eider Alaska breeding population is projected by a simple deterministic population model to reach functional extinction (125 birds) in 35 years.

Take anticipated from other Federal actions which have recently undergone section 7 consultation is estimated to be 10 listed Steller's eiders per year, or 0.9% of the Alaska breeding population, and, when modeled, results in functional extinction by year 30, approximately 5 years prior to that predicted by a 6.1% annual decline alone.

Take as a result of the construction of a mooring basin at the head of Akutan Harbor is estimated to be 9 listed Steller's eiders due to chronic exposure to petroleum compounds. This represents 0.8% of the Alaska breeding population of Steller's eiders, and leads to functional extinction 5 years earlier than predicted by the range wide trend alone; this level of take does not appear to accelerate functional extinction over the baseline model.

Conclusion

After reviewing the current status of the Steller's eider, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Steller's eider, and is not likely to destroy or adversely modify designated critical habitat. This conclusion is based on the following factors.

Although long-term data indicate a 6.1% annual decline, several assumptions fundamental to this survey design are likely violated, thereby confounding interpretation of the data. Steller's eiders that begin migration early may have departed the spring survey area prior to commencement of the survey. This situation would violate the assumption that all of the Pacific wintering population is within the survey area during the survey. Furthermore, movements by satellite transmitter-tagged birds during the survey in 2002 suggest that major migrational shifts may occur during the spring survey, violating the assumption that all Steller's eiders remain stationary on staging areas during the survey period and are not missed or double counted. Finally, the tendency for observers to progressively underestimate the size of increasingly large flocks may actually result in an underestimate of the rate of eider decline (i.e., the number of birds in large flocks were likely underestimated, but as birds become fewer and flocks become smaller, estimation of flock size may become more accurate; the rate of decline in this scenario would be less than what was actually occurring). For these reasons changes in Steller's eider numbers may not represent real population changes.

Trends in fall counts of Steller's eiders at Izembek Lagoon collected during Emperor goose surveys are contradictory to the spring migration counts (ABR 1998). While numbers of Steller's eiders observed during this survey declined from 1981 to 1991, they have shown an increasing trend since 1991. However, these data must be interpreted with caution. This survey was designed and is flown to maximize the number of emperor geese encountered. Recording the abundance of Steller's eiders is an ancillary objective of this survey. Thus, surveyors follow a flight route that maximizes the number of emperor goose that they see, attempting to arrive at emperor goose concentrations during high tides. Such flight paths and survey timing do not maximize the numbers of Steller's eiders encountered. Furthermore, it is possible that survey effort directed towards counting Steller's eiders changed over time as interest in this species increased (Robert Stehn, Migratory Bird Management, Anchorage, pers. comm. 2003). Surveys that result in population indices become problematic when effort changes over time. Thus, we acknowledge the existence of this data set that shows an increase in Steller's eider numbers at Izembek Lagoon over time, but choose to dismiss it as an indicator of overall population trend.

The breeding population of Steller's eiders in northern Alaska is estimated to number between the low hundreds to low thousands. However, the imprecision of our breeding ground estimates precludes us from detecting any but the most obvious population trends for the listed entity. Populations may be overestimated due to the periodic presence of local non-breeders in non-nesting years, or may be underestimated due to observer bias. Our understanding of Steller's eider productivity is limited to reproductive parameters estimated for the breeding population near Barrow, which may not be representative of Steller's eider breeding success throughout their range in Alaska.

Uncertainties surrounding population sizes and trends, and overall productivity undermine our ability to confidently detect appreciable changes in probability of recovery and survival due to the proposed action. Efforts to model the population based on current information resulted in times to functional extinction equal to that predicted by baseline conditions (5 years sooner than the range-wide trend). Therefore, we do not reasonably expect that the incremental increase in take of listed Steller's eiders resulting from this action will, directly or indirectly, reduce appreciably the likelihood of both survival and recovery of the species in the wild.

Uncertainties surrounding population sizes and trends, and overall productivity also undermine our ability to determine whether this listed entity is in jeopardy. Deficiencies in our information include: 1) a lack of information on the rate of immigration of individuals from the Russian breeding population to the Alaska breeding population; 2) projection of population decline based on the results of a (spring) survey that is not optimally designed to detect trends in this species; 3) use of a simple deterministic model that does not take into account stochasticity or the tendency of Steller's eiders to breed intermittently; and 4) the assumption that subsistence harvest will remain constant through time. Within the framework of these limitations, our best available information suggests that the Alaska breeding Steller's eiders will undergo extirpation in approximately 30 years due to preexisting baseline conditions.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the USACOE so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The USACOE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACOE (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USACOE or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

Amount or Extent of Take

We anticipate that incidental take of Steller's eiders will be difficult to document because: 1) Steller's eiders exposed to petroleum levels that are not immediately lethal may not die near the location of contact; 3) Steller's eiders exposed to sub-lethal levels of petroleum will not exhibit readily apparent signs of toxicity; 4) impacts to prey abundance and distribution from released petroleum products will not be readily apparent; 5) the extent to which petroleum contamination can be attributed to the proposed action will be difficult or impossible to determine, and 6) the actual number of Steller's eiders belonging to the Alaska breeding population at this site is unknown.

The Service will not refer the incidental take of any migratory or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Take Related to Acute and Chronic Exposure to Petroleum Compounds

The Service anticipates that petroleum releases will occur in association with the legal operation of the harbor due to operator error, equipment failure, sunken vessel, or contaminated bilge water discharges. This recognition by the Service is not intended to legitimize the otherwise illegal act of releasing petroleum into the environment. **We estimate that no more than nine Steller's eiders of the listed Alaska breeding population will be taken as a result of petroleum releases that occur within Akutan Harbor, including the proposed mooring basin itself.** This take is expected to be in the form of harm or direct lethal take.

Take Related to Collisions with Vessels or Structures

The Service expects that the operation of the harbor will result in harm or direct lethal take of birds striking harbor-related facilities, including vessels moored within the mooring basin or within Akutan Harbor. We anticipate that this take will be in association with the use of bright lights during poor weather. **We estimate that no more than one Steller's eider of the listed Alaska breeding population will be taken as a result of striking harbor-associated structures, including moored vessels.**

We are currently unable to distinguish between North American breeding Steller's eiders and Steller's eiders that breed elsewhere when the birds are present on their molting or wintering areas. Future research may enable us to distinguish between listed and non-listed populations. Absent such capabilities, we will consider the expected take levels associated with this Incidental Take Statement to have been exceeded if any of the following occur:

1. Greater than nine Steller's eiders belonging to the listed Alaska breeding population are harmed or killed as a result of petroleum releases that occur within Akutan Harbor, and these releases can reasonably be attributed to a vessel or vessels that would not be present in the area but for the presence of the mooring basin;
2. Greater than 204 Steller's eiders are harmed or killed as a result of petroleum releases that occur within Akutan Harbor, and these releases can reasonably be attributed to a vessel or vessels that would not be present in the area but for the presence of the mooring basin;
3. Greater than one Steller's eiders belonging to the listed Alaska breeding population are harmed or killed as a result of striking harbor-associated structures, including vessels moored within the mooring basin or Akutan Harbor;
4. Greater than 24 Steller's eiders are harmed or killed as a result of striking harbor-associated structures, including vessels moored within the mooring basin or Akutan Harbor.

Effect of Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Steller's eider.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Steller's eider:

1. The USACOE shall minimize impacts to Steller's eiders during construction of the harbor.
2. The USACOE shall minimize impacts to Steller's eiders during operation of the harbor.
3. The USACOE shall monitor impacts of harbor operation to Steller's eiders.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, USACOE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions shall implement Reasonable and Prudent Measure No. 1: "The USACOE shall minimize impacts to Steller's eiders during construction of the harbor."
   - 1.1. The USACOE shall ensure that all construction activities that may harass Steller's eiders shall occur prior to the birds' arrival in the fall or after their departure in the spring. We estimate the arrival date to be November 15, but construction activities that may harass Steller's eiders shall cease as soon as eiders are observed in Akutan Harbor. We estimate the date of departure from the area to be March 30. However, upon concurrence of the Ecological Services Anchorage Field Office, construction activities may commence provided that no Steller's eiders have been observed within 2.4 nm of the construction site for 7 consecutive days after February 28. The USACOE shall immediately notify the Field Office of the presence of any Steller's eider that is observed from the project area during construction.
   - 1.2. The USACOE shall permanently install eyebolts into concrete or steel structures at appropriate locations at the outer and inner ends of the breakwater and any breaches for rapid attachment of spill containment booms.
   - 1.3. The USACOE shall ensure that the waters of the entrance channel are isolated from Akutan Harbor during dredging by installation of a silt curtain or similar material.

2. The following terms and conditions shall implement Reasonable and Prudent Measure No. 2: "The USACOE shall minimize impacts to Steller's eiders during operation of the harbor."
   2.1. In the Project Cooperation Agreement, the USACOE will require the local project sponsor to develop a Best Management Practice Plan (BMP) for the new mooring basin in cooperation with the City of Akutan. This plan should be based on the 1995 publication "BMP Examples for Alaska Compilation and Assessment for Harbor, Marina, Boat Operations, Repair and Maintenance" (Ross et al. 1995) (Appendix II), and should adapt pollution prevention strategies to meet conditions specific to Akutan Harbor. The Service will have the opportunity to review the draft BMP. In addition to Best Management Practices appropriate for Akutan Harbor, the following items shall be included in the BMP:
      2.1.1. The USACOE shall require the local project sponsor to provide receptacles for waste oil at the new mooring basin to reduce the amount of improperly disposed waste oil. The local project sponsor will maintain and empty these receptacles as long as vessels are using the harbor. Waste oil receptacles must be maintained so that they do not leak oil onto the surrounding substrate, and must be repaired or replaced within one month of the detection and reporting of any such leak. The local project sponsor will dispose of this waste oil according to ADEC standards.
      2.1.2. The local sponsor shall keep the shoreline between North Creek and longitude 165°43' West free of any wildlife entanglement (fishing nets, parts of traps and pots, monofilament lines, ropes, cords, etc.) and contamination hazards (batteries, zinc plates, engines, etc.). Any entanglement or contamination hazards that are removed should be disposed of according to ADEC standards.
      2.1.3. The local project sponsor shall consult with oil spill response experts to develop an oil spill response plan for the mooring basin. The Spill Response Plan shall be developed to prevent any spilled petroleum products from contaminating the areas where eiders were found to concentrate during the surveys conducted by LGL in January and February 2000 (Lanctot and King 2000a and 2000b) (Fig. 2). This Spill Response Plan shall:
         a. Determine the best method for containing and recovering oil spilled within the proposed mooring basin.
         b. Identify the type and number of equipment that is necessary to retain the oil within the harbor.
         c. Provide detailed instructions as to how the required equipment shall be deployed to keep the oil within the mooring basin, including appropriate locations for permanent boom anchor points and equipment staging areas.
         d. Identify who is the responsible party for implementing the Spill Response Plan and for maintaining spill response equipment in good working order.
         e. Provide detailed discussion of the specific primary, secondary and tertiary response measures, and their instructions for deployment, to be used to minimize effects to Steller's eiders and eider habitat in the event of a fuel spill. This discussion should refer to "The Best Practices for Migratory

Bird Care During Oil Spill Response" for accepted protocols. The Spill Response Plan should also identify any contractor to be bonded for wildlife rehabilitation if required by regulations. The selected contractor should have at a minimum a Federal Permit for Migratory Bird Rehabilitation and training as described in the Best Practices.

f. Identify vessels, within the harbor, that are capable of implementing the Spill Response Plan.
g. Provide necessary instructions to successfully implement the plan.
h. Be implemented no fewer than 45 days prior to construction of the new mooring basin.

2.1.4. At lease one qualified oil-spill response individual shall be present at Akutan Harbor during harbor operations.

2.1.5. The local project sponsor shall develop and enter into a contract with an oil spill response organization capable of implementing the Spill Response Plan in response to large (greater than 500 gallons) spills. This condition shall be implemented no later than September 1 of the year in which operation of the mooring basin commences.

2.1.6. The local project sponsor shall obtain all necessary equipment to implement this oil Spill Response Plan by September 1 of the year in which operation of the mooring basin commences. The local project sponsor shall ensure that the equipment needed to implement this Spill Response Plan is procured, readily available for deployment, and passes annual inspections by an oil spill response organization. The local project sponsor or their contractor is responsible for maintaining the equipment in good working order.

2.1.7. The oil spill response organization or a qualified individual at Akutan Harbor is responsible for coordinating and conducting annual oil spill response drills for spills that occur within the mooring basin.

2.1.8. The use of in-line bilge water filter systems for removing both dissolved and dispersed hydrocarbon contamination from bilge water will be encouraged.

2.1.9. The use of fuel collars during vessel fueling will be encouraged.

2.1.10. The local project sponsor will design, produce, and install two information signs. One sign shall be installed at the new mooring basin; the other shall be made available for installation at the Trident fueling facility. The signs shall address the effects of oil on the marine environment, background information on Steller's eiders, ways that the public can prevent and reduce fuel spills, and that discharge of oil is illegal. Design, content, text, and placement of the signs will be developed in cooperation with the U.S. Fish and Wildlife Service. The signs shall be completed and installed by September 1, of the year harbor construction is completed

2.2. Stationary lighting that is associated with the operation of the proposed mooring basin shall be shielded downward in such a way as to minimize the hazard of disorienting flying birds and causing them to strike fixed objects. The COE shall coordinate with the Service on the specifications for shielded lighting to be installed by the local sponsor.

2.3. The Corps of Engineers 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 for Akutan Harbor prior to the start of harbor construction.

3. The following Term and Conditions shall implement Reasonable and Prudent Measure No. 3: "The USACOE shall monitor impacts of harbor operation to Steller's eiders."
   3.1. The USACOE shall monitor the releases of petroleum at existing harbor facilities and at the proposed mooring basin. The USACOE shall coordinate with the U.S. Fish and Wildlife Service on the study design for this monitoring effort prior to its initiation. The Service and COE are currently developing applicable methods. Petroleum release monitoring shall occur pre-construction and post-construction in years 1 and 4 of harbor operation. A summary report shall be submitted to the Service annually. After these sampling periods, the monitoring terms will be re-evaluated by the Service and COE.
   3.2. The USACOE shall ensure that collisions of Steller's eiders with physical structures associated with the operation of the mooring basin (including, but not limited to associated power lines and poles, pilings, vessels moored in the harbor, and other structures present within and adjacent to the harbor that are associated with the operation of the harbor) are monitored.
      3.2.1. Eiders that have been injured or killed by colliding with harbor-related structures shall be immediately reported to the Anchorage Fish and Wildlife Field Office and handled according to the "Protocol for Handling Sick, Injured, and Dead Spectacled and Steller's Eiders". Dead Steller's eiders shall be salvaged and kept frozen until they can be transferred to the Service.
      3.2.2. The local project sponsor shall pay for the expenses incurred in shipping and rehabilitating birds injured through collision with structures associated with the presence of the proposed mooring basin.
      3.2.3. The local project sponsor shall coordinate with the Service on the design and placement of notices urging the public to report dead or injured Steller's eiders. The local project sponsor shall cover the expenses associated with the printing and maintenance of these notices, and see that these notices are maintained in a readable manner throughout the year for the duration of the operation of the harbor, or until the Service no longer deems this measure necessary.
   3.3. The USACOE shall conduct pre-construction and post-construction surveys to monitor Steller's eider use of waters in the action area. These surveys should follow the survey design used by the LGL (Lanctot and King 2000a, 2000b). Pre-construction surveys shall be conducted once a month in November, December, January, February, and March during the winter prior to commencement of any construction activities. Post-construction surveys shall be conducted once a month in November, December, January, February, and March during the first two winters following construction of the proposed harbor. The COE may, alternatively, require the local project sponsor to fund a private consultant or the Service to conduct the surveys in the pre- and two post-

construction seasons. A summary report shall be submitted by the USACOE to the Service annually.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Make Best Management Practices Plan available to harbor customers via the web (for example on the Akutan web page) or by some other means (i.e., hard copy).
2. Partner with the Service to secure funding for the procurement of equipment needed to implement the Akutan Harbor GRS. Equipment will be stored and maintained in Akutan Harbor.
3. Conduct an educational/outreach program in conjunction with the Service that includes:
   - 3.1. Holding an oil spill prevention education workshop for the fishermen using Akutan Harbor. The Service can provide contact information for workshop leaders.
   - 3.2. Designing and mailing a pamphlet to each tenant vessel owner in the proposed harbor regarding the effects of oil on waterfowl, ways that commercial fishing vessel operators can prevent and reduce fuel spills, and explaining that discharge of oil is illegal.
4. Conduct a clean-up of the beach areas between the Whaling Station and the Trident seafood plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, etc. and transport them to an approved landfill.
5. Facilitate the removal of a holding tank from the shoreline at the head of the bay.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a matter or to an extent not considered in this biological opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species not covered by this opinion is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take should cease pending reinitiation. If the action agency is unable to fulfill the Terms and Conditions specified in the Incidental Take Statement of this Biological Opinion, consultation should be reinitiated.

APPENDIX III
LITERATURE CITED

LITERATURE CITED

ABR, Inc. 1999. Results of Steller's eider surveys near Barrow, Alaska. Prepared for U.S. Fish and Wildlife Service, Fairbanks, Alaska.

Agler, B. A., S. J. Kendall, P. E. Seiser, and D. B. Irons. 1994. Monitoring seabird populations in areas of oil and gas development on the Alaskan Continental Shelf: Estimates of marine bird and sea otter abundance in lower Cook inlet, Alaska, during summer 1993 and winter 1994.

Alaska Department of Environmental Conservation. 1997. Unocal Steelhead Platform 3697. Quarterly Report of Oil and Hazardous Substance Response. January 1-March 31, 1997.

Alaska Department of Environmental Conservation. 1999a. Cook Inlet Chesapeake Trader. Quarterly Report of Oil and Hazardous Substance Response. January 1-March 31, 1999. Vol. 5-No. 1.

Alaska Department of Environmental Conservation. 1999b. Unocal Dillon Platform. Quarterly Report of Oil and Hazardous Substance Response. October 1-December 31, 1999. Vol. 5-No. 4.

Alaska Department of Environmental Conservation. 1999c. Controller Bay and Redfin Groundings. Quarterly Report of Oil and Hazardous Substance Response. April 1-June 30, 1999. Vol. 5-No. 2.

Anderson et al. 1992. Philopatry, dispersal and the genetic structure of waterfowl populations. Pages 365-395 *in* B. D. J. Batt, A. D. Afton, M. G. Anderson, C. D. Ankney, D. H. Johnson, J. A. Kadlec, and G. L. Krapu (eds.), Ecology and management of breeding waterfowl. University of Minnesota Press, Minneapolis.

Begon, M. and M. Mortimer. 1986. Population ecology: a unified study of animals and plants. 2nd ed. Blackwell Scientific Publications. Cambridge, MA.

Bellrose, F. C. 1980. Ducks, geese and swans of North America. A wildlife management institute book sponsored jointly with the Illinois Natural History Survey. Stackpole Books, PA.

Bengtson, S. A. 1972. Breeding ecology of the harlequin duck (*Histrionicus histrionicus*) in Iceland. Ornis Scand. 3:1-19.

Bent, A. C. 1987. Life Histories of North American waterfowl. Two parts bound as one. Dover Publications, Inc., New York.

Brackney, A. W. and R. J. King. 1996. Aerial breeding pair surveys of the arctic coastal plain of Alaska: Distribution and abundance 1995. U. S. Fish and Wildlife Service, Migratory Bird Management.

Bustnes, J. O., M. Asheim, T. H. Bjorn, H. Gabrielsen, and G. H. Systad. 2000. The diet of Steller's eiders wintering in Varangerfjord, Northern Norway. Wilson Bull., 112(1):8-13.

Camphuysen, K. 2000. Mass mortality of Common Eiders in the Wadden Sea, winter 1999/2000: food related parasite outbreak? Atlantic Seabirds 2:47-48.

Cooke, F., G. J. Robertson, C. M. Smith, R. I. Goudie, and W. S. Boyd. 2000. Survival, emigration and winter population structure of harlequin ducks. Condor 102:137-144.

COE. 2000. Sand Point Trip Report, Steller's eider Surveys Nos. 1 and 2. Unpublished memorandum for record. CEPOA-EN-CW-ER (1105-2-10b). U.S. Army Corps of Engineers, Alaska District, Anchorage.

Dau, C. P., P. L. Flint, and M. R. Petersen. 2000. Distribution of recoveries of Steller's eiders banded on the lower Alaska Peninsula, Alaska. In Press. J. Field Ornithology.

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.

Dow, H., and S. Fredga. 1983. Breeding and natal dispersal of the goldeneye (Bucephala clangula. J. Anim. Ecol. 53:679-692.

Esler, Daniel, J. A. Schmutz, R. L. Jarvis, and D. M. Mulched. 2000. Winter survival of adult female harlequin ducks in relation to history of contamination by the Exxon Valdez oil spill. J. Wildl. Manage. 64(3):839-847.

Finley, D. B., G. I. Scott, J. W. Daugomah, S. L. Layman, L. Reed, M. Sanders, S. K. Sivertsen, E. D. Strozier. 1999. Case study: Ecotoxicological assessment of urban and agricultural nonpoint source runoff effects on the grass shrimp, *Palaemonetes pugio*. Pages 243-273, in, M. A. Lewis, F. L. Mayer, R. L. Powell, M. K. Nelson, S. J. Klaine, M. G. Henry, and G. W. Dickson [eds], Ecotoxicology and Risk Assessment for Wetlands. A special publication of SETAC

Flint, P. L., M. R. Petersen, and J. B. Grand. 1997. Exposure of spectacled eiders and other diving ducks to lead in western Alaska. Can. J. Zool.

Flint, P. L., M.. R. Petersen, C. P. Dau, J. E. Hines, J. D. Nichols. 2000. Annual survival and site fidelity of Steller's eiders molting along the Alaska Peninsula. J. Wildl. Manage. 64(1):261-268.

Gilpen, M. E. 1987. Spatial structure and population vulnerability, p. 125-139, in M. E. Soule, editor. Viable populations for conservation. Cambridge University Press, New York.

Glegg, G. A., L. Hickman, and S. J. Rowland. 1999. Contamination of limpets (*Patella vulgator*) following the Sea Empress oil spill. Marine Pollution Bulletin. Vol. 38. No. 2:119-125.

Goodman, D. 1987. The demography of chance extinctions. Pages 11-34, in M. E. Soule, editor, Viable populations for conservation. Cambridge University Press, New York.

Goudie, R. I., and C. D. Ankney. 1986. Body size, activity budgets, and diets of sea ducks wintering in Newfoundland. Ecology 67:1475-1482.

Hodges, J. I., J. G. King, B. Conant, and H. A. Hanson. 1996. Aerial surveys of waterbirds in Alaska 1957-94: Population trends and observer variability. U. S. Department of the Interior. National Biological Service.

Holmes, W. N. 1984. Reviews in environmental toxicology 1. Editor Ernest Hodgson, North Carolina State University. Elsevier Science Publishers, New York.

Holmes, W. N., J. Cronshaw, and J. Gorsline. 1978. Some effects of ingested petroleum on seawater-adapted ducks (*Anas platyrhynchos*). Environmental Research. 17:177-190.

Holmes, W. N., J. Gorsline, J. Cronshaw. 1979. Effects of mild cold stress on the survival of seawater-adapted mallard ducks (*Anas platyrhynchos*) maintained on food contaminated with petroleum. Environmental Research. 20:425-444.

Johnsgard, P. A. 1994. Arena birds, sexual selection and behavior. Smithsonian Institution Press, Washington and London.

Jones, R. D. 1965. Returns from Steller's eiders banded in Izembek Bay, Alaska. Wildfowl Trust 16:83-85.

Kertell, K. 1991. Disappearance of the Steller's eider from the Yukon-Kuskokwim Delta, Alaska. Arctic 44:177-187.

Laing, K. 1995. A pilot survey to determine distribution and abundance of Steller's eiders on the Alaska Arctic Coastal Plain. U.S. Fish and Wildlife Service, Migratory Bird Management.

Lande, R., and G. F. Barrowclough. 1987. Effective population size, genetic variation, and their use in population management. Pages 87-123, in M. E. Soule, editor. Viable populations for conservation. Cambridge University Press, New York.

Larned, W. W. 1998. Steller's eider spring migration Surveys, 1998. U.S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W. 2000a. Steller's eider spring migration surveys, 2000. U.S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W. 2000b. Aerial surveys of Steller's eiders and other waterbirds and marine mammals in southwest Alaska areas proposed for navigation improvements by the U.S. Army Corps of Engineers, Alaska. U.S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W. 2001. Steller's eider spring migration surveys, 2001. U.S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W. 2002. Steller's eider spring migration surveys, 2002. U.S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W., and G. Balogh. 1996. Eider breeding population survey, Arctic coastal plain, Alaska, 1992-96. U. S. Fish and Wildlife Service.

Larned, W. W., B. Butler, and G. Balogh. 1993. Progress report: Steller's eider spring migration surveys southwest Alaska, 1993. U. S. Fish and Wildlife Service, Migratory Bird Management Project.

Larned, W. W. and T. Tiplady. 1996. Distribution and abundance of sea ducks in Kuskokwim Bay, Alaska, September 1996. Migratory Bird Management, U.S. Fish and Wildlife Service.

Larned, W. W., T. Tiplady, R. Platte, and R. Stehn. 1999. Eider breeding population survey Arctic coastal plain, Alaska, 1997-98. U. S. Fish and Wildlife Service, Migratory Bird Management.

Larned, W. W. and D. Zwiefelhofer. 1995. Distribution and abundance of Steller's eiders (Polysticta stelleri) in the Kodiak Archipelago, Alaska, March 1994. 18pp.

Leighton, F. A. 1993. The toxicity of petroleum oils to birds. Environmental Review. Vol.1:92-103.

Leighton, F. A., D. B. Peakall, and R. G. Butler. 1983. Heinz-body hemolytic anemia from the ingestion of crude oil: A primary toxic effect in marine birds. Science. 220:271-273.

LGL Alaska Research Associates. Inc. 2000a. Abundance and distribution of Steller's eiders and other waterbirds at False Pass, Alaska, January through March of 2000.

LGL Alaska Research Associates, Inc. 2000b. Steller's eider and other waterbird numbers and distribution at Akutan Harbor, Alaska, Winter of 1999/2000.

Mallek, E. J., and R. J. King. 1999. Aerial breeding pair surveys of the Arctic coastal plain of Alaska. U.S. Fish and Wildlife Service.

Martin, P. D. and T. Obritschkewitsch. Distribution and abundance of Steller's eiders in northern Alaska. Unpublished Information. U.S. Fish and Wildlife Service.

Metzner, K. A. 1993. Ecological strategies of wintering Steller's eiders on Izembek Lagoon and Cold Bay, Alaska. A Thesis presented to the faculty of the Graduate School, University of Missouri, Columbia.

McEwan, E. H. and P. M. Whitehead. 1980. Uptake and clearance of petroleum hydrocarbons by the glaucous-winged gull (*Larus glaucescens*) and the mallard duck (*Anas platyrhynchos*). Canadian Journal Zoology. 58:723-726.

Morrison, M.L. and K.H. Pollock. 2000. Development of a practical modeling framework for estimating the impact of wind technology on bird populations. *In* Proceedings from the National avian-wind power planning meeting III, San Diego, California, May 1998. http://www.nationalwind.org/pubs/avian98/27-Morrison_Pollock-Modeling.pdf/accessed 12 March, 2003.

Morrison, M.L., K.H. Pollack, A.L. Olberg, and K.C. Sinclair. 1998. Predicting the response of bird populations to wind energy-related deaths. Unpublished report, National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

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

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

Quakenbush, L. T., R. S. Suydam, K. M. Fluetsch, and C. L. Donaldson. 1995. Breeding biology or Steller's eiders nesting near Barrow, Alaska, 1991-1994. Technical Report, U.S. Fish and Wildlife Service and North Slope Borough, Department of Wildlife Management.

Rand, G. M. and S. R. Petrocelli. 1985. Fundamentals of aquatic toxicology. Hemisphere Publishing Corporation, Washington.

Robertson, G. J. 1997. Pair formation, mating system, and winter philopatry in harlequin ducks. Dissertation, Simon Fraser University, Vancouver, British Columbia, Canada.

Robertson, G. J., F. Cooke, R. I. Goudie, and W. S. Boyd. 1999. Within-year fidelity of Harlequin Ducks to a moulting and wintering area. Pages 45-51, in, R. I. Goudie, M. R. Petersen, and G. J. Robertson [eds.], Behaviour and ecology of sea ducks. Canadian Wildlife Service Occasional Paper Series No. 100, Ottawa, Ontario, Canada.

Ross, N., M. Amaral, J. Rhodes, L. Hansen, G. McCorkle. 1995. BMP Examples for Alaska. State of Alaska Department of Transportation. 39 pp.

Rocke, T. E., T. M. Yuill, and R. D. Hinsdill. 1984. Oil and related toxicant effects on mallard immune defenses. Environmental Research. (33) 343-352.

Savard, J. P. L. 1985. Evidence of long-term pair bonds in Barrow's Goldeneye (*Bucephala islandica*). Auk 102:389-291.

Savard, J. P. L. and J. M. Eadie. 1989. Survival and breeding philopatry in Barrow's and common goldeneyes. Condor 91:198-203.

Scribner, K. T., R. L. Fields, S. Talbot, J. Pearce, M. Petersen, and R. K. Chesser. 2000.Sex-biased gene flow in spectacled eiders (Anatidae): Inferences from molecular markers with contrasting modes of inheritance. Submitted to Evolution on 6-30-2000.

Shaffer, M. 1987. Minimum viable populations: coping with uncertainty. Pages 69-86, in M. E. Soule, editor, Viable populations for conservation. Cambridge University Press, New York.

Schmutz, J. A., R. F. Rockwell, and M. R. Petersen. 1997. Relative effects of survival and reproduction on the population dynamics of emperor geese. Journal of Wildlife Management 61:191-201.

Solovieva, D. 1997. Timing, habitat use and breeding biology of Steller's eider in the Lena Delta, Russia. Wetlands International Seaduck specialist Group Bulletin.

Sterns, S. C. 1992. The evolution of life histories. Oxford University Press, New York, New York, USA.

Trust, K. A., E. Esler, B. R. Woodin, and J. J. Stegeman. 2000. Cytochrome P450 1A induction in sea ducks inhabiting near shore areas of Prince William Sound, Alaska. Marine Pollution Bulletin 40:397-403.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; threatened status for the Alaska breeding population of the Steller's eider. Federal Register/Vol. 62, No. 112. 31738.

Yamato, O., I. Goto, and Y. Maede. 1996. Hemolytic anemia in wild seaducks caused by marine oil pollution. J. Wildl. Diseas. 32(2). Pp. 381-384.

Zydelis, R. and R. Skeiveris. 1997. Increasing conflict between gill-net fishery and Steller's eiders wintering along the Lithuanian coast. Wetlands International Seaduck specialist Group Bulletin.

FEIS-APPENDIX 5

Report: Potential biochemical oxygen demand sources associated with the proposed Akutan Boat Harbor and Transmittal letter to USEPA-Region X dated October 7, 2003

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 898
ANCHORAGE, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

OCT - 7 2003

Environmental Resources Section

Ms. Judith Lee
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Ms. Lee:

As requested by your agency and the Alaska Department of Environmental Conservation, the U.S. Army Corps of Engineers, Alaska District (Corps) has thoroughly researched the possible effects of the proposed Akutan, Alaska, navigation improvements project on Akutan Harbor's biological oxygen demand (BOD) and settleable solid residues (SSR) total maximum daily loads (TMDL) established by the U.S. Environmental Protection Agency's (USEPA)[1]. The Corps' April 16, 2003, letter sent to your office summarized our findings to date. The Corps has now concluded its evaluation of the effects of the project on Akutan Harbor's water quality and is providing you a copy of our report for your review and comment (enclosure 1). A summary of our findings follows.

The estimated future BOD loads from the harbor of approximately 24 and 499 lbs/day for the normal operating and extreme conditions are only approximately 0.02% to 0.34% of the TMDL of 149,100 lbs/day. This calculation is based on expected conditions described in the Corps' report, including the implementation of best management practices. Many references were used to prepare the report, including the findings of the USEPA and Washington Department of Fisheries investigations.[2] An independent technical review of the Corps' first draft report (enclosure 2) supported the Corps' findings.[3]

---

[1] USEPA. 1994. Total Maximum Daily Load for Settleable Residue Solids in the Waters of Akutan Harbor, Alaska. October 13, 1994. 9 pp. **and** USEPA. 1994. Total Maximum Daily Loads for Biological Oxygen Demand in the Waters of Akutan Harbor, Alaska. 44 pp.

[2] USEPA. 1985. Coastal marinas assessment handbook. Chapter 4.0 Environmental Impacts: Assessment Techniques (111 pages), EPA 904/6-85-132. United States Environmental Protection Agency, Region IV, Atlanta, Georgia; and Cardwell, R.D., Carr, M.I., and E.W. Sanborn. 1980. Water Quality and Flushing of Five Puget Sound Marinas. Washington Department of Fisheries, Olympia, WA. Technical Report No.56. September 77pp.

[3] Initial storm water runoff BOD calculations were revised after the independent technical review, which account for the Total BOD discrepancy between the Corps's final report and the independent technical review.

Since the 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 lbs/day, well below their TMDL BOD_5 allocation of 133,200 lbs/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 combined with the estimated severe case for the marina would reach only approximately 71% of the TMDL.

Settleable solids is a parameter directly related to the impact of effluent discharges of residues deposited on the seafloor in a receiving water. Like the BOD TMDL issue, the concern about SSR levels are rooted in the seafood waste discharging practices of shore-based seafood processors in Akutan Harbor. The SSR allocations for the seafood processors constitute the basis of the settleable solid limitations.

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[4], has shown that no Trident-generated SSR would reach the head of the bay and therefore would not enter the mooring basin.[5] 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.

With the assistance of the Alaska Department of Transportation and Public Facilities, the ADEC, and the Corps' project contractor (Tryck Nyman Hayes, Inc.), the 12-acre mooring basin at the head of Akutan Harbor has been redesigned to increase water circulation and flushing (enclosure 3). The proposed design changes and implementing harbor-related best management practices would maximize the mixing properties of the harbor with the receiving waters, i.e., Akutan Harbor.

---

[4] Coastline Engineering. 2001. Circulation modeling in Akutan Harbor and the Potential Impacts by and to the proposed small boat harbor. Prepared for Tryck Nyman Hayes, Inc. June. 29 pp.

[5] Tim Rumfelt (Alaska Department of Environmental Conservation) agreed with this statement made at a January 22, 2002, Akutan Harbor Coastal Consistency interagency coordination meeting held in Anchorage, Alaska.

Given the Corps' findings, the technical review provided by Evans-Hamilton, Inc., and new information about the decrease in BOD loading in Akutan Harbor, the Corps requests that the USEPA Region X 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.

The Corps would appreciate feedback on our request, and Mr. Wayne M. Crayton of my staff is available to answer any questions you and your staff may have on the information we presented. Mr. Crayton can be contacted at 907-753-2672 or via email at Wayne.M.Crayton@usace.army.mil . We look forward to working with you to resolve all water quality issues to our mutual satisfaction.

Sincerely,

Guy R. McConnell

Guy R. McConnell
Chief Environmental Resources Section

Enclosures

Cc: Rumfelt, Alaska Department of Environmental Conservation, Anchorage, AK
Weiss, Alaska Department of Natural Resources, Anchorage, AK
Walter, Alaska Department of Natural Resources, Anchorage, AK
Rockwell, U.S. Environmental Protection Agency, Anchorage, AK
Eagleton, National Marine Fisheries Service, Anchorage, AK
Schroeder, U.S. Fish and Wildlife Service, Anchorage, AK
Smith, Alaska Department of Transportation and Public Facilities, Anchorage, AK
Magee, Alaska Division of Natural Resources, Anchorage, AK
Juettner, Aleutians East Borough, Anchorage, AK
Tritremmel, City of Akutan, Anchorage, AK
Daley, Tryck Nyman Hayes, Inc. Anchorage, AK
Cox, Evans-Hamilton, Inc., Seattle, WA

Potential Biochemical Oxygen Demand Sources Associated with the Proposed Akutan Boat Harbor

Prepared by Ashley Reed and Wayne M. Crayton
U.S. Army Corps of Engineers Alaska District
Environmental Resources Section
Anchorage, Alaska

October 2003

Table of Contents

Page

Table of Contents (continued)

Figures **Page**

Table

1.0 INTRODUCTION

1.1 Purpose

This report addresses U.S. Environmental Protection Agency (USEPA) and Alaska Department of Environmental Conservation (ADEC) water quality concerns associated with the construction and operation of the proposed boat harbor at Akutan, Alaska (figure 1). USEPA and ADEC concerns focus 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). This report will identify BOD sources and quantify the amount of BOD the proposed harbor is likely to produce.

In this document, "harbor" refers to the proposed boat harbor and "Akutan Harbor" refers to the natural body of water.

1.2 Problem

The U.S. Army Corps of Engineers, Alaska District (Corps) and project sponsors (Aleutians East Borough and the City of Akutan) are proposing construction of a boat harbor to serve the Bering Sea commercial fishing fleet at Akutan, Alaska, a community on Akutan Island in the Aleutian Island chain. Akutan Harbor currently has no protected mooring areas. The boat harbor would be constructed inland at the head of Akutan Harbor and have a 12-acre mooring basin providing moorage for 57 vessels (figure 2).

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. Currently only one seafood processor, Trident Seafoods, operates in 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.

According to the USEPA and ADEC, the two main water quality concerns in Akutan Harbor are benthic waste accumulations and reduced dissolved oxygen. Seafood wastes degrade water quality by contributing settleable seafood waste residues, which accumulate in piles near outfalls. Seafood wastes reduce dissolved oxygen levels by contributing organic matter to the water column. Microorganisms in the water column metabolize this organic matter and consume dissolved oxygen in the process. The measure of the amount of dissolved oxygen consumed in the decomposition of a substance is BOD. Lowered dissolved oxygen levels can negatively affect fish and other organisms that require dissolved oxygen for respiration (USEPA 1995).

The USEPA has established two metrics to regulate the amount of pollutants discharged into Akutan Harbor. One is the TMDL for SSR and the other is the TMDL for BOD_5 (USEPA 1995). Because there would be no seafood processing or subsequent release of SSR inside the proposed harbor, the TMDL for SSR is not a water quality concern for the

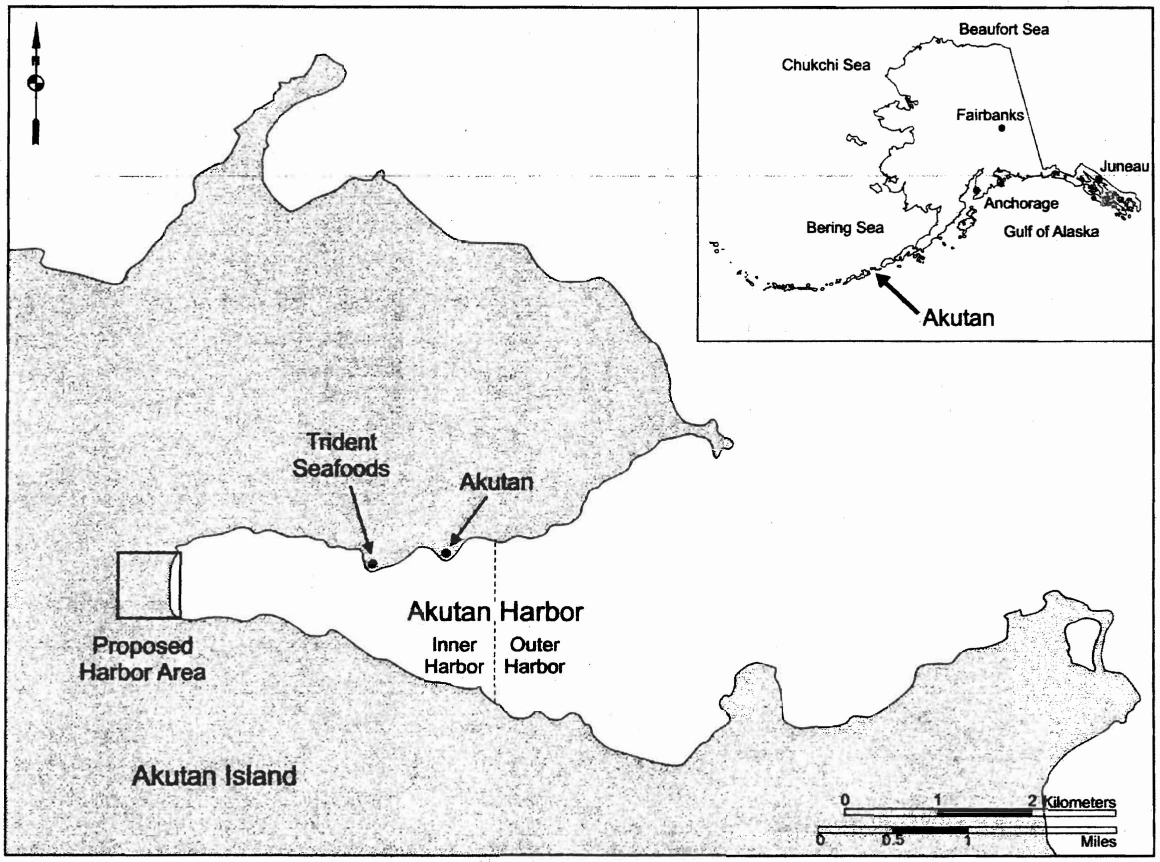


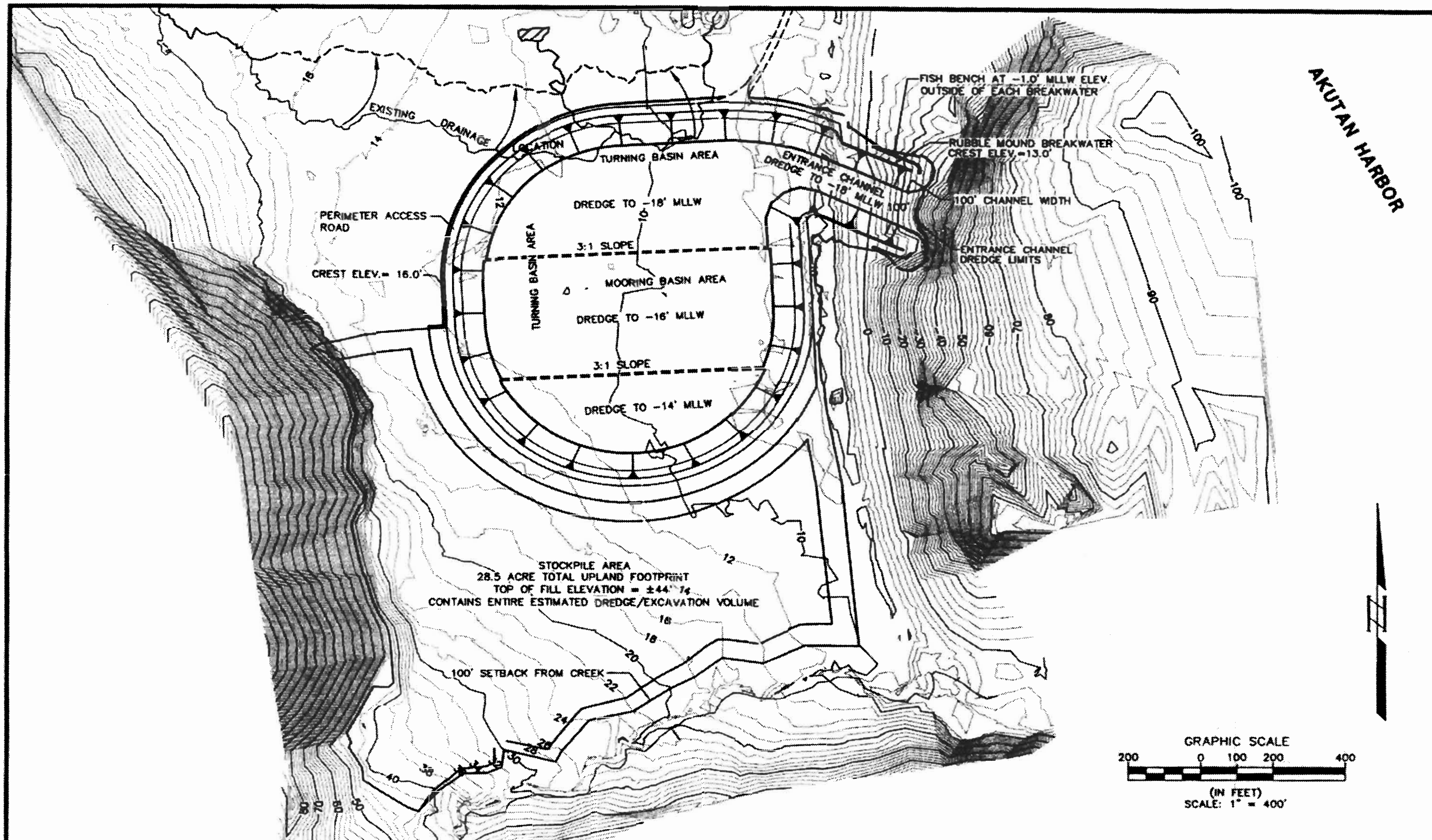
Figure 1. Location and vicinity map of Akutan Harbor. Inner harbor is classified as water quality impaired.

proposed harbor. The current TMDL for Akutan Harbor is 149,000 pounds of BOD_5 per day, applicable May 1 through October 31 (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. Harbors can reduce circulation and increase pollutant concentrations in a water body. However, harbors do not necessarily impair water quality, and many harbors have good to excellent water quality (USEPA 2001). Before the proposed harbor plan can proceed, this concern about the boat harbor at Akutan creating additional BOD needs to be investigated and addressed.

1.3 Problem-Solving Strategy

To address the water quality concerns associated with the proposed boat harbor in Akutan Harbor, the potential sources of BOD from boat harbors were identified from literature searches and personal interviews. Research is available on pollution impacts, including BOD, from recreational boats and large vessels such as cruise ships and ferries, but little is available on pollution impacts from commercial fishing vessels specifically. However,



NOTES
TOTAL DREDGE VOLUME = 843,000 CY
BASIN AREA = 14.9 ACRES
ENTRANCE CHANNEL AREA = 1.3 ACRES
(BASIN AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR BASIN PROJECT AREA = 16.1 ACRES
TOTAL HARBOR PROJECT AREA (INCLUDES PERIMETER ROAD AND SLOPES) = 28.7 ACRES
TOTAL HARBOR PROJECT AREA (INCLUDES STOCKPILE FOOTPRINT) = 57.2 ACRES

12 – ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE 2

research from other types of vessels can be adapted to estimate the pollution impacts of commercial fishing vessels.

After examining harbor-related best management practices (BMPs) and expected vessel practices in Akutan Harbor, 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 BOD sources found to be applicable and significant to the proposed harbor were quantified using a combination of information from the existing literature and the expected conditions at the proposed harbor. BOD created from a worst-case scenario was also quantified for comparison. The result of this strategy is a range of BOD values likely to result from the construction and operation of the proposed boat harbor at Akutan. This range of expected BOD is intended to provide the USEPA and ADEC with the information needed to determine the impact of the proposed boat harbor at Akutan on the water quality of Akutan Harbor.

2.0 BACKGROUND

2.1 Biochemical Oxygen Demand

Biochemical oxygen demand is a measure of the amount of dissolved oxygen consumed by microorganisms in the decomposition of organic matter (USEPA 1985). In other words, BOD is a measure of how much dissolved oxygen will be depleted by the introduction of an organic substance to a body of water. Organic substance refers to any substance that is consumed by microorganisms, and can include plant matter, animal matter, or chemicals such as petroleum products. Substances vary in the amount of organic matter they contain; the more organic matter a substance contains, the higher its BOD, i.e. the introduction of a substance with high BOD will deplete more dissolved oxygen than the introduction of a substance with low BOD.

According to Standard Methods for the Examination of Water and Wastewater (APHA et al. 1998), BOD_5 is measured by first collecting a water sample. The dissolved oxygen is measured immediately using an oxygen meter. Then the sample is incubated at 20 degrees Celsius in the dark for a certain length of time (APHA et al. 1998). Five days is the most common length in the U.S., and is the standard used by the USEPA. This is referred to as BOD_5 and is expressed in milligrams per liter (mg/L). For a frame of reference, BOD_5 for urban runoff averages 17 mg/L, whereas BOD_5 for raw domestic sewage averages 200 mg/L (Laws 1993). Ultimate BOD refers to the total amount of oxygen that will be depleted over the course of the entire decomposition process. This document discusses BOD in terms of BOD_5 because that is the measurement used by the USEPA to regulate TMDLs for Akutan Harbor.

2.1.1 Importance of Biochemical Oxygen Demand to Organisms

Biochemical oxygen demand is important because it indicates the effect organic substances will have on the dissolved oxygen available to aquatic organisms. When BOD is high, dissolved oxygen that would otherwise be used by fish and other aquatic organisms for respiration is instead used up in the decomposition process (USEPA 2001).

Different organisms have different dissolved oxygen requirements. Salmonids, for example, need about 6 mg/L of dissolved oxygen. They can survive at lower dissolved oxygen levels, but their abilities to grow, swim, and metabolize food are impaired (Bjornn and Reiser 1991).

Low dissolved oxygen can cause fish to move to other areas with higher dissolved oxygen, or can kill fish by hypoxia. Sessile organisms are more likely than motile organisms to be adversely affected by low dissolved oxygen. Fish kills and benthic infauna kills have occurred in harbors with low dissolved oxygen (Cardwell et al. 1980). In addition, studies have shown that dissolved oxygen is often lower inside harbors than in their adjacent water bodies (USEPA 2001, Cardwell et al. 1980). Low dissolved oxygen levels in harbors can be a result of high BOD, poor flushing, high temperatures, or a combination of these (USEPA 2001). Reduction of dissolved oxygen levels can also cause severe shifts in community composition and abundance (USEPA 1985).

2.2 Akutan Harbor Characteristics

Akutan Island (54° 08' north latitude, 165° 46' west longitude) is 35 miles east of Unalaska, and 766 air miles southwest of Anchorage. It is in the eastern Aleutian Islands and one of the Krenitzin Islands of the Fox Island group. The proposed harbor facility lies 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. Rains occur any time of the year, with average annual precipitation of 79 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. Akutan Harbor's winds can be described as having a bi-modal pattern from the northwest and the southeast. The average wind speeds during winter (October through April) are 17 to 21 knots and 9 to 13 knots during summer (May through September). Tides vary from an extreme high of 7.15 feet to an extreme low of –2.90 feet. Mean higher high water is 4.03 feet and mean lower low water is 0.00 feet.

USEPA studies (1993, 1994) indicate that Akutan Harbor's tidal currents are weak [1 to 2 centimeters per second (cm/sec)] and drive a relatively minor portion (<10%) of the harbor's hydrodynamics. Winds, especially intermittent wind currents, are the primary forces generating circulation in Akutan Harbor. Severe storm activities with winds in excess of 40 knots are common in Akutan Harbor, and it is these storm events that produce the higher velocity currents (USEPA 1993). Akutan Harbor has three cellular circulation patterns: (1) an outer harbor cell from the mouth to roughly 0.2 nautical miles east of Akutan village, (2) a mid-harbor cell from the outer cell to the eastern edge of the Trident onshore facility dock, and (3) an inner harbor cell from the middle cell to the head of the harbor. Circulation and current velocities decrease from the outer to the inner harbor (USEPA 1994).

Vessels from the Bering Sea commercial fishing fleet deliver product to Akutan Harbor and seek refuge from inclement weather in Akutan Harbor. 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 associated vessels participate in the crab, pollock, Pacific cod, and halibut commercial fisheries. Nineteen smaller vessels and skiffs, ranging in length from 14 to 32 feet, mainly reside at Akutan.

The harbor's mooring basin at the tentatively preferred site (Head of the Bay, inland design) is being designed to accommodate 57 vessels of the Bering Sea trawler type. Although larger vessels may use the mooring basin, such as catcher processors, 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: 160 feet length overall, 35-foot beam, and 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 specifically designed to accommodate such sized vessels.

2.2.1 Water Quality

Akutan Harbor has had 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 report 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 fishmeal. Measured water temperature ranged from 7.3 to 10.8 °C. Water temperature was generally higher at sampling stations in the inner harbor and decreased toward the harbor mouth. The lowest DO concentrations (less than 7 mg/L) occurred in the inner harbor west of Trident's discharge. The BOD_5 of the water in Akutan Harbor is about 1.5 mg/l (USEPA 1995).

The USEPA, for National Pollution Discharge Elimination System (NPDES) permitting purposes, has divided Akutan Harbor into two areas: east of longitude 165°46' West, which is the outer harbor, and west of same longitude, which is the inner harbor (Figure 1). The inner harbor is on the USEPA's impaired water body list and TMDLs have been established for BOD and settleable solids (Chris Cora, personal communication). Individual NPDES permits are required for discharge activities in the inner harbor and general permits apply for discharges in the outer harbor. The current BOD TMDL is 149,000 pounds per day, and is applicable from May 1 through October 31. No BOD 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.

Discharge 007 requires Trident to transport and dispose of seafood processing wastewater and wastes measuring no more than one-half inch in width, and ungrounded mollusk shells, to a discharge area outside of Akutan Harbor that is more than one 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 fish-meal 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 (ABR 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 (ABR 2000).

Water quality problems are also associated with improperly disposed of 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 quarts of oil) have been observed on the shoreline and floating in Akutan 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.

3.0 BIOCHEMICAL OXYGEN DEMAND IN HARBORS

Any organic substance that ends up in the harbor is a potential source of biological oxygen demand. BOD sources in harbors can be divided into two groups: BOD originating from the harbor infrastructure and BOD originating from vessels (Figure 3).

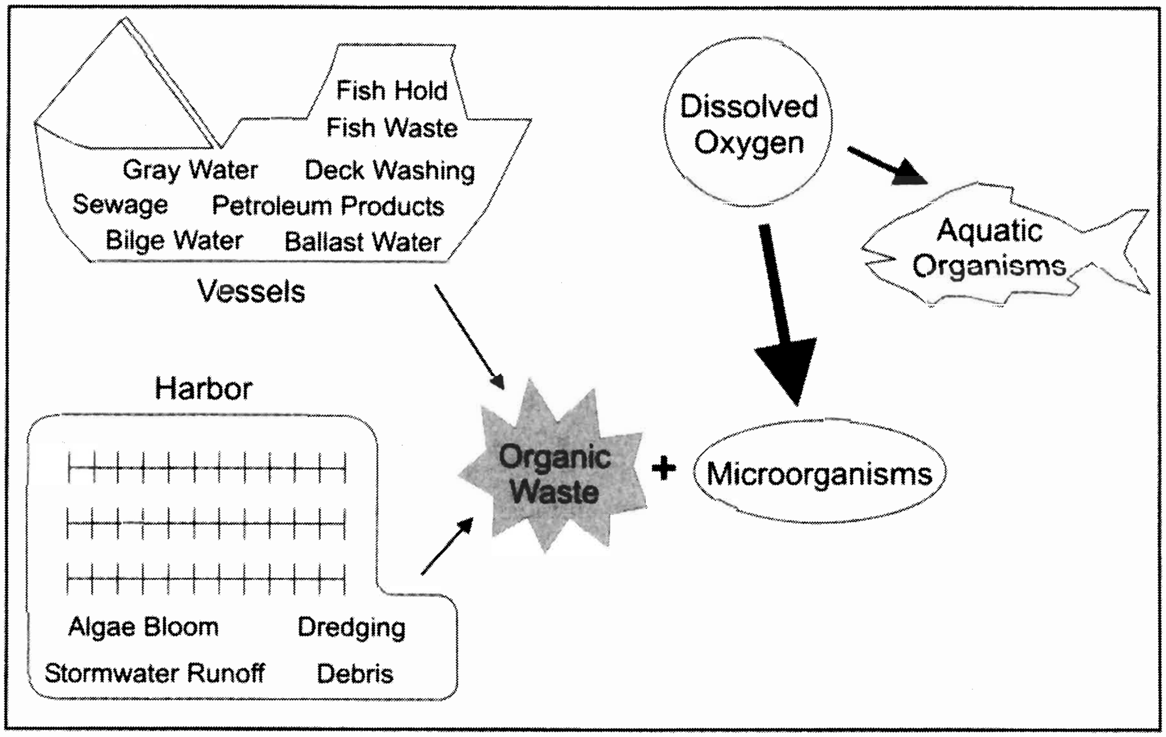


Figure 3. Pollution from vessels and harbors can exert biochemical oxygen demand, reducing the amount of dissolved oxygen available to aquatic organisms.

3.1 Biochemical Oxygen Demand from Harbor Infrastructure

Sources of BOD related to the harbor infrastructure include dredging sediments, storm water runoff from harbor parking lots and buildings, algae blooms, and debris.

3.1.1 Dredging

Dredging is a source of BOD because it suspends sediments in the water column and increases turbidity. Suspended dredged materials are a source of sediment oxygen demand (SOD), which is a specific type of BOD that refers to the decomposition of organic particles in sediment. Dredging increases turbidity by resuspending bottom sediments, thereby reducing the amount of sunlight transmitted through the water column. This decreases the amount of photosynthesis that can occur, which decreases the production of dissolved oxygen. The length of time the sediments are suspended in the water column and the organic content of the sediment determine the amount of BOD exerted by dredging. The longer the sediment is exposed to microorganisms in the water column, the greater the amount of BOD. Larger particle sizes fall out of the water column faster. Particles in areas of high circulation are dispersed faster, although high circulation can stir up more sediment from the bottom. Sediment with high organic content, such as sediment containing partially decayed plant material, has higher BOD than sediment with low organic content, such as clean sand (USEPA 1985).

The majority of BOD concerns associated with dredging are related to dredged material disposal in open water, not the dredging itself. Dredging stirs up bottom sediment and a small amount of sediment is suspended in the water column as sediment is removed. During dredged material open-water disposal, all the dredged material is suspended in the water column as it settles to the ocean bottom. Early studies about BOD and dissolved oxygen during dredging and disposal had mixed results, according to the USEPA's 1985 "Coastal Marinas Assessment Handbook." This report stated that dredging and disposal might reduce dissolved oxygen by 16 to 83 percent, and increase BOD eightfold. At Chesapeake Bay, high BOD was present at the surface 600 feet from dredging operations. At Mobile Bay, high BOD was present at the bottom about 1,700 feet from dredging operations. Dissolved oxygen concentrations measured during dredging of a tidal waterway were 16 to 33 percent below normal. Conversely, a study conducted before, during, and after dredging of the Atlantic Intercoastal Waterway found that neither dissolved oxygen nor BOD in dredged areas was significantly different from control areas. Studies in Wassaw Sound, Georgia, found that the oxygen demand of sediments can remove up to 500 times its volume of oxygen from the water column. Dredging in areas of poor circulation has been found to decrease dissolved oxygen. Areas of poor circulation include steep-sided dead-end canals, areas dredged more than a foot deeper than surrounding areas, and areas where stratification of the water column occurs (USEPA 1985).

The current consensus is that dredging has minimal effect on dissolved oxygen. According to the 2001 "Dredging Activities: Marine Issues" prepared by the University of Washington, dredging does not significantly reduce the amount of dissolved oxygen, implying that the amount of BOD produced by dredging is low (Nightingale and Simenstad 1991). At a Hudson River bucket dredge site, dissolved oxygen was reduced by less than 0.2 mg/l. A 1986 report determined that, at worst, dissolved oxygen would be reduced by less than 0.1 mg/L when suspended sediment loads were 500 mg/L. A study at a Grays Harbor, Washington, cutter head dredge site found that dissolved oxygen was periodically reduced by 2.9 mg/l. A hopper dredge operation in an Oregon tidal slough was found to reduce dissolved oxygen in the lower water column by 1.5 to 3.5 mg/l during slack tide. At a hopper dredge site in Coos Bay, Oregon, minimal to no change in dissolved oxygen was detected (Nightingale and Simenstad 1991).

In summary, dredged sediments are unlikely to exert enough BOD to reduce dissolved oxygen significantly. Dredging usually occurs only during harbor construction and at periodic maintenance intervals. BOD from dredged sediments is temporary and localized. According to Nightingale and Simenstad (1991), "very little evidence exists of dissolved oxygen reduction levels associated with dredging that would pose a risk to fish moving through the immediate area." The effects of dredging on BOD should be examined on a site-specific basis. Important factors to consider when determining the effect of dredging on BOD include the background BOD or dissolved oxygen, circulation characteristics, amount of material to be dredged, BOD of the dredged sediment, the length of time sediments will be suspended, and the type of dredge.

3.1.2 Storm Water Runoff

When harbors are constructed, much of the natural vegetative cover is replaced by impermeable surfaces such as buildings and parking lots that reduce the area available for storm water percolation (USEPA 1985). Storm water runoff from parking lots, roads, walkways, and roofs adjacent to harbors can flow into the harbor basin and contribute to BOD. Runoff can flow into the harbor either through a drainage system, such as culverts, or over land. Storm water can contain sediment, organic debris, oil and any other debris on the ground that is light enough to be carried away by flowing water. The exact composition of debris in storm water runoff depends on the land use. The two most common pollutants in runoff from harbor parking lots and maintenance areas are suspended solids, such as paint chips and sanding dust, and organics, such as oil and grease (USEPA 2001). The decomposition of debris from runoff in the harbor exerts BOD. The BOD from urban runoff is typically around 17 mg/l. An immediate effect of runoff entering harbors is a temporary reduction in the availability of dissolved oxygen in the water (USEPA 1985).

Several factors determine the amount of storm water runoff that reaches the harbor. The rainfall frequency and intensity combined with vegetation and ground surface characteristics influence the amount of runoff. Higher rainfall frequency and intensity result in greater volumes of runoff. Vegetation reduces the amount of runoff by taking up water. The porosity of the ground surface greatly affects the amount of runoff. Impervious surfaces such as concrete create more runoff than pervious surfaces such as sandy soil. Likewise soil characteristics such as soil type (sand, loam, silt, clay) and soil compaction affect runoff volumes. Steep slopes cause greater runoff volumes than shallow slopes (USEPA 1985).

3.1.3 Algal Blooms

In Lower-48 harbors, algal (phytoplankton) blooms have caused higher BOD and lower dissolved oxygen. In a study of five Puget Sound, Washington marinas, lowered dissolved oxygen inside the harbors was attributed mainly to phytoplankton blooms (Cardwell *et al.* 1980). Poor circulation causes increased water temperatures and nutrient loads, which in turn can cause phytoplankton blooms. Phytoplankton blooms typically occur in the summer and commonly cause nocturnal dissolved oxygen declines (Cardwell *et al.* 1980). Algal blooms also decrease the amount of dissolved oxygen when the algae die and decompose inside the harbor (USEPA 2001). Excessive organic enrichment from runoff can cause algal blooms (USEPA 1985). Also, excessive nitrogen and phosphorus from detergents, sewage, animal droppings, fertilizer, and fish cleaning waste causes algal blooms (USEPA 2001). The amount of BOD created by phytoplankton blooms depends on the frequency, size, and duration of the blooms.

3.1.4 Debris

Debris in the harbor may include vegetation such as kelp that has drifted into the harbor and litter. Common litter in harbors includes paper towels, cups, plastic bags, plastic and glass bottles, fish netting, fishing line, discarded oil filters and engine parts, debris from pressure washing and sanding, discarded rags, pet droppings, and aluminum cans. Activities that generate litter in harbors are boat maintenance and repair, fueling, parties, restaurants, commercial activity, and harbor maintenance (USEPA 2001). The amount of BOD exerted by debris depends on the type and amount of debris, and the length of time it is in the harbor.

3.2 Biological Oxygen Demand from Vessels in Harbors

Discharges from vessels are a common source of BOD in harbors. The types of discharges depend on the type of vessel. A small recreational boat will have different discharges than large commercial fishing vessels or cargo vessels. Because little research has been done specifically on discharges from commercial fishing vessels, research from other types of vessels has been adapted to estimate the BOD from commercial fishing vessel discharges.

A general overview of vessel discharges, with an emphasis on discharges from commercial fishing vessels, is provided below. Possible sources of BOD from vessels include boat sewage, gray water, petroleum products, wastewater from washing out fish holds, wastewater from washing off boat decks, bilge water, ballast water, and fish waste.

3.2.1 Sewage

Of all the types of vessel discharges, boat sewage discharges have the highest BOD (USEPA 2001). Boat sewage, also called black water, is typically discharged at sea or stored in Type III Marine Sanitation Device (MSD) holding tanks onboard to be pumped out onshore. Black water may be combined with gray water for storage or treatment. According to federal law, it is illegal to discharge untreated sewage within 3 miles of shore. If a vessel has a Type I or Type II MSD to treat sewage, the treated sewage can be discharged within 3 miles of shore as long as it is not in a No Discharge Zone, and there are no local laws prohibiting discharge (USEPA 2001). Theoretically, there should be no boat sewage in a harbor. However, boat sewage may end up in harbors intentionally because of illegal dumping or unintentionally through leaks or accidental spills. The amount of boat sewage discharged into harbors is difficult to determine. A 1982 study of Aurora Basin and Auke Bay harbors in Juneau attributed fecal coliform in the harbors to sewage outfalls and live-aboard vessels, many of which directly discharged sewage into the water (Malinky and Toland 1982).

According to the USEPA, the BOD of recreational boat sewage is 1,700 to 3,500 mg/L. This is ten times greater than the BOD of raw municipal sewage because it is highly concentrated (USEPA 2002). No specific BOD value for boat sewage from commercial fishing vessels could be found. The amount of boat sewage on a vessel depends on the number of people on board and the characteristics of the vessel, such as type of sewage system and size of sewage storage tank (Vedeler 2000).

3.2.2 Gray Water

Gray water is non-sewage wastewater, and includes wastewater from the galley, showers, and sinks. Galley gray water is sometimes combined with black water. Gray water contains organic material such as food waste and soap, and can contribute to BOD. Gray water is usually discharged at sea, but it could be stored onboard to be treated and disposed of on land (Vedeler 2000). BOD values for gray water from cruise ships in Juneau average 720 mg/L for galley gray water, and 450 mg/L for domestic gray water, which includes showers and sinks (Carson Dorn 2001). Data specific to gray water from commercial fishing vessels could not be found. The amount of gray water discharged by a vessel depends on the number of people on board and vessel characteristics, such as the size of the storage tank (if any).

3.2.3 Petroleum Products

The breakdown of petroleum products contributes to BOD. The two major ways petroleum products enter the harbor are spills during fueling and the discharge of bilge water (USEPA 2001). Bilge water is addressed separately below. Because BOD is a minor concern when compared to toxicity of petroleum spills, and because degradation rates are extremely variable, no research specific to BOD_5 could be found. The ultimate BOD is 3 to 4 pounds of oxygen for every pound of petroleum hydrocarbon (USEPA 2001). However, petroleum products are not likely to be a major source of BOD because they break down slowly in cold climates and faster in warm climates (U.S. Congress 1991). In addition, degradation of petroleum through oxidation can take several years or more depending on the chemical makeup of the petroleum, salinity, pH, temperature, and nutrient availability.

3.2.4 Wastewater from Fish Holds

The size of fish holds varies by vessel type and class. For example, the holds on a 150-foot trawler can have a 570 metric ton capacity. Fish holds accumulate organic debris, such as regurgitated stomach contents and feces, from the fish stored in them. This organic matter exerts BOD. The amount of organic debris in the hold depends on the type of boat. Crab boats constantly exchange seawater with the water in the hold to keep the crabs alive. Therefore, relatively little organic debris collects in the hold, although a large volume of water passes through the hold and picks up organic debris. Holds on finfish boats contain dead fish in stagnant water. Because the organic debris collects in the finfish hold instead of being flushed out, BOD is higher than in crab holds. However, the volume of water that comes into contact with finfish-generated organic debris is less than in crab boats because water in the hold is not exchanged as it is in crab holding tanks (Hoffman 2003).

Fish holds are emptied at the processor. In the case of larger finfish boats, a vacuum line from the processor pumps the holds out. As the catch is vacuumed out, seawater is pumped into the hold to flush out residual material left over from the catch. Everything that is vacuumed out of the hold is taken into the plant and processed. Residual material is either ground and discharged from the processing plant via outfall lines or used in the production of fishmeal. Smaller vessels offloading at floating or shore-based processors that do not have a vacuum/backwash system would typically offload using a brailer attached to a crane. A brailer is a mesh net bag used to transport the fish from the hold to the processor. When a brailer is used to transport fish from a trawler or long-liner, all the water in the hold must be pumped overboard since adequate means do not exist to siphon it into the processing plant. When crab boats are unloaded, a brailer is always used because the crabs need to be kept alive in the processing plant. Since a brailer is used, all the water in the hold is pumped overboard (Hoffman 2003).

After all the fish have been removed from the separate holds on the ship, a worker with a hose cleans the holds. Typically, the only material remaining in the hold is fish scales. These scales sink to the bottom and are not efficiently flushed out by water from the processing plant. Workers shovel the scales into buckets and later dump the buckets over the side of the ship. Typically, the volume of scales would not fill more than two five-gallon buckets (Hoffman 2003). Fish scales likely have a lower BOD than fish excrement and regurgitated stomach contents because of their inert characteristics and slow rate of degradation.

3.2.5 Wastewater from Deck Washing

Boat decks are typically washed off at sea, either by hose or, more commonly, by waves from rough water. With trawlers unloading by vacuum from a processing plant, there is normally no contact between the fish and the deck, thereby eliminating any need to wash decks during the off-loading process. Occasionally, such as when a season is about to close, the last haul of fish is stored on deck if the holds are full. When this occurs, fish are transferred to the hold as space becomes available during the offload process so the catch on the deck can enter the processing plant via the vacuum system. If the deck needs to be washed, it is done at the processor (Hoffman 2003). The wastewater from washing off boat decks may include organic material such as grease, lubricants, and fish waste.

3.2.6 Bilge Water

Bilge water is the water and other materials that collect in the lowest part of the boat. Bilge water can contain water, oil, grease, or cleaners leaking from machinery or pipes, or from spills during cleaning or maintenance. Bilges may also collect water draining from hatches and compartments. Oil/water separators or filter pads can be used in bilges to prevent oil from being discharged from the bilge. In boats with oil/water separators, the amount of oil discharged in bilge water is less than 15 ppm (Vedeler 2000). Bilge pumps are typically connected to a float system so that they come on automatically when the water in the bilge reaches a predetermined height. Bilge water is sometimes pumped in port, but federal regulations require it to pass through the oil-water separator at all times (Hoffman 2003). Because bilge water is generally abiotic (Warrington 2000), the main source of BOD in bilge water would likely be petroleum products. As discussed in section 3.2.3, petroleum products are not a major contributor of BOD because they take a long time to break down. In addition, petroleum products would be diluted in bilge water and therefore would not exert as much BOD. There is no recognized value for BOD_5 in bilge water, but it can be estimated using the ultimate BOD of petroleum hydrocarbons.

3.2.7 Ballast Water

Ballast water is taken on board and stored in ballast tanks. The purpose of ballast water is to adjust the vessel's stability, trim, or draught (Carson Dorn 2001). Vessels generally take on ballast water at the beginning of a trip and discharge it at the end of a trip. This means that ballast water is often discharged hundreds or thousands of miles from where it was taken. Ballast water can contain algae and other organic materials that contribute to BOD (Warrington 2000). Because the most serious environmental concern about ballast water is the introduction of non-native organisms, there is no data specific to BOD in ballast water. Ballast water taken from an area with clean water may initially have a low BOD but as the water ages, the BOD is likely to increase as dissolved oxygen levels decrease. Likewise, ballast water taken from an area polluted with high BOD would probably have a higher BOD level when it is discharged.

3.2.8 Fish Waste

Fish waste can enter a harbor either from fish cleaning or fishing gear maintenance inside the harbor. In harbors with a sizeable recreational, subsistence, or charter fishing base, cleaning tables are often provided on the docks. Fish cleaning inside harbors often results in fish waste being tossed into the harbor (USEPA 2001). The amount of BOD from fish waste from cleaning is dependent upon the amount of fish waste generated, but the BOD is expected to be elevated.

As fishing gear is cleaned or transferred, some small pieces of fish, bait, or vegetative debris may fall into the water. The amount of BOD from this depends on the type of fishing gear, the extent to which maintenance is performed on board, and how often gear is transferred.

4.0 APPLICABILITY OF BOD SOURCES TO AKUTAN PROJECT

The BOD sources previously discussed above are general sources that may occur in harbors; however, not all of these sources apply to the Akutan project. The sources that are not applicable, applicable but not significant, and applicable and significant are discussed in detail below. The expected conditions were quantified for both worst-case conditions and expected conditions from current and predictable practices at Akutan Harbor and implementing BMPs.

4.1 Sources of BOD Not Applicable

Three of the 12 sources identified, as potential sources of BOD do not apply to Akutan: ballast water, wastewater from deck washing, and wastewater from fish holds.

4.1.1 Ballast Water

The vessels at Akutan would be commercial fishing vessels or small boats and skiffs owned by local residents. These types of vessels do not have ballast tanks and therefore have no ballast water to discharge (Chris Hoffman, personal communication). Vessels with ballast tanks are typically large cargo-carrying ships such as oil tankers or container ships. These vessels would not be using the harbor at Akutan. Even if such a vessel with ballast tanks did happen to use the harbor at Akutan, BMPs would prohibit the discharge or uptake of ballast water inside the harbor (Warrington 2000).

4.1.2 Wastewater from Deck Washing

Wastewater from deck washing is not a potential source of BOD at the proposed harbor because the decks are washed off at the seafood processor's facility, which is outside the harbor (Hoffman 2003).

4.1.3 Wastewater from Fish Holds

Fish holds would not be permitted to be washed inside the harbor at Akutan, and therefore, would not be a source of BOD. Fish holds are either vacuumed or flushed out at the processor (Hoffman 2003), and the processor in Akutan Harbor is outside the proposed harbor area. The wastes generated by the activities at the processors are already accounted for in the BOD TMDL for Akutan Harbor.

4.2 Applicable But Not Significant BOD Sources

Five of the 12 potential sources of BOD could potentially exert BOD at Akutan, but either occur so infrequently or in such small quantities that they are not considered significant BOD sources: algal blooms, debris, fish waste, petroleum products, bilge water.

4.2.1 Algal Blooms

In the Lower-48, algal blooms are often the primary cause of dissolved oxygen declines in harbors (Cardwell et al. 1980). Generally, algal blooms in Alaska are widespread ocean occurrences that can affect but are not caused by harbors (Larry Bartlett, personal communication). This is not a common or major problem in Alaska because of the cold climate (Greg Meissner, personal communication). However, algae blooms have occurred in some Alaskan harbors, such as Dutch Harbor, during the summer (Chris Hoffman, personal communication). Algal blooms are a temporary and seasonal occurrence, and may or may not occur in the proposed harbor. ADEC has no records of harmful algal blooms at Akutan. Water quality and algal samples are often taken for regulatory purposes and whenever a possible shellfish-related illness in humans is reported (Chris Allison, personal communication). Akutan resident Erica Tritremmel reports that historically, no algal blooms occur in Akutan Harbor (personal communication). Therefore, algal blooms are unlikely to be a significant source of BOD at Akutan.

4.2.2 Debris

Natural material (such as upland vegetation blown into the harbor and flotsam from Akutan Harbor) is likely the main source of debris contributing a BOD. The common practice, and the practice expected at Akutan, is that the harbormaster monitors for all types of debris and removes that which might create a navigation hazard. Uprooted vegetation and deteriorating algae may collect and decompose in the harbor, but because of the harbor's circulation pattern and tidal cycle, the vegetation would ultimately be flushed from the harbor.

Even though Akutan Harbor has a littered shoreline, much of it is inorganic and therefore does not contribute to BOD. Upland-and vessel-derived litter is expected to be a minor BOD contributor, as many of the litter-contributing activities described by the EPA would not occur in the harbor at Akutan. No fueling would occur inside the harbor and no restaurants would be constructed at the harbor site. There would be few, if any, recreational boats in the harbor; therefore, litter from recreational activities is expected to be minimal.

Litter-contributing activities likely to occur inside the harbor are boat maintenance and repair, "residential" activities on moored commercial fishing vessels, and general harbor maintenance. Much of the litter from boat maintenance and repair is inorganic and will not contribute to BOD. Best management practices can reduce the amount of litter in the harbor and prevent further deterioration of Akutan Harbor's water quality. USEPA best management practices (USEPA 2001) applicable to Akutan include, at a minimum:

- Place covered dumpsters and trash receptacles in convenient locations for harbor patrons.
- Provide trash receptacles at boat launch sites.
- Provide harbor patrons with trash bags.

4.2.3 Fish Waste

Three main fishing gear types in Bering Sea fisheries are long-line, trawl, and crab pot. These types of gear are usually not cleaned or repaired onboard. The bits of debris that cling to exposed crab pots and the exposed outer roll of nets are generally eaten by birds (Hoffman 2003). The BOD contribution from fish waste coming off fishing gear and getting into the harbor would therefore be very small. However, fish from subsistence/recreational fishing might possibly be cleaned inside the harbor. Implementing best management practices can minimize the amount of fish waste disposed of in the harbor. BMPs include, at a minimum:

- Install fish cleaning tables with waste containers in harbors to prevent fish waste from being discarded into the harbor during fish cleaning (USEPA 2001).

Because major users of the harbor would be commercial fishing vessels, not recreational or subsistence vessels, there should not be much fish waste from fish cleaning in the harbor. Shellfish/finfish waste being discharged into Akutan Harbor is already accounted for in the BOD TMDL.

4.2.4 Petroleum Products

Major ways petroleum products enter marine waters include during fueling, discharging bilge water (discussed in section 4.2.5), and vessel accidents (USEPA 2001).

With the exception of fuel spills in the harbor from vessel accidents, petroleum products are unlikely to be a significant source of BOD in the harbor because of BMPs. Also, no fueling facilities would be constructed within the harbor and petroleum products biodegrade very slowly, especially in cold climates. Small petroleum spills that go unnoticed would largely disperse from the harbor before much degradation could occur inside the harbor. Large spills would likely be contained and cleaned up inside the harbor, with much of the remaining petroleum dispersing outside the harbor. The residence time of pollutants in the harbor under calm conditions with relatively little circulation is 6.25 days (Coastline Engineering, 2003).

Based on 10 years of data from Akutan and Dutch Harbor, the average petroleum spill rate is 3.3 gallons per day (ABR 2000). Dutch Harbor data was combined with Akutan data because spills are more likely to be reported at Dutch Harbor where use is more concentrated, resulting in a more accurate spill record. The largest spill in the last 10 years of spill records from the Eastern Aleutian Islands/Alaska Peninsula region was 10,000 gallons in Akutan (ABR 2000). Fuel spills would be minimized in the harbor because fueling would not be permitted in the harbor; vessels currently and would continue to be fueled at Trident Seafoods, Inc., which is outside the proposed harbor (Jim Richardson, personal communication).

Petroleum products can take several years or more to biodegrade, and petroleum products exert a BOD of 3 to 4 pounds. for every 1 pound of petroleum hydrocarbon (U.S. Congress 1991). For example, if 3.3 gallons of diesel were spilled every day and biodegraded in 1 year, the daily BOD contribution would be about 0.2 pound. If it took 5 years to degrade, the BOD contribution would be 0.03 pound per day. If a 10,000-gallon diesel spill occurred and degraded over 1 year, the BOD would be 521 pounds per day. If it took 5 years to degrade, the BOD would be 104 pounds per day (see Appendix A, Table 1).

Assumptions for these calculations include:

- Most spills in the East Aleutian Islands/Alaska Peninsula region are diesel spills (ABR 2000)
- Diesel weighs 6.7 pounds per gallon (Esso 1999)
- 30 days after a diesel spill, 29 percent has evaporated, 43 percent has dispersed, and 28 percent remains (MMS 2002). Ultimate BOD was calculated from volumes based on 71 percent of the diesel remaining inside the harbor and dispersed outside of the harbor.
- 3-4 parts oxygen are needed to break down 1 part petroleum hydrocarbon (U.S. Congress 1991)

Under the expected conditions, degradation of petroleum products would exert approximately 0.03 pound of BOD per day. In the worst-case event of a 10,000-gallon spill, petroleum products would exert approximately 104 pounds of BOD per day. Both of these estimates are conservative because they do not account for harbor flushing or circulation of water out of Akutan Harbor, both of which would decrease the BOD exerted in the area. The estimates are also conservative because the likelihood of daily diesel spills and a catastrophic spill occurring are expected to be minimal. In addition, fueling would occur at Trident's fueling dock, which is not in the harbor.

4.2.5 Bilge Water

The bilges on most Bering Sea-type fishing vessels only contain water and oil dripping from the stuffing box, which is the packing on the propeller shaft. The engine rooms are generally compartmentalized and do not receive water from the upper decks. Most, if not all, the Bering Sea-type fishing vessels have oil/water separators, and the bilge pumps are automatic (Hoffman 2003). The main way bilge water would contribute to BOD is the degradation of the petroleum residues that pass through the oil/water separator. This is a very small amount—less than 15 ppm (Vedeler 2000). BOD from bilge water would exert much less BOD than the expected daily BOD input of 0.03 pounds from petroleum spills. Because of the small volume and the slow degradation rate of petroleum, bilge water is expected to be a negligible source of BOD at Akutan.

4.3 Applicable and Significant BOD Sources

The Corps believes that four of the twelve 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. Harbor BMPs would be applied to minimize the impact of these sources.

4.3.1 Boat Sewage

Theoretically, boat sewage would not be discharged in the harbor, as it is against the law to do so. The common practice on Bering Sea-type vessels is to store sewage and galley wastewater together in a tank and pump it overboard when the vessel is at least 12 miles off shore (Hoffman 2003). However, spills and illegal dumping may occur, and should be accounted for because boat sewage has the highest BOD by volume of any of the potential sources at the harbor. Although crews may live aboard their vessels in the harbor for short periods of time, sewage should not be a problem because the vessels have sewage holding tanks.

As an estimate, discharging 10 gallons of sewage per day would exert 0.29 pound of BOD (USEPA 2001). A 1000-gallon sewage spill would exert 29 pounds of BOD (see Appendix A, Table 2). To be conservative, it is assumed that the sewage would deteriorate in one day; however, the actual time it takes to deteriorate is expected to be longer, which means that the BOD per day will be lower. Following the best management practice of providing clean restrooms at the harbor would help minimize the discharge of sewage into the harbor (USEPA 2001).

4.3.2 Gray Water

Gray water is expected to contribute BOD at the harbor. The vessels using the harbor would mostly be large Bering Sea-type commercial fishing vessels. Most of these vessels store galley gray water in the sewage tanks, while domestic gray water (e.g. shower water) is directly discharged overboard. A vessel in port is expected to discharge some gray water, as crews (usually about 7 people) often live aboard the vessel while in port for brief periods during fishing season. However, implementing the BMP of providing clean restrooms with showers, and encouraging their use by in-port crews, can minimize the discharge of gray water from vessels into the harbor (USEPA 2001).

There is no data enumerating the amounts for gray water generated by commercial fishing vessels while port. As an example, 100 gallons of gray water discharged per day would create about 0.38 pound. of BOD per day, and 10,000 gallons would create about 38 pounds of BOD per day. These calculations are based on a BOD value of 450 mg/L for domestic gray water (see Appendix A, Table 3). This is the BOD of domestic gray water on cruise ships in Juneau, in the absence of data specific to commercial fishing vessels (Carson Dorn 2001). To be conservative, it is assumed that the gray water would deteriorate in one day; however, the actual time it would take to deteriorate is expected to be longer, which means that the BOD per day will be lower.

4.3.3 Dredging

Dredging the 843,000 cubic yards associated with harbor construction would contribute to BOD; however, it is important to note that during construction, the turning and mooring basins would be dredged totally isolated from Akutan Harbor. It won't be until the entrance channel is dredged/constructed that the water from the harbor basin would begin to mix with Akutan Harbor and BOD could be a concern. Construction is expected to last 2 to 4 months and to occur during the summer period, coincidently when the BOD TMDL applies.

Because the harbor would not be connected to the adjacent marine waters immediately, the turbidity and suspended sediments associated with dredging would have time to decrease before mixing with Akutan Harbor. When the entrance channel is dredged, a silt curtain would separate it from the adjacent marine waters, also decreasing turbidity. Silt curtains can reduce suspended solids outside the curtain by 80 to 90 percent (USACE 1995).

The majority of BOD concerns associated with dredging are related to dredged material disposal in open water, not the dredging itself. Open water disposal creates large turbidity plumes as the material drops through the water column, whereas dredging itself creates smaller, localized turbidity clouds as bottom sediments are removed. The Akutan project proposes to stockpile dredged material on land, not in open water.

Because the material to be dredged is mostly sand and gravel (12 percent gravel, 81 percent sand, and 7 percent silt), most likely a suction dredge would be used (Shannon & Wilson 2001). The use of suction dredging has been noted by the U.S. Fish and Wildlife Service (USFWS) as a BMP to localize sediment movement caused by dredging (USFWS 1995). Suction dredging removes sediment from the bottom with very little loss to the water column (USACE 1993). Gravel and sand particles exert less BOD and are suspended in the water column for a much shorter length of time than silt (USEPA 1985). Conservative estimates (Merlin Peterson, personal communications) are that gravel dropped from the water surface to the proposed harbor depths should settle to the bottom in less than half a minute, sand should settle in less than half an hour, and silt should settle in less than 24 hours.

Maintenance dredging, if necessary, would occur about every 25 years, and not be considered an annual contributor to BOD because of the long interval between dredging.

Most literature the Corps found on the BOD effects of dredging discusses the BOD effects from dredged material disposal not necessarily from the dredging itself. Current information suggests that dredging has very little effect on dissolved oxygen and BOD (Nightingale and Simenstad 1991). Studies from suction dredging in freshwater rivers and lakes have reported increases in BOD from 0-5 mg/l (California Regional Water Quality Control Board 2001, Lambertsen and Sartori 2002). Therefore, it is expected that there would be little to no BOD increase from suction dredging at Akutan. Other assumptions include:

- The dredged material suspended in the water column would settle before the harbor basin is opened to Akutan Harbor, meaning there would be negligible BOD contribution to Akutan Harbor from this material
- Dredged material from the entrance channel would contribute to BOD
- The volume of water affected by dredging would be roughly equal to the volume of material dredged
- BOD increase from dredging would be 3 mg/l. Based on range of 0-5 mg/l of BOD from suction dredging in lakes and rivers with high organic sediments (California Regional Water Quality Control Board 2001, Lambertsen and Sartori 2002)
- Silt curtains would reduce the amount of sediment in the water column in Akutan Harbor by 80 percent (USACE 1995)

A worst-case scenario estimates BOD to be about 35 pounds per day (see Appendix A, Table 4). This estimate is based on the assumption that dredging is capable of increasing BOD eightfold (USEPA 1985). Assumptions for the worst-case scenario are:

- The dredged material suspended in the water column would settle before the harbor basin is opened to Akutan Harbor, meaning there would be no BOD contribution to Akutan Harbor from this material
- Dredged material from the entrance channel would contribute to BOD
- The volume of water affected by dredging will be roughly equal to the volume of material dredged
- Silt curtains are not used
- Dredging increases background BOD eightfold (USEPA 1985)
- Background BOD is 1.5 mg/l (USEPA 1995)

In summary, the amount of BOD from dredging under the expected conditions is estimated to be about 2 pounds per day (see Appendix A, Table 4). The mooring and turning basins would be totally isolated from Akutan Harbor during dredging. The dredged material consists mostly of coarse sand, which is low in organic material, and does not stay suspended in the water column for long. BMPs would be employed, including the use of containment techniques and most likely suction dredging. There would be no BOD from disposal because the dredged material would not be disposed of in Akutan Harbor. However, BOD concerns related to runoff from the dredged material stockpile and surrounding area are a concern and are addressed in the following section.

4.3.4 Storm water Runoff

Storm water runoff would be a periodic but important contribution to BOD in the proposed harbor. Runoff from the area upslope of the harbor would drain into the harbor from the dredged material disposal area, the staging area, the road surrounding the mooring basin, and from harbor buildings. BOD from storm water runoff at Akutan is likely to be less than the BOD value of 17 mg/l accepted for urban areas because the portion of the drainage area that would be altered by construction activities is comparably smaller than most urban watersheds. A road, staging area, and harbor buildings would replace the natural surfaces, causing an increase in impervious areas and subsequent runoff. The dredged material stockpile would be pervious but could potentially be a significant source of sediment in runoff until vegetation begins to grow and cover the surface, or the land is developed for other uses.

Implementing BMPs would decrease the impact of runoff from dredged material stockpiles. A containment berm would be built around the dredged material stockpile to prevent draining water from reaching Akutan Harbor or any streams. Silt fences would also surround the stockpile. During construction, the harbor basin would be used as a settling basin for any water draining from the dredged material stockpile and surrounding area. Planting grass or creating vegetated swales between impervious areas and the harbor basin, and using pervious surfacing such as crushed gravel for parking lots would reduce runoff into harbors. Vegetated swales are low gradient channels or ditches planted with grass that reduce and filter runoff. Swales collect runoff and allow it to infiltrate the soil, and the grass absorbs nutrients that would otherwise be discharged into the harbor (USEPA 2001).

A 60:40 ratio for mooring basin area to staging area is the general rule of thumb (Harvey Smith, personal communication). According to this rule, a 12-acre mooring basin would require an 8-acre staging area. However, 28.5 acres would actually be filled with dredged material. Therefore, the Corps' runoff and BOD calculations are based on 8 acres of staging area and about 21 acres of dredged disposal area. The runoff potential of the dredged material stockpile would decrease as vegetation becomes established on its slope. Other assumptions include:

- Record-high rainfall of about 5 inches in one day, and average daily high rainfall of about 2 inches (http://weatherunderground.com)
- Soils are in soil group B: moderate infiltration rates when thoroughly wetted; moderately well to well-drained soils with moderately fine to moderately coarse textures; moderate rate of water transmission and a moderate runoff potential (USEPA 1985)
- BOD of urban runoff is 17 mg/l (USEPA 1985)

- Swales remove about 80 percent of pollutants including BOD-exerting pollutants (USEPA 2001)

Runoff from a record-high rainfall of about 5 inches in one day would exert about 327 pounds of BOD (see Appendix A, Table 5). If swales were incorporated into the harbor design, 5 inches of rain would exert about 84 pounds of BOD. Runoff from the average daily high rainfall of about 2 inches in one day would exert about 113 pounds of BOD. Incorporating swales would reduce this to about 23 pounds of BOD.

5.0 BOD CALCULATIONS

The primary harbor construction activity, dredging, is not expected to generate a substantial BOD load. Dredging would be a temporary (i.e., occur during the construction and maintenance dredging phases only) and minor source of BOD because dredging 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.

Based on past observations, algal blooms at Akutan Harbor are unlikely. If they occurred, they would most likely be a larger ocean phenomenon and not a result of conditions in the proposed harbor. Deck washing and fish hold washing would not be sources of BOD in the harbor because these activities would take place outside the harbor. The types of vessels using the harbor are not expected to have ballast tanks and therefore there would be no BOD from ballast tanks at the proposed harbor. Fish waste is not expected to contribute BOD to the harbor as there would be no seafood processors within the harbor.

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) (Table 1). 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, these four BOD sources would generate an expected BOD load of about 24 pounds per day, and a worst case BOD load of 498 pounds day.

Table 1. Summary of potential biochemical oxygen demand sources at the proposed boat harbor, Akutan, AK.

	BOD (lbs/day)		Assumptions	
Source	**Worst Case**	**Expected**	**Worst Case**	**Expected**
Storm water runoff	327.34	22.60	8-acre staging area and 33-acre dredged material disposal area, highest daily rainfall in history (~5"). No swales or drainages.	8-acre staging area and 33-acre dredged material disposal area, mean daily record high rainfall (~2"). Disposal area has vegetated swales.
Petroleum	104.26	0.03	10,000 gallon spill degrades in 5 years.	3.3 gallon daily spill degrades in 5 years.
Sewage	29.21	0.29	1000 gallon spill.	10 gallon spill.
Fish hold wastewater	0.00	0.00	Fish holds washed outside of harbor.	Fish holds washed outside of harbor.
Fish waste	0.00	0.00	No fish waste discharged in the harbor.	No fish waste discharged in the harbor.
Deck washing wastewater	0.00	0.00	Decks washed outside harbor.	Decks washed outside harbor.
Bilge water	0.00	0.00	Extremely dilute and degrades slowly.	Extremely dilute and degrades slowly.
Ballast water	0.00	0.00	No ballast water discharged in harbor.	No ballast water discharged in harbor.
Gray water	37.55	0.38	10,000 gallons discharged.	100 gallons discharged.
Algae blooms	0.00	0.00	Little chance of algae blooms.	Little chance of algae blooms.
Debris	0.00	0.00	Large debris removed from harbor.	Large debris removed from harbor.
Total[1]	**498.36**	**23.30**		

[1] Dredging operations during construction and periodic maintenance dredging would generate between 2.02 lbs/day BOD (expected) and 35.40 lbs/day BOD (worst case).

6.0 REFERENCES

ABR, Inc. 2000. Literature Search for Steller's Eider Study: Task 2C. Estimated Future Spills. Prepared for U.S. Army Corps of Engineers, Alaska District.

Allison, C. Personal communication on May 5, 2003, phone conversation. Alaska Department of Environmental Conservation, Environmental Microbiologist, Palmer, Alaska.

American Public Health Association (APHA), et al. 1998. Standard Methods for the Examination of Water and Wastewater, 20th ed. APHA, Washington, D.C.

Bartlett, Larry. Personal communication on May 6, 2003, conversation. U.S. Army Corps of Engineers, Civil Works Environmental Resources, Biologist, Anchorage, Alaska.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society Special Publications 19.

California Regional Water Quality Control Board. 2001. Waste discharge requirements for dredging of berths J,K, and I, the Port of Stockton, San Joaquin County.

Cardwell, R.D., Carr, M.I., and E.W. Sanborn. 1980. Water quality and flushing of five Puget Sound marinas. State of Washington, Department of Fisheries, Technical Report No. 56. 77 pp.

Carson Dorn, Inc. 2001. City and Borough of Juneau Wastewater Evaluation. Prepared for City and Borough of Juneau. 26 pp.

Coastline Engineering. 2003. 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. U.S. Environmental Protection Agency, Compliance Section, Seattle, Washington.

Esso Exploration and Production Chad, Inc. (Esso). 1999. General Oil Spill Response Plan. http://www.essochad.com/Chad/Files/Chad/SectH.pdf.

Hoffman, C. 2003. Fishing trawler tour. Memorandum for CEPOA-EN-CW-ER (1105-2-10b), 6 pp.

Hoffman, C. 2003. Personal communication on April 24, 2003, conversation. U.S. Army Corps of Engineers, Alaska District, Civil Works Environmental Resources Biologist, Anchorage, AK.

http://www.weatherunderground.com

Lambertsen, K., and Sartori, A. 2002. Environmental Assessment Report: Burnaby Lake Rejuvenation Project Fish Assessment. Prepared by Phoenix Environmental Services Ltd. for City of Burnaby.

Laws, E.A. 1993. Aquatic pollution: an introductory text, 2nd edition. Wiley, New York.

Malinky, G., and D. Toland. 1982. Comparison of selected trace metals and organics in two small boat harbors, Juneau, Alaska: a working paper. Alaska Department of Environmental Conservation (ADEC), Division of Environmental Quality Operations, Environmental Quality Monitoring and Laboratory Operations. 42 pp.

Meissner, G. 2003. Personal communication on February 24, 2003, phone conversation. Wrangell, Alaska Harbormaster.

Minerals Management Service (MMS). 2002. Beaufort Sea Planning Area Sales 186, 195, and 202 Oil and Gas Lease Sale Draft Environmental Impact Statement. MMS 2002-029.

Nightingale, B., and C.A. Simenstad. 1991. Dredging activities: marine issues. Prepared by University of Washington. Prepared for Washington State Transportation Center and U.S. Department of Transportation. WA-RD 507.1

Peterson, M. 2003. Personal communication on May 8, 2003, conversation. U.S. Army Corps of Engineers Alaska District, Civil Works Hydraulics and Hydrology, Anchorage, Alaska.

Richardson, Jim. 2003. Personal communication on February 26, 2003, phone conversation. Consulting economist for proposed Akutan harbor project.

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.

Smith, H. 2003. Personal communication on March 10, 2003, phone conversation. Alaska State Coastal Engineer.

Tritremel, E. 2003. Personal communication on May 6, 2003, phone conversation. Resident, Akutan, Alaska.

U.S. Army Corps of Engineers (USACE). 1995. Engineering and Design - Design of Coastal Revetments, Seawalls, and Bulkheads. EM 1110-2-1614. 30 June 1995.

USACE. 1993. Dredging Fundamentals: student study guide.

U.S. Congress, Office of Technology Assessment. 1991. Bioremediation for marine oil spills—background paper, OTA-BP-O-70. Washington, DC: US Government Printing Office, May 1991.

U.S. Environmental Protection Agency (USEPA). 2002. Illicit Discharge Detection & Elimination: Recreational Sewage. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/illi_5.cfm.

USEPA. 2001. National management measures to control nonpoint source pollution from marinas and recreational boating. USEPA Office of Water. EPA 841-B-01-005. November.

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

USEPA. 1994. Water quality assessment: Akutan Harbor.

USEPA. 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.

USEPA. 1985. Coastal marinas assessment handbook. USEPA, Region 4, EPA 904/6-85-132. Atlanta, Georgia. April.

U.S. Fish and Wildlife Service (USFWS). 1995. Sacramento-San Joaquin Delta Native Fishes Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

Vedeler, J. 2000. Optimised environmental technologies for cruise and ferry vessels. Prepared by Det Norske Veritas. Report No. 2000-0306.

Warrington, P. 2000. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. http://www.nalms.org/bclss/storage.html.

APPENDIX A
BOD CALCULATIONS

APPENDIX A. TABLE 1

BOD from Petroleum Product spills

Spill size (gal.)	Spill type	Spill weight per gallon (lb.)	Spill weight (lb.)	Percent evaporated	Percent remaining	Spill weight remaining (lbs.)	Lbs. oxygen to break down 1 lb. hydrocarbon	Ultimate BOD (lb.)	Degradation time (days)	BOD per day (lb.)
3.3	diesel	6.7	22.11	0.29	0.71	15.7	4	63	365	0.17
3.3	diesel	6.7	22.11	0.29	0.71	15.7	4	63	1825	0.03
10000	diesel	6.7	67000	0.29	0.71	47570.0	4	190280	365	521.32
10000	diesel	6.7	67000	0.29	0.71	47570.0	4	190280	1825	104.26

Notes:
3.3 gallon spill size is average of Akutan/Dutch Harbor spill volume per day (ABR)
10,000 gallons is largest spill in the area over the past 10 years (ABR)
Most spills in the East Aleutian Islands/Alaska Peninsula region are diesel spills (ABR)
Diesel weighs 6.7 lbs. per gallon (http://www.essochad.com/Chad/Files/Chad/SectH.pdf)
Diesel spill: after 30 days 29% would evaporate, 43% would disperse, and 28% would remain (MMS 2002)
3-4 parts oxygen are needed to break down 1 part petroleum hydrocarbon (US Congress 1991)

APPENDIX A. TABLE 2

BOD from Sewage

Sewage per day (gallons)	Sewage (liters)	BOD in sewage (mg/l)	BOD per day (mg)	BOD per day (lb.)
5	18.93	3500	66245	0.15
10	37.85	3500	132489	0.29
25	94.64	3500	331224	0.73
50	189.27	3500	662447	1.46
75	283.91	3500	993671	2.19
100	378.54	3500	1324894	2.92
1000	3785.41	3500	13248942	29.21

Notes:
BOD from boat sewage is 1700-3500 mg/l (http://cfpub.epa.gov.npdes/stormwater/menuofbmps/illi_5.cfm)

APPENDIX A. TABLE 3

BOD from Gray Water

Gray water per day (gallons)	Gray water per day (liters)	BOD in gray water (mg/l)	BOD per day (mg)	BOD per day (lb.)
5	18.9	450	8517	0.02
10	37.9	450	17034	0.04
25	94.6	450	42586	0.09
50	189.3	450	85172	0.19
75	283.9	450	127758	0.28
100	378.5	450	170344	0.38
1000	3785.4	450	1703435	3.76
10000	37854.1	450	17034354	37.55

Notes:
450 mg/L is the BOD from domestic gray water on Juneau cruise ships (Carson Dorn 2001)

APPENDIX A. TABLE 4

BOD from Dredging

Source	Water volume (cubic yards)	Water volume (liters)	BOD (mg/l)	BOD (mg)	BOD (lb.)	Dredging period (days)	BOD (lbs/day)
Entrance channel	180000	137619882	3	412859646	910	90	10.11
Entrance channel with silt curtain	180000	137619882	3	412859646	182	90	2.02
Entrance channel	180000	137619882	10.5	1445008761	3186	90	35.40
Entrance channel with silt curtain	180000	137619882	10.5	1445008761	637	90	7.08

Notes:

The dredged material suspended in the water column will settle before the harbor basin is opened to Akutan Harbor, meaning there will be no BOD contribution to Akutan Harbor from this material

Dredged material from the entrance channel will contribute to BOD

The volume of water affected by dredging will be roughly equal to the volume of material dredged

BOD increase from dredging is expected to be 3 mg/l. Based on range of 0-5 mg/l of BOD from suction dredging in lakes and rivers with high organic sediments (California Regional Water Quality Control Board 2001, Lambertsen and Sartori 2002)

Silt curtains will reduce the amount of sediment in the water column in Akutan Harbor by 80% (USACE 1995)

Worst case is that dredging increases background BOD eightfold (USEPA 1985)

Background BOD is 1.5 mg/L (USEPA 1995)

APPENDIX A. TABLE 5

BOD from Runoff

Weather event	Soil Grp.	Surface	Runoff Curve No.	Rainfall (in.)	Rounded rainfall (in.)	Runoff (in.)	Runoff (feet)	Area (acres)	Area (square feet)	Runoff (cubic feet)	Runoff (liters)	BOD (mg/l)	BOD (mg)	BOD (lb.)	BOD with swales (lb.)
Worst case scenario (Highest daily rainfall ever)	B	Gravel Staging Area	85	4.75	5	3.37	0.28083	1	43560	12233.1	346402.9	17	5888849	12.98	2.60
						3.37	0.28083	5	217800	61165.5	1732014.3	17	29444243	64.91	12.98
						3.37	**0.28083**	**8**	**348480**	**97864.8**	**2771223.2**	**17**	**47110792**	**103.84**	**20.80**
	B	Graded Gravel Stock-pile Area	90	4.75	5	3.88	0.32333	1	43560	14084.4	398825.8	17	6780039	14.95	2.99
						3.88	0.32333	5	217800	70422.0	1994129.2	17	33900197	74.74	14.95
						3.88	0.32333	10	435600	140844.0	3988258.4	17	67800393	149.47	29.89
						3.88	0.32333	15	653400	211266.0	5982387.6	17	101700590	224.21	44.84
						3.88	**0.32333**	**21**	**914760**	**295772.4**	**837534.2**	**17**	**142380810**	**223.50**	**62.79**
	B			4.75	**5**	**Total: 8 acres gravel staging area & ~21 acres graded gravel stockpile area**								**327.34**	**83.59**
Expected Conditions (Average of daily highs)	B	Gravel Staging Area	85	1.75	2	0.80	0.06667	1	43560	2904.0	82232.1	17	1397946	3.08	0.62
						0.80	0.06667	5	217800	14520.0	411160.7	17	6989731	15.41	3.08
						0.80	**0.06667**	**8**	**348480**	**23232.0**	**657856.8**	**17**	**11183568**	**24.64**	**4.96**
	B	Graded Gravel Stock-pile Area	90	1.75	2	1.09	0.09083	1	43560	3956.7	112041.3	17	1904702	4.20	0.84
						1.09	0.09083	5	217800	19783.5	560206.4	17	9523509	21.00	4.20
						1.09	0.09083	10	435600	39567.0	1120412.8	17	19047018	41.99	8.40
						1.09	0.09083	15	653400	59350.5	1680619.2	17	28570527	62.99	12.60
						1.09	**0.09083**	**21**	**914760**	**83090.7**	**2352867.3**	**17**	**39998742**	**88.20**	**17.64**
	B			1.75	**2**	**Total: 8 acres gravel staging area & ~21 acres graded gravel stockpile area**								**112.84**	**22.60**

Notes:

Weather data from weatherunderground.com historical data

Soils in soil group B are characterized by moderate infiltration rates when thoroughly wetted; are moderately well to well-drained soils with moderately fine to moderately coarse textures; have a moderate rate of water transmission and a moderate runoff potential (USEPA 1985)

Runoff curve numbers assume gravel parking lots and roads, and that the dredged material stockpile will have similar characteristics to newly graded dirt (USEPA 1985)

Runoff calculated from tables in USEPA 1985

BOD of urban runoff is 17 mg/l (USEPA 1985)

Swales remove about 80% of pollutants including BOD-exerting pollutants (USEPA 1995)

APPENDIX B
FISHING TRAWLER TOUR

CEPOA-EN-CW-ER (1105-2-10b)

MEMORANDUM FOR RECORD

SUBJECT: Fishing Trawler Tour.

Introduction. A tour of a fishing trawler was conducted on 18 March 2003 in Dutch Harbor, Alaska. Chris Hoffman, biologist, Army Corps of Engineers, Alaska District and Joseph Connor, biologist, U. S. Fish and Wildlife Service, Anchorage participated in the tour. We toured the F/V Aurora based out of Anacortes, Washington while it was moored at the Unisea dock in Dutch Harbor. The F/V Aurora is an approximately 150 ft. long trawler that delivers pollock to Unisea in Dutch Harbor. Trawlers are sometimes referred to as "draggers" and "stern-haulers".

A tour was conducted to answer questions regarding the input of fish waste and the nature of ship discharges while vessels are offloading or moored in port. Information obtained may factor into discussions regarding biological oxygen demand (BOD) imposed by waste discharge in harbors.

2. **Observations.** Upon returning from sea with a catch, a number of activities take place while the ship is in port. After offloading their catch at the processor, the ship may immediately return to sea to continue fishing or may take on fuel or perform maintenance. Depending on the season and time of year, the ships will either remain in Dutch Harbor to await the next open season or head back to their homeport. The majority of large commercial fishing vessels capable of fishing far offshore in the Bering Sea or Gulf of Alaska are based out of the Pacific Northwest. The following observations pertain to large trawlers offloading at large shore-based processors and are grouped into several specific categories.

- The F/V Aurora holds approximately 570 metric tons in its holds. A photograph of a similar size trawler is included in figure 1. The holds are pumped out by a vacuum line from the processor at a rate of 50 metric tons per hour. As the catch is vacuumed out, seawater is pumped into the hold to flush out residual material left over from the catch (regurgitated stomach contents, feces, etc.) Everything that is vacuumed out of the hold is taken into the plant and processed. Residual material is either ground and discharged from the processing plant via outfall lines or used in the production of fishmeal. Workers sorting fish on a conveyor belt remove by-catch for subsequent use or disposal. After all of the fish have been removed from the separate holds on the ship, a worker with a hose cleans the holds. Typically, the only material remaining in the hold is fish scales. These scales sink to the bottom and are not efficiently flushed out by water from the processing plant. Workers shovel the scales into buckets and later dump the buckets over the side of the ship. Typically, the volume of scales would not fill more than two five-gallon buckets.

- Boat decks are typically washed off at sea, either by hose or, more commonly, by waves from rough water. With trawlers unloading by vacuum from a processing plant there is no contact between the fish and deck, thereby eliminating any need to wash decks during the off-loading process. Occasionally, such as when a season is about to close, the last haul of fish is stored on deck if the holds are full. When this occurs, this fish are transferred to the hold as space becomes available during the offload process so the catch on the deck can enter the processing plant via the vacuum system.

- Some small pieces of fish typically are present in the trawl nets that are spooled on the deck of the ship when it returns from sea. Eagles or seagulls typically pick off these pieces from the outer layers of the net (figure 2). Otherwise, the net is cleaned off when it enters the water the next time the vessel begins fishing. When net maintenance is necessary, the net is laid out on shore near the Grand Aleutian Hotel and a local net service company repairs the net. Typically, a large number of eagles will congregate in the area to pick the nets clean. A photograph of eagles on a net repair truck is included in figure 3.

- The F/V Aurora has a crew of 7 people, a typical crew size for a trawler in its size class. The length of time the vessels stays at sea depends on several factors including weather, ice conditions, distance to fishing grounds from port, and fishing success rate. While at sea, sewage (i.e. black-water) produced on the boat is pumped overboard as long as the vessel is at least 12 miles off shore. This discharge also includes wastewater from the sink in the galley (gray-water). Water from the showers goes directly over the side at all times. The crew often lives aboard the vessel for the brief periods when it is in port during a fishing season.

- The engine room is compartmentalized and does not receive water from the upper decks. The primary source of water in the engine room is from leaks around the propeller shaft packing, called a stuffing box. These packings are not intended to be a dry seal and a slight amount of water is normal. Leakage from the stuffing box is typically the primary source of water in the bilge. The bilge water is filtered through an oil-water separator prior to discharge over the side in order to remove any petroleum residues. Bilge pumps are typically connected to a float system so that they come on automatically when the water in the bilge reaches a predetermined height. Bilge water is sometimes pumped in port, but federal regulations require it to pass through the oil-water separator at all times.

3. **Discussion and Conclusions.** The observations described above would generally be applicable to vessels of similar size and design (i.e. trawlers) unloading at shore-based processors with vacuum/back flush capabilities. Smaller vessels offloading at floating or shore-based processors that do not have a vacuum/backwash system would typically offload using a brailer attached to a crane. A brailer is a mesh net bag used to transport the fish from the hold to the processor. When a brailer is used to transport fish from a trawler or long-liner, all of the water in the hold must be pumped overboard since

adequate means do not exist to siphon it into the processing plant. Photographs of smaller vessels off-loading their catch at a floating processor in Dutch Harbor are included in figures 4 and 5. When crab boats are unloaded, a brailer is always used because the crabs need to be kept alive in the processing plant. Since a brailer is used, all of the water in the hold is pumped overboard. However, the water in the hold is always being exchanged with seawater in order to keep the crabs alive. Consequently, the water pumped overboard when the catch is off-loaded is very clean compared to water from a hold loaded with dead fish.

In general, all off-loading (including flushing the holds) and deck cleaning takes place where a vessel offloads its catch to a processor. It is essential that the hold is pumped during offloading or else it would be impossible to remove the fish from the hold since at some point during the offload process there would be more water in the hold than fish. It seems unlikely that a vessel would have anything left to pump or wash overboard after it has moored within the confines of harbor. Even if material was present in the holds upon arrival inside a harbor, it is unlikely that the crew would choose to pump it overboard as the effluent typically attracts large numbers of undesired seagulls.

The term "harbor" in this report refers to small boat harbors confined by breakwaters. Fish holds are routinely pumped into large natural harbors where fish process plants are located such as Dutch Harbor and Iliuliuk Harbor.

Christopher Hoffman
Biologist

Figure 1. The large trawler on the left of the photograph is similar to the F/V Aurora discussed in this report. COE photograph from Sand Point, AK.

Figure 2. Eagles congregate on the spooled net after a trawler has returned from sea to offload its catch.

Figure 3. Eagles gather around a net repair truck near the Grand Aleutian hotel in Dutch Harbor. Although net repairs are completed some scraps remain on the ground. Larger numbers of eagles arrive when the net is first laid out.

Figure 4. The fishing vessel on the right is offloading its catch and pumping its hold resulting in the white foam. The trawler in the foreground is tied up and is not contributing to the discharge.

Figure 5. A trawler offloading its catch at the floating processor at the head of Dutch Harbor. This vessel is being unloaded by a brailer since the floating processor is not set up to use a vacuum line to offload the fishing vessels. The white discharge is from the vessels hold. The floating processor is typically moored in its present location for the entire winter where it discharges waster material to the outside of the spit through an underwater outfall line.

Assessment of Potential BOD Loading from a Proposed Boat Marina in Akutan Harbor, Alaska

PREPARED FOR:

Tryck Nyman Hayes, Inc.
911 West Eighth Avenue
Anchorage, Alaska 99501

PREPARED BY:

Evans-Hamilton, Inc.
4608 Union Bay Pl. NE
Seattle, WA 98105

September 2003

EHI Job No. 5334

INTRODUCTION AND OBJECTIVES

The Corps of Engineers has proposed the construction of a boat marina at the head of Akutan Harbor, Alaska to serve the Bering Sea commercial fishing fleet. The proposed marina would be 12 acres in size and provide moorage for 58 vessels.

Akutan Harbor has been listed by the State of Alaska as a water-quality limited water body, and the US Environmental Protection Agency (USEPA) has listed Akutan Harbor as a Clean Water Act Section 303(d) Tier III impaired water body, due to reduced dissolved oxygen (DO) levels within the harbor. These unacceptable low DO levels have been primarily attributed to the discharge of seafood processing wastes, which have consisted of a settleable solids portion (stick waste) and a liquid portion, and their biological oxygen demand (BOD) upon the water column. In 1995, the USEPA established a Total Maximum Daily Load (TMDL) for BOD (measured as BOD_5) for Akutan Harbor of 149,000 lbs. of BOD_5 per day, applicable May 1st through October 31st (USEPA 1995).

The USEPA and the Alaska Department of Environmental Conservation (ADEC) have expressed concern that the proposed Akutan boat marina will create additional BOD loading to Akutan Harbor that will further impair the dissolved oxygen water quality conditions. An initial assessment of the BOD loadings from the proposed boat marina and their impact upon water quality is contained in a draft report by the Corps of Engineers (2003).

Evans-Hamilton, Inc. (EHI) was asked to review the BOD report prepared by the Corps of Engineers, evaluate the validity of the report's analysis, and provide a recommendation, if possible, of a reasonable BOD loading value associated with small boat marinas in climates similar to Akutan, Alaska. In order to meet this objective, EHI performed the following activities:

1. Review available literature on BOD loadings appropriate to small boat marinas, or other similar applications.

2. Interview several scientists dealing with BOD and Sediment Oxygen Demand (SOD) research and issues to assess their knowledge of appropriate studies and information appropriate to the project's goal. Find and review such appropriate studies and information.

3. Interview appropriate scientists and managers at Alaska and Washington state government agencies, and the USEPA Region X, concerning existence of any similar BOD loading values, and requirements on how such values are determined.

4. Review BOD and SOD data from previous EHI projects that may be able to place in perspective BOD loadings associated with small boat marinas.

5. Review the BOD report prepared by COE and evaluate the validity of the report's analysis based on the results of the above 4 tasks. Prepare a short summary report detailing the literature reviewed, sources contacted, and knowledge gained, and provide a recommendation if needed for additional studies needed to better document the report findings.

METHODS

To do this work the following were performed:

- Reviewed the draft Army Corps of Engineers (COE) report on the *Proposed Akutan Boat Harbor Water Quality Issues: Analysis of Expected Biochemical Oxygen Demand from the Proposed Akutan Boat Harbor.*
- Reviewed the Federal and State of Alaska Interagency Coordination Meeting Minutes of January 22, 2002.
- Reviewed the USEPA *TMDL Determination* reports for BOD and Settleable Solids Residues in Akutan Harbor.
- Reviewed of various forwarded email between involved parties regarding the BOD loading issue.
- Performed a literature search and reviewed additional articles regarding BOD loadings.
- Called personal contacts with special knowledge of design, construction, engineering, operational, biological, and permitting concerns of boat harbors and water quality issues.
- Assess reasoning of COE report.

Three attachments are contained with this report. Attachment 1 is a list of the literature reviewed with a general outline of why certain articles were selected for more detailed review. Attachment 2 is a list of persons we contacted concerning BOD and other water quality issues as they relate to marina design, operation, and permitting. Some of their comments are included in this list. Attachment 3 is a brief assessment of COE reasoning of the BOD loading values determined in their draft proposal.

RESULTS

Literature Search Results

The literature search was conducted using the internet. Several searches were conducted using keywords such as: Biological Oxygen Demand, Biochemical Oxygen Demand, BOD, Dissolved Oxygen, DO, marinas, harbors, water quality, Total Daily Maximum Daily Load, TMDL, Settable Solids, SOD, Petroleum Hydrocarbons, and combinations of the above keywords. Although multiple listings referencing the above parameters were available, only about fifty prompted further review by opening up their associated website. Most of these websites and articles dealt with upland issues or BOD associated with sewage treatment facilities. After a brief initial review of those websites, only nine (9) articles providing information possibly significant to the topic at hand were downloaded for detailed review. Relevant points from those nine articles are briefly summarized in Attachment 1. No article was found that deals specifically with BOD loading from a small boat harbor in a northern marine environment.

Personal Interviews

All the people contacted were asked if they knew of any standard BOD loadings, or any standard BOD loading limits, for small boat marinas. The thinking was that somewhere BOD loadings from an existing marina, or estimates of future BOD loadings for the permit applications of a proposed marina, might have occurred. We contacted both researchers and government personnel in Washington State and Alaska who should be familiar with any such BOD measurements of marinas, and both engineering and environmental firms as well as government agencies in those states concerning any previous requirements to estimate future BOD loads from a marina during its design and permitting phases. While BOD measurements have been made for, and limits placed upon, several point source discharges, we could find no measurements, existing limits, nor standard estimates of BOD loadings for marinas. The TMDL criterion for BOD loading has not come up at all among the marina designers, planners, and permitting consultants that we contacted.

Reasonableness of COE Draft Report

Since no standard total BOD loading from similar marinas could be found, we reviewed the list of potential BOD loading sources associated with the marina, as put forth in the Corps of Engineers' draft report, as well as compared the estimated values assigned by the COE to these sources to, where possible, similar information found in the literature. In developing their list of potential sources and probable BOD loadings, the COE report assumes that Best Management Practices will be in place for operation of the marina.

The COE report appears to be thorough in reviewing the potential BOD sources that would be associated with the marina, as well as in estimating the BOD loadings from those individual sources. For instance, BOD values associated with boat sewage that we found in the literature were between 1700mg/l to 3500 mg/l as compared to the 3500 mg/l value used by the COE to conservatively estimate a worse-case condition. We therefore conclude that the expected daily and severe BOD loadings from the marina, as estimated by the COE, appear reasonable and inclusive of any significant potential source within the marina.

Estimated Marina BOD vs. TMDL for Akutan Harbor

The COE report estimates that the BOD loading from the marina to Akutan Harbor for normal operations is 26.91 lbs/day (BOD_5), and 673.76 lbs/day during an extreme rainfall combined with a recent major fuel spill. During construction, an additional loading of 35.40 lbs/day from dredging is expected during the construction phase of this project and at approximately 25 year maintenance dredging intervals.

The present BOD TMDL for Akutan Harbor is 149,100 lbs/day. This value was developed based on mathematical modeling of Akutan Harbor. The modeling was performed based on measured conditions in the harbor in 1993, when there existed two major seafood processors discharging to the harbor: Trident Seafoods (discharging a median of approximately 251,000 lbs/day), Deep Sea Fisheries (discharging approximately 700 lbs/day. General NPDES permits were issued in Akutan Harbor for the vessels <u>Arctic Enterprise</u> and <u>Arctic Five</u> however were not included in the wasteload allocation. The model also assumed that the receiving waters of Akutan Harbor had a natural BOD_5 rate of 1.5 mg/l based on 1993 data collected during periods of no discharges, and that the levels of DO in all waste discharges are zero since DO levels in the discharge greater than 0 mg/l will reduce the impact of the DO of the receiving waters (i.e. a worst case approach was used).

The estimated future BOD loads from the marina of approximately 27 and 674 lbs/day for the normal operating and extreme conditions are only 0.02% to 0.45% of the TMDL of 149,100 lbs/day. Since the TMDL was established, two of the seafood processors have discontinued their discharges. Comments from the EPA indicate that Trident Seafoods is now the only BOD discharge in Akutan Harbor, and that they have reduced their BOD discharges significantly since1998 down to approximately 105,000 lbs/day (BOD_5 allocation of 133,200 lbs/day). Also mentioned by the EPA source was that Trident 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.

A Margin Of Safety (MOS) is developed as part of any TMDL to allow for variability and uncertainty from several sources including data and modeling uncertainties, an incomplete knowledge of the distribution and impact of the solids discharged by the seafood processors, and an incomplete knowledge of DO demand associated with bottom sediments and other potential BOD sources. The present MOS for BOD discharges to Akutan Harbor versus the BOD TMDL is approximately 44,100 lbs/day, or 30%. The addition of BOD from the marina, estimated at less than 0.5% for an extreme case, will not significantly increase the total BOD loading to the harbor, nor cause the TMDL to be exceeded.

CONCLUSIONS

While our literature search and interviews with knowledgeable scientists, engineers, and government personnel was not exhaustive, no indications were found that BOD loadings associated with small boat marinas in northern latitudes have either been measured, or that any standard estimate of BOD loadings has been developed for planning and permitting future marinas. Our review of the Corps of Engineers report on the probable sources of BOD from a marina concluded that the report was comprehensive in both the types of BOD sources that would be introduced with a marina, and reasonable in the estimated BOD loads from those sources. The overall range of normal to severe (worst case?) BOD loadings caused by the marina also seem reasonable. This range (normal to severe) represents only 0.02% to 0.45% of the TMDL of 149,100 lbs/day. If the severe case for BOD loading from the marina off by even 100%, that would still represent a BOD loading of less than 1% of the TMDL. The estimate for normal operations would have to increase 55 times to reach 1% of the TMDL. In addition, the estimated normal and severe BOD loadings from the marina are both far less than either of previous discharges that have been discontinued in recent years. Trident Seafoods, which remains as a BOD source, has also significantly reduced their BOD discharge. Thus all existing anthropogenic BOD sources combined with the estimated severe case for the marina would reach only approximately 71% of the TMDL. For these reasons, we conclude that the Corps of Engineers is appropriate in concluding that the addition of a boat marina at the head of Akutan Harbor should not cause the BOD TMDL to be exceeded, nor the dissolved oxygen levels in the harbor to be adversely impacted.

RECOMMENDATIONS

While judgments could be made concerning the reasonableness of the potential BOD sources within the proposed marina, and the estimated BOD loads from those sources, the assessment of the impact of the marina BOD loading versus other BOD discharges and the TMDL limit relied upon the accuracy of the Trident Seafoods discharge quantities provided by EPA, and the belief that combined discharge quantities under the TMDL level will not cause dissolved oxygen levels in Akutan Harbor to reach unacceptably low levels. Both of these items could be further checked. We recommend the following be considered:

1. Verification of Trident Seafood NPDES discharge data, and any other point source discharge data, is available from the EPA by means of a Freedom of Information Act (FOIA) request. An analysis of the trends in BOD discharges over the last five years, including the daily variations to those discharges, could place in better perspective the potential influence of the estimated loading from the marina, and the potential for the combination of all discharges to exceed the TMDL on even a daily basis.
2. A comparison of the discharge data over the last 5-10 years (before and after significant reductions by Trident Seafoods, shipping of settleable solids, and closure of the other two seafood processing discharges, against dissolved oxygen measurements within the harbor over those same years, would provide an excellent indication as to whether the harbor dissolved oxygen conditions have improved over the last five years, and are of a concern with the present discharge levels.
3. To better confirm the marina's actual BOD loadings and impact on dissolved oxygen water quality, conduct in-situ and limited profiling measurements of dissolved oxygen in the area within and adjacent to the propose marina now, and after its construction.

ATTACHMENT 1
Results From The Literature review on BOD Loadings

The literature search was conducted primarily using the internet. Keywords used were: Biological Oxygen Demand, Biochemical Oxygen Demand, BOD, Dissolved Oxygen, DO, marinas, harbors, water quality, Total Daily Maximum Daily Load, TMDL, Settable Solids, SOD, Petroleum Hydrocarbons and combinations of the above keywords. Although multiple listings referencing the above parameters were available, only about fifty prompted further review by opening up their associated website and after a brief initial review, only nine (9) articles provided information remotely significant to the topic at hand and were downloaded for detailed review. Two additional studies were contained within EHI and were also reviewed. This eleven articles or reports reviewed in detail are listed below.

Overview of Current Total Maximum Daily Load - TMDL - Program and Regulations **as well as** ***Guidelines For Reviewing TMDLs Under Existing Regulations Issued in 1992*** from the EPA website (http://www.epa.gov). This information provided a better understanding of how the water bodies were ranked under Section 303(d) of the Clean Water Act and provided explanations of Load Allocations (LAs), Wasteload Allocations (WLAs), and Margin of Safety (MOS).

Alaska's 1998 Section 303(d) List and Prioritization Schedule from the Alaska Department of Environmental Conservation (ADEC) website (http:\\www.state.ak.us) Division of Air and Water Quality. This list provides a comparative look at several water bodies in the State of Alaska with their associated activity such as mining, log transfer facilities, and point sources as well as how they are ranked on the Tier System. Akutan Harbor ranks as Tier III that is a water quality-limited waterbody which have had assessments completed and now needs waterbody recovery plans compared to Dutch Harbor which is listed as Tier I that is a water-quality limited waterbody which requires water quality assessments to pollution and what controls are in place or needed. King Cove, is also listed as Tier III. A marina facility has been recently constructed and may provide comparative data to Akutan Harbor. Further research into this site may be required.

Five TMDL determination documents including;

1) ***Total Maximum Daily Load for Settleable Solid Residues in the Waters of Akutan Harbor, Alaska***
2) ***Total Maximum Daily Load (TMDL) for Biochemical Oxygen Demand (BOD_5) in the Waters of Akutan Harbor, Alaska***
3) ***Total Maximum Daily Load for Settleable Solid Residues in the Waters of King Cove, Alaska***
4) ***Total Maximum Daily Load (TMDL) for Biochemical Oxygen Demand (BOD_5) in the Waters of South Unalaska Bay, Alaska***
5) ***Total Maximum Daily Load for Biochemical Oxygen Demand in the Surface Waters of Ward Cove, Alaska***

were downloaded from the ADEC website (http://www.state.ak.us/dec/dawq/tmdl/fin_tmdl.htm) Division of Air and Water Quality. These were reviewed to help develop an understanding of the TMDLs within similar Alaskan environments and to assess the allocations that were developed as a result of current modeling and other scientific studies within Akutan Harbor.

A short paper on ***Greywater*** was downloaded (http://www.greywater.com) mainly for its direct bearing on two of the potential discharge components from each vessel and also provided general information of the breakdown time of sewage versus gray water.

A FAQ sheet of the **Clean Vessel Act by Boaters** from Florida Department of Environmental Protection (http://www.dep.state.fl.us/law/grants/CVA/CVAFAQsBoaters.htm) depicting concentrations of vessel sewage and corresponding BOD levels was downloaded.

The ***Budd Inlet Scientific Study Final Report (EHI, 1998)*** was reviewed for information regarding significant BOD loading data at Budd Inlet and how it may be applicable to Akutan Harbor. BOD5 data was collected at several stations and suggests that very seasonal influences from the freshwater lake, and algal blooms from Puget Sound contribute to the daily BOD load in this water body. Since Budd Inlet is one of the better flushed bays within the Puget Sound, and has several different geological and oceanographic characteristics than that which is reported for Akutan Harbor, it would be difficult to apply information from this study to Akutan.

The ***Review of Oceanography and Seafood Effluent Discharge in Unalaska Bay (EHI, 1993)*** was reviewed for information regarding circulatory patterns and DO levels within a similar Alaskan environment to develop better understanding of the local energetics of marine environments and considerations for numerical modeling.

An attempt to obtain ***Water Quality and Flushing of Five Puget Sound Marinas*** **(Cardwell,1980)** at the University of Washington resulted with the discovery of missing documents and publications.

ATTACHMENT 2

Results of Telephone and Email Contacts

Several contacts were made to persons with specific knowledge and may have insight into various marine issues as they relate to the engineering, biological, and operational concerns of marinas and water quality issues such as Biochemical Oxygen Demand Loading.

Vladimir Shepsis, PE - Coast and Harbor Engineering, Edmonds, WA (Phone)

Response:

He has worked extensively with marina and harbor development as well as physical and numerical modeling of currents. He was not familiar with any BOD requirements or regulations in past projects he has been part of. Most recently was the Port of Ilwaco marina where the emphasis was to reduce residence time to reduce potential pollution. He was not aware of any particular water quality standards to meet.

Glenn Grette, Biologist - Grette Associates Environmental Consultants, Wenatchee/Tacoma, WA. (Phone)

Response:

He has worked extensively with the marina development and mitigation for Port of Bellingham - Drayton Harbor Project. He did not perform the Environmental Impact Study however was not aware of BOD loading values ever being an issue there.

From a permitting point of view, Glenn would address the following:

Implement BMPs
Reallocate TMDL Distributions
Engineer for optimum circulation

Jayne Carlin - Alaska TMDL Program Manager, Seattle, WA (phone & email)

Jayne was in attendance at the coordination meeting of January 22, 2003. Most questions we asked of her were specific to the topics of that meeting and just needed elaboration or updating if possible.

Response:

Could not provide specific answers regarding when the TMDL for Akutan Harbor was established and from what total point and non-point sources was the 149,000 lbs./day derived. Response: "not sure".
She is not aware of any new modeling available or where on the EPA website that one could get an example of how to demonstrate that harbor projects would not affect Akutan Harbor DOs and TMDLs.
She was not aware of any other harbors that have been studied for BOD loading.

She did not know who kept the NPDES data records for this region but provided me with the number for Kim Ogel (EPA data management) who put me in contact with Chris Cora (EPA NPDES caseworker)

Jayne would forward my email to others within her division to see if they could provide some answers regarding this issue.

Chris Cora - EPA, NPDES Caseworker -Trident Seafoods Case worker, Seattle, WA (Phone)

Response:

It appeared to him that the 149,000 lbs./day TMDL BOD_5 was based on the 1998 NPDES data at which time Trident Seafoods was the major contributor to the loading with its allocation of 133,200 lbs./day BOD_5 along with Deep Sea Fisheries at 1,000 lbs./day BOD_5 with a 14,900 lbs/day MOS. To his knowledge, Trident Seafoods is the only remaining source of discharge within the bay and has reduced its loading down to 12 million lbs./year or 105,000 lbs./day avg.

Trident performs its own environmental monitoring but NPDES data could be obtained by submitting a FOIA. Contact person at Trident would be Earl Hubbard (206) 783-3818 or Steven Francais at Akutan Facility.

Also mentioned that since Trident now dumps its 'stick" water offshore, he would expect the fish pile to be reduced thereby reducing some of the loading.

Also mentioned abandoned military grounds leaking oil that Trident has contract to buy from the army. Since this site appears to be leaking oil into the bay (visual observations made by Trident) and as such contributing to the BOD loading by the breakdown of hydrocarbons.

Note: Chris will be in Alaska the week of August 18,2003 and may be able to make observations.

Skip Albertson - Department of Ecology, WA (phone)

Response:

He is aware of a few studies that occurred within the Puget Sound Region but could not recall specific issues. Most notably and probably the most intensive study over time he is aware of would be the Budd Inlet Study (EHI,1998).

Watershed permit manual contains guidelines for TMDLs. Several water bodies such as Hood Canal and Everett Slough are currently being studied for water quality standards. Bob Cuzomono with the Department of Ecology Watershed Development,(360) 407- 6688, may have further information regarding Port of Everett issues.

Harvey Smith - Alaska Department of Transportation and Public Facilities, AK (phone)

He was in attendance during coordination meeting of January 22, 2003. Most questions we asked of him were specific to the topics of that meeting and just needed elaboration or updating if possible.

Response:

When asked if he had run further numerical current models since the meeting of January 22 for the planned boat harbor, he had. Additional modeling has shown approximately a 300% improvement in the exchange coefficient for the boat harbor only. This would increase the numerical model coefficient from about 0.05 he achieved in January to about 0.17 by reducing the size of the entrance to the boat harbor.

From past studies that he has been a part of including Water Quality and Flushing of Five Puget Sound Marinas (Cardwell,1980), *he is confident that the resulting coefficient from numerical model, which tends to be more conservative, would be equivalent to a coefficient of approximately 0.34 on the physical model. He states that Cardwell (et.al) found that an average physical coefficient of 0.30 would provide sufficient exchange of water within marinas.*

He also clarified that his model refers to the proposed boat harbor only and does not model all of Akutan Harbor.

Mike Stoner - Environmental Officer, Port of Bellingham, WA (phone, return message)

Mike is involved with management of Squallicum Harbour, which houses about fifty, 50' to 100' fishing vessels.

Response:

The BOD issue never came up and they do not collect BOD or DO data.

Eric Lottsfeldt - Environmental Manager (Fisherman's Terminal), Port of Seattle,WA (phone)

Fisherman's Terminal houses about 350 vessels ranging in size from 30' to 340'

Response:

They are not required to perform any water quality monitoring other than their parking lot run-off that has its own NPDES permit. He recalls that the planting of trees along the shore, mitigated for the need to perform DO monitoring.

Only monitor specific parameters such as turbidity and occasionally DO during construction activities.

Leslie Socka - Environmental Permitting, Port of Seattle, WA (phone)

Leslie has prepared environmental permitting for most small marinas and larger harbor facilities as for the Port of Seattle as well as the Port of Tacoma.

Response:

The Port of Seattle is not tasked with monitoring any BOD loading or D.O. parameters at any of the Puget Sound Marinas under her jurisdiction nor has she had to address this issue in any detail for any of the permits she authors for marina development. She did mention that a couple of marinas on Lake Washington (freshwater) may be currently be monitoring for DO levels.

<u>Jack Ward – MEC (phone)</u>

Jack is a senior marine biologist, and has worked on numerous water quality, sediment, benthic invertebrate, and marine organism issues.

Response:

While Jack knew of marine BOD measurements that have been collected in bays and inlets, and in fact his company provides laboratory services for running BOD_5, almost all such samples have been collected for point source discharges. He is unaware of any measurements regarding BOD levels within marinas, nor does he know of any established BOD limits for, or typical BOD levels for, boat marinas.

<u>Susan Bauer - Port Planner, Port of Port Angeles, WA (phone)</u>

The Port of Port Angeles was contacted since it was brought up that John Wayne Marina, within the Ports' jurisdiction, may currently be under study or had BOD loading issues addressed in the past. Susan Bauer manages the Ports permitting records and has copies of Environmental Impact Statements (EIS) from John Wayne Marina in Sequim, WA.

Response:

She is aware that several water quality issues were addressed in the past during the development of the marina and the subsequent EIS in 1984. However, she mentioned that the EIS is four volumes and would be a bit of a production to review for specific information but is willing to do so if requested. Currently there is no water quality or sediment quality monitoring taking place within the marina. Battelle Labs in Sequim, WA may have data of past monitoring.

Port Angeles Harbor is under continual monitoring since it is industrialized and has significant deposits of wood chips on the bottom since the Ports' establishment.

<u>Ralph Petorite, PE - Reid Middleton, Everett, WA (email)</u>

Has worked on several marina and harbor designs.

No response to date.

<u>Mary Sue Brancato, Toxicolgist - NOAA, Port Angeles, WA (Email)</u>

Has directed work on several environmental toxicological programs such as the EPA mandated Long-Term Monitoring Program for Tributyltin that the collection on auxiliary water quality data from regions and marinas around the country. She also worked closely with Rick Cardwell on many of his studies.

Response:

She didn't have much information on BOD issues as they relate to harbors and marinas.

ATTACHMENT 3
Assessment of Corps of Engineers Reasoning

The Army Corps of Engineers (COE) takes into consideration eight (8) sources of BOD loading from marina construction and operations applicable to the boat harbor at Akutan. They have categorized these sources as "Not Significant" such as algal blooms, debris, fish waste, petroleum products, and bilge water. Sources such as boat sewage, gray water, dredging, and storm runoff have been categorized as "Significant".

Sources within Akutan indicate that algal blooms, that are a significant source of BOD loading in the lower 48 states including Puget Sound, do not occur. Therefore the COE has minimized any significant impact that an algal bloom would have. Debris, fish waste, and bilge water should not occur within the confines of the marina if Best Management Practices (BMP) are met and have been determined that BOD loading from these sources would be negligible.

Included as not significant, is the contribution of petroleum hydrocarbons from vessels within the marina to daily BOD loading. Although COE expects all fueling to take place at the Trident Seafood Dock and not within the marina, they have allowed for a daily spillage of approximately 3.3 gallons of diesel contributing to a daily BOD loading of approximately 0.03 lbs/day if it was assumed that it would take 5 years for the hydrocarbons to degrade and approximately 29 % evaporated within 30 days. A worst-case event of a 10,000 gallon spill was calculated to exert approximately 104 lbs. of BOD per day if the spill degrades over 5 years and not assuming any flushing.

Based upon the literature reviewed, the maximum BOD loading values the COE applies to sewage and gray water provides a conservative estimate of BOD loading from these sources if BMP are not met within the marina. Dredging has been included as a significant source, however will only occur during the construction and subsequent maintenance of the marina (25 years est.) and only accounts for approximately 5 % BOD lbs/day contribution of the worst-case during these times.

The most significant loading as outlined by the COE would be a result of storm water runoff in both worst-case and expected scenarios. The worst-case scenario for rain runoff maximizes the highest daily record rainfall of approximately 5 inches in Akutan with no swales or drainage on an 18 acre gravel lot. Using proper BMP by the application of graded fill with vegetative swales and based on the mean daily record high rainfall of approximately 2 inches, the BOD loading from this source is reduced to about five percent of the worst-case estimate. At an expected BOD loading of 26.21 lbs/day, storm water runoff is estimated to contribute the most to the total BOD loading from the marina.

Based upon the recovered literature and contacts made regarding BOD loadings within marinas, COE's assessment of the worst-case and expected daily BOD loading values appear to be valid and conservative.

FEIS-APPENDIX 6

404(b) (1) EVALUATION
INLAND MOORING BASIN
AKUTAN NAVIGATION IMPROVEMENTS, ALASKA

Section 404(b)(1) GUIDELINES EVALUATION (40 CFR PART 230)
FOR
AKUTAN NAVIGATION IMPROVEMENTS PROJECT
(DREDGE DISPOSAL ACTIVITIES)

I. PROJECT DESCRIPTION

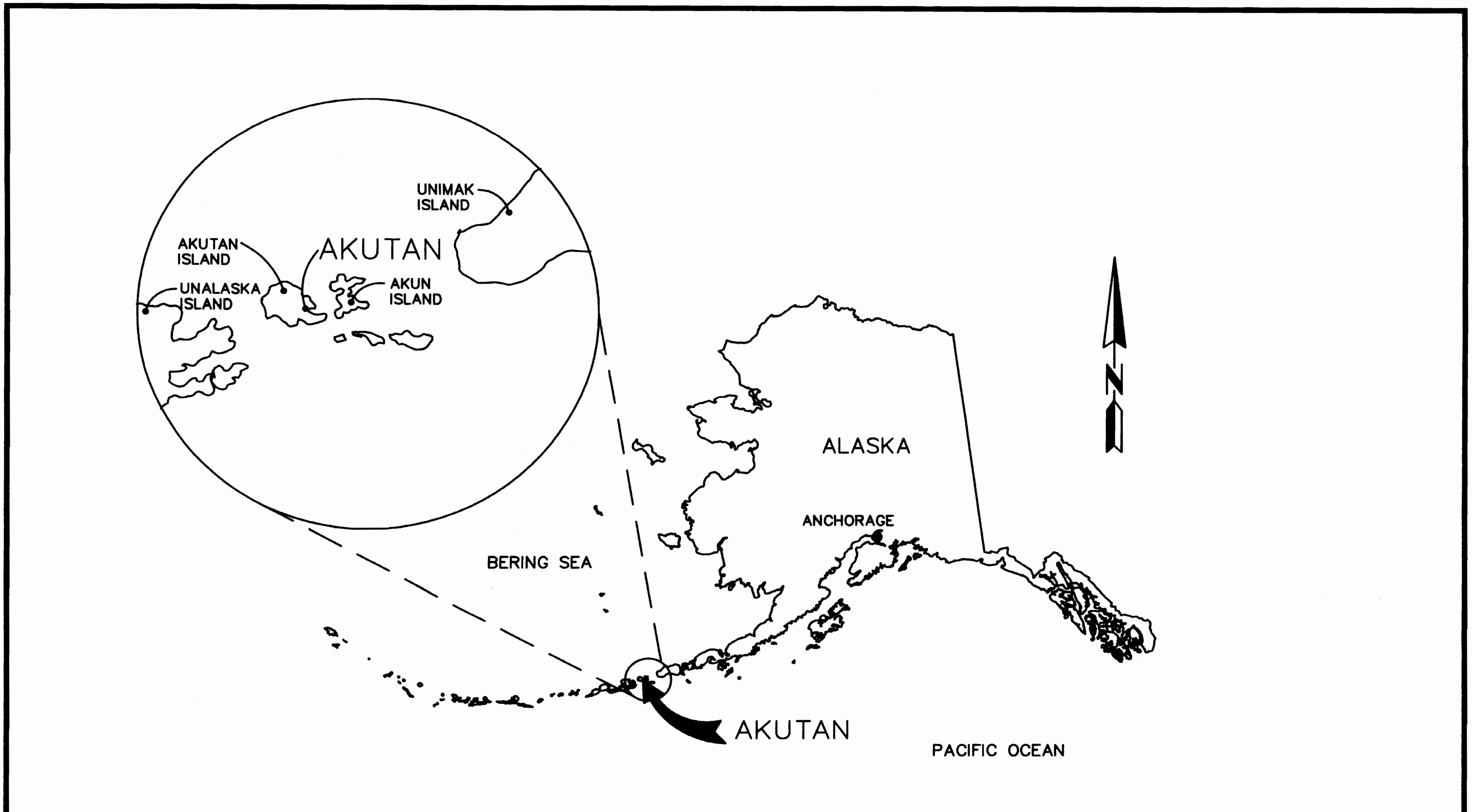
Project Authority and Purpose: The Akutan Navigation Improvements study is authorized under the Rivers and Harbors in Alaska study resolution adopted by the U.S. House of Representatives Committee on Public Works on December 2, 1970. The House Conference Agreement, dated September 12, 1996, appropriated funds to initiate reconnaissance studies of navigational needs at several of Alaska's coastal communities, including Akutan.

The purpose of the Corps' proposed action is to provide a safe and efficient harbor for the Bering Sea commercial fishing fleet and the City of Akutan. Since the early 1980s, the City of Akutan has been pursuing various means to construct a boat harbor to serve these vessels. Currently, there is no protected moorage at Akutan and these vessels must travel to other locations to obtain provisions for fishing and to moor during closed fishing periods. Portions of the crab and groundfish vessels operating in the Bering Sea that do not deliver product to Akutan also 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.

Project Location and General Description: 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 1). It is in the eastern Aleutian Islands and one of the Krenitzin Islands of the Fox Island group. Akutan Island 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. The average annual temperature is 40.9 °F, and the average winter and summer temperatures are 34.7 °F and 49.8 °F, respectively.

The City of 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. 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 proposed harbor site is in a glacially carved, steep walled, volcanic bedrock valley, or fjord, at the head of Akutan Harbor. The harbor basin would include an entrance channel and turning basin, both –18 feet mean lower low water (MLLW), and two rubblemound breakwaters designed to protect the harbor entrance. The mooring basin would have project depths of –14, –16, and –18 feet MLLW. Dredged material would be stockpiled onshore at the head of Akutan Harbor.



LOCATION MAP, AKUTAN, AK

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE 1

General Description of Dredged or Fill Material: Approximately 843,000 cubic yards of material would be dredged from an area where a harbor basin would be constructed, and disposed of adjacent to the harbor. The upper 4 to 6 feet of material to be dredged consists of silty-sand with organics. The material below this layer has been characterized as coarse to fine-grained sands (Shannon & Wilson, 2001).

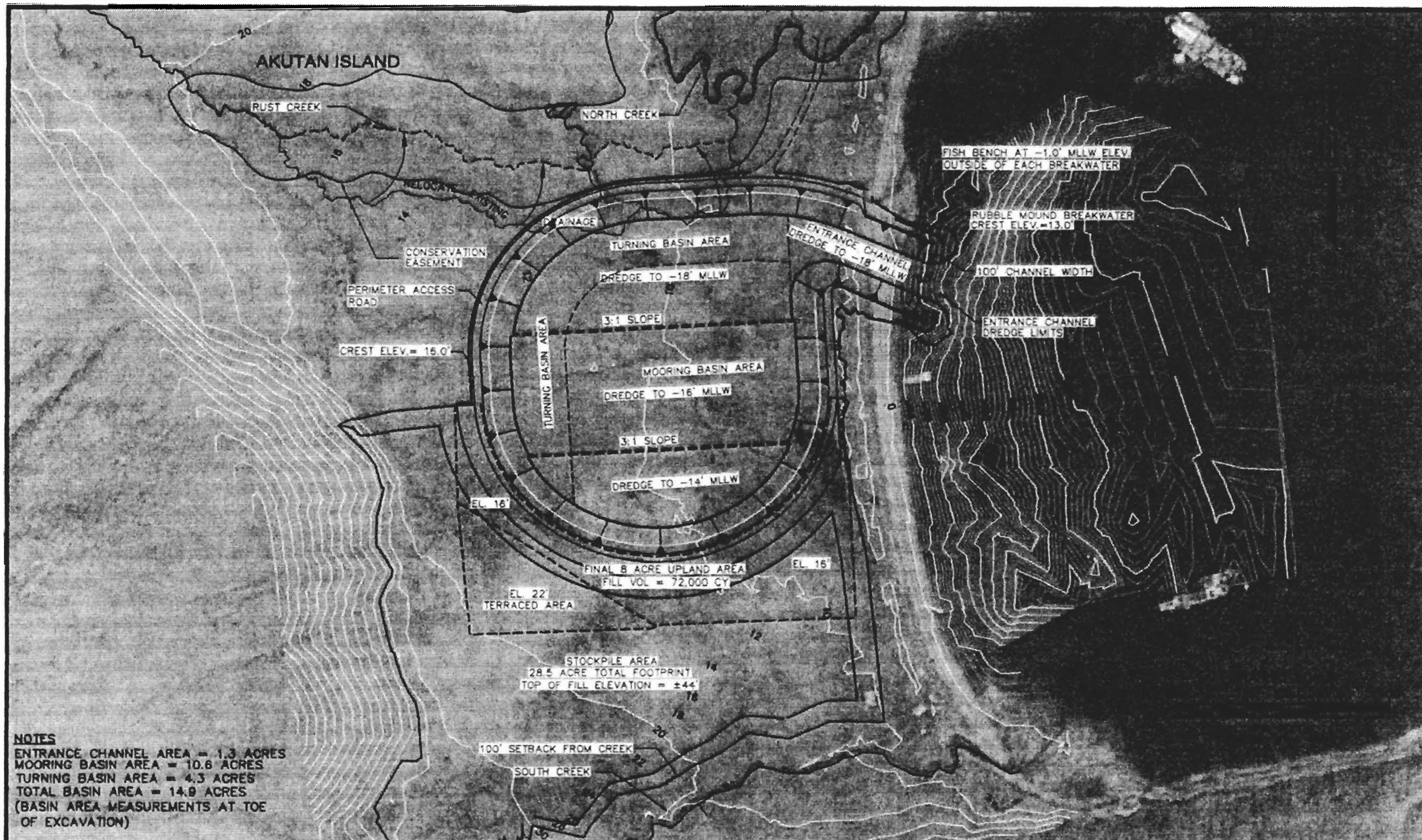
Description of the Proposed Discharge Site: The 28.5-acre, dredged material disposal site is at the head of Akutan Harbor, adjacent to the harbor basin in area wetlands and uplands (figure 2). Approximately 71,000 cubic yards of dredged material would be used to construct a harbor staging area and the balance of dredged material (772,000 cubic yards) would be used to construct a 20.5-acre stockpile area. The harbor project would be constructed over a period of 2 years.

Description of Disposal Method: 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.

II. FACTUAL DETERMINATION

A. Physical Substrate Determination

Two distinct areas would be dredged and filled. The mooring basin, turning basin, and part of the entrance channel would be excavated out of an area containing a mix of wetlands and uplands. The remaining part of the entrance channel and the foundation of the rubblemound breakwater would be dredged out of the near-shore marine environment. The undeveloped 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. The majority of the harbor basin and staging area would be between 1 and 4 meters above sea level. The dredged material stockpile would be between 2 and 9 meters above sea level. The characters of the substrate at the proposed disposal site would change from being a richly organic soil to a sandy/gravelly soil type. The top-elevation of the new substrate would rise to approximately 44 feet (13 meters) above sea level and its sides would slope down and terminate around 6 feet (2 meters) above sea level.



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 2

B. Water Circulation, Fluctuations, and Salinity Determinations

Because the proposed dredged material disposal site is onshore at the head of Akutan Harbor, it would not affect Akutan Harbor's water circulation, fluctuations, or salinity. However, the hydrology of the uplands would be unavoidably and significantly impacted by construction of the dredged material stockpile, the staging area, and the harbor basin.

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 head-ward 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 expected 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:

- 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 headward erosion to the north and the south. An extreme situation would be stream piracy, whereby an eastward-flowing stream is intercepted, causing the headward 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 expected to change providing harbor construction directly avoids these creeks.

The Corps believes that incorporating the U.S. Fish and Wildlife Service'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 will mitigate to the maximum extent practicable, the project's potential environmental impacts on the head of Akutan Harbor's hydrology.

C. Suspended Particulate/Turbidity Determinations

The large volume of material to be dredged, coupled with disposal via upland stockpiling, would likely mean that the project's construction season would extend 2 years. 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. Turbid water produced while dredging the inland mooring basin would remain isolated from Akutan Harbor until such time that the entrance channel is constructed. Upon breaching the entrance channel, an undetermined volume of turbid water would begin discharging into Akutan Harbor.

In addition to increasing turbidity, dredging activities could increase suspended solids, decrease dissolved oxygen concentrations, and increase dissolved nutrients concentrations in receiving waters. A decrease in water clarity and suspension of fine materials could be associated with increased turbidity and suspended solids. 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 will do. However, the reduction in dissolved oxygen is usually brief. A study of dredged material released in San Francisco Bay showed a 3 to 4 minute reduction in dissolved oxygen near the point of release (USACE, 1973), and another study in New York Harbor showed a small reduction in dissolved oxygen near the dredge, but no reductions in levels 200 to 300 feet away from the dredging activities (Lawler, Matusky, and Skelly, 1983). Nutrients could be released into the water column during the dredging operations, but are not expected to promote nuisance growths of phytoplankton, as water temperatures are too low and the dredging period too short to facilitate growth. Furthermore, the material to be dredged (sand and gravel) is not conducive to having toxic metals and organics, pathogens, and viruses absorbed or adsorbed to its surface and becoming biologically available to organisms either in the water column or on the substrate.

The recommended plan would construct dredged material stockpiles in wetlands and uplands adjacent to the mooring basin. It is the turbid water draining from the wet, stockpiled sediment 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 settling basins constructed adjacent to the mooring basin.

D. Contaminant Determination

An environmental site investigation was performed at the proposed harbor site at the head of Akutan Harbor (Shannon & Wilson, Inc., 2001), the results and findings of which are presented in this section. Thirty-one test pits were excavated in and near the proposed mooring basin. Subsurface soil samples were analyzed and classified from 11 of the test pits, as well as marine sediments collected along the beach at the harbor site

Approximately 40 to 50, 55-gallon steel drums were observed in and near the project site, primarily on the beach berm separating the freshwater wetlands from the head of Akutan Harbor. No intact containers with measurable amounts of waste or product were observed within the project area, so no waste samples were collected. Four former dump areas were observed on the beach berm, one of which appeared to be within the project area. The dumps appeared to contain primarily metallic debris. No stained soil or other indication of contamination was observed during the field investigation.

Low concentrations of diesel range organics (DRO) and residual range organics (RRO) were reported in most of the soil samples throughout the site. Study chemists noted that naturally-occurring organic matter was quantified as petroleum hydrocarbons in six of the samples. The soil samples contained DRO up to 10 milligrams per kilogram (mg/kg) and RRO to 28 mg/kg. These levels do not exceed the applicable Alaska Department of Environmental Conservation Method 2 soil cleanup levels contained in 18 AAC75.341 for areas with less than 40 inches of annual rainfall.

The volatile organic compound tetrachloroethene (PCE) was reported in six soil samples at up to 160 micrograms per kilogram (ug/kg). The four samples above the ADEC Method 2 soil cleanup level for PCE (30 ug/kg) were collected from the northern and central portion of the study area. Due to elevated detection limits, only two of the samples collected from the site contain less than the ADEC Method 2 soil cleanup level. The remaining samples had detection limits above the associated ADEC cleanup level, and therefore could contain concentrations of PCE above the ADEC Method 2 cleanup level of 30 ug/kg. Concentrations of PCE were not reported in the groundwater samples collected at the site. The source and extent of the PCE contamination are not known; however, there is a possibility that the detection of PCE may be a data anomaly due to contamination of the sample either in the field or in the laboratory.

Petroleum hydrocarbons (DRO and/or RRO) were reported in each of the groundwater samples collected at up to 3.7 milligrams per liter (mg/L) DRO and 2.1 mg/L RRO. ADEC cleanup levels for these compounds are 1.5 and 1.1 mg/L, respectively. The test pit and two monitoring points with groundwater cleanup level exceedances were located near the central portion of the site.

Several volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) were reported in the soil and groundwater samples. Aside from PCE, the concentrations do not exceed cleanup levels. The VOCs commonly associated with petroleum products were not reported in the soil or water samples.

Except for the detection of arsenic, which was within typical naturally occurring levels, RCRA metals, copper, and zinc concentrations in the soil samples did not exceed cleanup levels. Metals results exceeded the applicable cleanup levels in four groundwater samples. The high level of sediment in one of these samples was thought to cause the total metals concentrations to be elevated.

Additional site-contamination investigation work will be performed during the Preconstruction Engineering Design phase of the project, and all sites requiring cleanup will be prior to project construction.

Samples met testing exclusion criteria since there are no known sources of contamination within the footprint of the site; the material is considered to be in a mild current/wave energy area, and sediment is composed predominantly of sand, gravel, and other bottom material with particle sizes larger than silt. Evaluation to determine the need to test material to be dredged is based upon guidance in the *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual.*

E. Aquatic Ecosystems and Organism Determinations

The discharge of dredged and fill material into the wetlands and on the uplands at the head of Akutan Harbor would have an impact on the area's aquatic ecosystem and the animals inhabiting it. Wetlands, a Special Aquatic Site, would be most impacted by the project. Approximately 57 acres of wetland (44 acres) and upland (13 acres) habitat would be impacted by the entire project. The dredged material stockpiles would affect approximately 11 acres of wetlands and 9 acres of uplands. The plankton, benthos, and nekton inhabiting the wetlands would be unavoidably and adversely impacted, as the streamlets and small open water areas within the wetlands would be filled with dredged material. Wildlife (passerines, waterfowl, seabirds, and small mammals) associated with the affected wetlands would be permanently displaced to other wetlands at the head of Akutan Harbor. The project would not affect the following aquatic ecosystems: sanctuaries and refuges; mud flats; vegetated shallows, coral reefs, and riffle and pool complexes. No aquatic ecosystem-related threatened and endangered species would be affected by the project.

F. Proposed Disposal Site Determinations

Approximately 843,000 cubic yards of material would be disposed of on uplands and in wetlands adjacent to the project site. The total footprint of the dredged material stockpile would be approximately 20 acres, and the stockpiles' height would be approximately 44 feet above sea level. No open water disposal of dredged material is proposed for this project because it would cause more of an adverse and significant environmental impact on the marine environment than it would on the wetlands and their fish and wildlife resources. In addition, the associated costs of deepwater disposal are exorbitantly high. The Corps, project sponsors, USFWS, USEPA, and state resource agencies will continue to evaluate ecosystem restoration opportunities for the beneficial use of dredged material, 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).

No mixing zone issues are associated with this action.

The human use characteristics of the area would change as a result of the dredged material disposal activity. The area is currently totally undeveloped and is occasionally used by Akutan residents and Trident Fisheries employees for recreation (hiking, sport fishing, picnicking). With construction of the harbor and dredged material stockpiles, recreation activities in the Central Creek drainage would be eliminated; however, recreation activities in the North and South creek drainages would not be impacted. Subsistence uses of the area are primarily limited to anadromous fishing in North and South creeks, both of which are outside the dredged material disposal areas.

No municipal and/or private water supplies would be affected by the dredged material disposal activities because none exist in the area.

The aesthetics associated with the aquatic ecosystem at the head of Akutan Harbor would be altered by the harbor project and the construction of dredged material stockpiles. The beauty of the natural aquatic ecosystem would be marred by the construction of the stockpiles and the harbor development that likely would follow.

No parks, National and Historic Monuments, National Seashores, Wilderness areas, research sites, or similar preserves would be affected by the project because none exist in the area.

G. Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem.

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 disposal of the mooring basin's dredged 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.

Recent discussions with representatives from the Akutan community and the 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 can 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 could 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 was used (e.g. road construction, airport construction, or ecosystem restoration projects), suitable harbor uplands would be made available for development.

It is the turbid water draining from the wet, stockpiled sediment that has the potential to adversely impact the water quality at the head of the bay 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 settling basins constructed adjacent to the mooring basin. In addition, the stockpiles material could be used as fill material for other unforeseen development projects.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. Six dredged material disposal alternatives have been identified (table 1). 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 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. 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, these 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 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. The Corps, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game 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 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 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. Secondarily, the indiscriminate discharge of dredged material offshore into Akutan Harbor

Assessment of Potential BOD Loading from a Proposed Boat Marina in Akutan Harbor, Alaska

PREPARED FOR:

Tryck Nyman Hayes, Inc.
911 West Eighth Avenue
Anchorage, Alaska 99501

PREPARED BY:

Evans-Hamilton, Inc.
4608 Union Bay Pl. NE
Seattle, WA 98105

September 2003

EHI Job No. 5334

INTRODUCTION AND OBJECTIVES

The Corps of Engineers has proposed the construction of a boat marina at the head of Akutan Harbor, Alaska to serve the Bering Sea commercial fishing fleet. The proposed marina would be 12 acres in size and provide moorage for 58 vessels.

Akutan Harbor has been listed by the State of Alaska as a water-quality limited water body, and the US Environmental Protection Agency (USEPA) has listed Akutan Harbor as a Clean Water Act Section 303(d) Tier III impaired water body, due to reduced dissolved oxygen (DO) levels within the harbor. These unacceptable low DO levels have been primarily attributed to the discharge of seafood processing wastes, which have consisted of a settleable solids portion (stick waste) and a liquid portion, and their biological oxygen demand (BOD) upon the water column. In 1995, the USEPA established a Total Maximum Daily Load (TMDL) for BOD (measured as BOD_5) for Akutan Harbor of 149,000 lbs. of BOD_5 per day, applicable May 1st through October 31st (USEPA 1995).

The USEPA and the Alaska Department of Environmental Conservation (ADEC) have expressed concern that the proposed Akutan boat marina will create additional BOD loading to Akutan Harbor that will further impair the dissolved oxygen water quality conditions. An initial assessment of the BOD loadings from the proposed boat marina and their impact upon water quality is contained in a draft report by the Corps of Engineers (2003).

Evans-Hamilton, Inc. (EHI) was asked to review the BOD report prepared by the Corps of Engineers, evaluate the validity of the report's analysis, and provide a recommendation, if possible, of a reasonable BOD loading value associated with small boat marinas in climates similar to Akutan, Alaska. In order to meet this objective, EHI performed the following activities:

1. Review available literature on BOD loadings appropriate to small boat marinas, or other similar applications.

2. Interview several scientists dealing with BOD and Sediment Oxygen Demand (SOD) research and issues to assess their knowledge of appropriate studies and information appropriate to the project's goal. Find and review such appropriate studies and information.

3. Interview appropriate scientists and managers at Alaska and Washington state government agencies, and the USEPA Region X, concerning existence of any similar BOD loading values, and requirements on how such values are determined.

4. Review BOD and SOD data from previous EHI projects that may be able to place in perspective BOD loadings associated with small boat marinas.

5. Review the BOD report prepared by COE and evaluate the validity of the report's analysis based on the results of the above 4 tasks. Prepare a short summary report detailing the literature reviewed, sources contacted, and knowledge gained, and provide a recommendation if needed for additional studies needed to better document the report findings.

METHODS

To do this work the following were performed:

- Reviewed the draft Army Corps of Engineers (COE) report on the *Proposed Akutan Boat Harbor Water Quality Issues: Analysis of Expected Biochemical Oxygen Demand from the Proposed Akutan Boat Harbor.*
- Reviewed the Federal and State of Alaska Interagency Coordination Meeting Minutes of January 22, 2002.
- Reviewed the USEPA *TMDL Determination* reports for BOD and Settleable Solids Residues in Akutan Harbor.
- Reviewed of various forwarded email between involved parties regarding the BOD loading issue.
- Performed a literature search and reviewed additional articles regarding BOD loadings.
- Called personal contacts with special knowledge of design, construction, engineering, operational, biological, and permitting concerns of boat harbors and water quality issues.
- Assess reasoning of COE report.

Three attachments are contained with this report. Attachment 1 is a list of the literature reviewed with a general outline of why certain articles were selected for more detailed review. Attachment 2 is a list of persons we contacted concerning BOD and other water quality issues as they relate to marina design, operation, and permitting. Some of their comments are included in this list. Attachment 3 is a brief assessment of COE reasoning of the BOD loading values determined in their draft proposal.

RESULTS

Literature Search Results

The literature search was conducted using the internet. Several searches were conducted using keywords such as: Biological Oxygen Demand, Biochemical Oxygen Demand, BOD, Dissolved Oxygen, DO, marinas, harbors, water quality, Total Daily Maximum Daily Load, TMDL, Settable Solids, SOD, Petroleum Hydrocarbons, and combinations of the above keywords. Although multiple listings referencing the above parameters were available, only about fifty prompted further review by opening up their associated website. Most of these websites and articles dealt with upland issues or BOD associated with sewage treatment facilities. After a brief initial review of those websites, only nine (9) articles providing information possibly significant to the topic at hand were downloaded for detailed review. Relevant points from those nine articles are briefly summarized in Attachment 1. No article was found that deals specifically with BOD loading from a small boat harbor in a northern marine environment.

Personal Interviews

All the people contacted were asked if they knew of any standard BOD loadings, or any standard BOD loading limits, for small boat marinas. The thinking was that somewhere BOD loadings from an existing marina, or estimates of future BOD loadings for the permit applications of a proposed marina, might have occurred. We contacted both researchers and government personnel in Washington State and Alaska who should be familiar with any such BOD measurements of marinas, and both engineering and environmental firms as well as government agencies in those states concerning any previous requirements to estimate future BOD loads from a marina during its design and permitting phases. While BOD measurements have been made for, and limits placed upon, several point source discharges, we could find no measurements, existing limits, nor standard estimates of BOD loadings for marinas. The TMDL criterion for BOD loading has not come up at all among the marina designers, planners, and permitting consultants that we contacted.

Reasonableness of COE Draft Report

Since no standard total BOD loading from similar marinas could be found, we reviewed the list of potential BOD loading sources associated with the marina, as put forth in the Corps of Engineers' draft report, as well as compared the estimated values assigned by the COE to these sources to, where possible, similar information found in the literature. In developing their list of potential sources and probable BOD loadings, the COE report assumes that Best Management Practices will be in place for operation of the marina.

The COE report appears to be thorough in reviewing the potential BOD sources that would be associated with the marina, as well as in estimating the BOD loadings from those individual sources. For instance, BOD values associated with boat sewage that we found in the literature were between 1700mg/l to 3500 mg/l as compared to the 3500 mg/l value used by the COE to conservatively estimate a worse-case condition. We therefore conclude that the expected daily and severe BOD loadings from the marina, as estimated by the COE, appear reasonable and inclusive of any significant potential source within the marina.

Estimated Marina BOD vs. TMDL for Akutan Harbor

The COE report estimates that the BOD loading from the marina to Akutan Harbor for normal operations is 26.91 lbs/day (BOD_5), and 673.76 lbs/day during an extreme rainfall combined with a recent major fuel spill. During construction, an additional loading of 35.40 lbs/day from dredging is expected during the construction phase of this project and at approximately 25 year maintenance dredging intervals.

The present BOD TMDL for Akutan Harbor is 149,100 lbs/day. This value was developed based on mathematical modeling of Akutan Harbor. The modeling was performed based on measured conditions in the harbor in 1993, when there existed two major seafood processors discharging to the harbor: Trident Seafoods (discharging a median of approximately 251,000 lbs/day), Deep Sea Fisheries (discharging approximately 700 lbs/day. General NPDES permits were issued in Akutan Harbor for the vessels Arctic Enterprise and Arctic Five however were not included in the wasteload allocation. The model also assumed that the receiving waters of Akutan Harbor had a natural BOD_5 rate of 1.5 mg/l based on 1993 data collected during periods of no discharges, and that the levels of DO in all waste discharges are zero since DO levels in the discharge greater than 0 mg/l will reduce the impact of the DO of the receiving waters (i.e. a worst case approach was used).

The estimated future BOD loads from the marina of approximately 27 and 674 lbs/day for the normal operating and extreme conditions are only 0.02% to 0.45% of the TMDL of 149,100 lbs/day. Since the TMDL was established, two of the seafood processors have discontinued their discharges. Comments from the EPA indicate that Trident Seafoods is now the only BOD discharge in Akutan Harbor, and that they have reduced their BOD discharges significantly since1998 down to approximately 105,000 lbs/day (BOD_5 allocation of 133,200 lbs/day). Also mentioned by the EPA source was that Trident 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.

A Margin Of Safety (MOS) is developed as part of any TMDL to allow for variability and uncertainty from several sources including data and modeling uncertainties, an incomplete knowledge of the distribution and impact of the solids discharged by the seafood processors, and an incomplete knowledge of DO demand associated with bottom sediments and other potential BOD sources. The present MOS for BOD discharges to Akutan Harbor versus the BOD TMDL is approximately 44,100 lbs/day, or 30%. The addition of BOD from the marina, estimated at less than 0.5% for an extreme case, will not significantly increase the total BOD loading to the harbor, nor cause the TMDL to be exceeded.

CONCLUSIONS

While our literature search and interviews with knowledgeable scientists, engineers, and government personnel was not exhaustive, no indications were found that BOD loadings associated with small boat marinas in northern latitudes have either been measured, or that any standard estimate of BOD loadings has been developed for planning and permitting future marinas. Our review of the Corps of Engineers report on the probable sources of BOD from a marina concluded that the report was comprehensive in both the types of BOD sources that would be introduced with a marina, and reasonable in the estimated BOD loads from those sources. The overall range of normal to severe (worst case?) BOD loadings caused by the marina also seem reasonable. This range (normal to severe) represents only 0.02% to 0.45% of the TMDL of 149,100 lbs/day. If the severe case for BOD loading from the marina off by even 100%, that would still represent a BOD loading of less than 1% of the TMDL. The estimate for normal operations would have to increase 55 times to reach 1% of the TMDL. In addition, the estimated normal and severe BOD loadings from the marina are both far less than either of previous discharges that have been discontinued in recent years. Trident Seafoods, which remains as a BOD source, has also significantly reduced their BOD discharge. Thus all existing anthropogenic BOD sources combined with the estimated severe case for the marina would reach only approximately 71% of the TMDL. For these reasons, we conclude that the Corps of Engineers is appropriate in concluding that the addition of a boat marina at the head of Akutan Harbor should not cause the BOD TMDL to be exceeded, nor the dissolved oxygen levels in the harbor to be adversely impacted.

RECOMMENDATIONS

While judgments could be made concerning the reasonableness of the potential BOD sources within the proposed marina, and the estimated BOD loads from those sources, the assessment of the impact of the marina BOD loading versus other BOD discharges and the TMDL limit relied upon the accuracy of the Trident Seafoods discharge quantities provided by EPA, and the belief that combined discharge quantities under the TMDL level will not cause dissolved oxygen levels in Akutan Harbor to reach unacceptably low levels. Both of these items could be further checked. We recommend the following be considered:

1. Verification of Trident Seafood NPDES discharge data, and any other point source discharge data, is available from the EPA by means of a Freedom of Information Act (FOIA) request. An analysis of the trends in BOD discharges over the last five years, including the daily variations to those discharges, could place in better perspective the potential influence of the estimated loading from the marina, and the potential for the combination of all discharges to exceed the TMDL on even a daily basis.
2. A comparison of the discharge data over the last 5-10 years (before and after significant reductions by Trident Seafoods, shipping of settleable solids, and closure of the other two seafood processing discharges, against dissolved oxygen measurements within the harbor over those same years, would provide an excellent indication as to whether the harbor dissolved oxygen conditions have improved over the last five years, and are of a concern with the present discharge levels.
3. To better confirm the marina's actual BOD loadings and impact on dissolved oxygen water quality, conduct in-situ and limited profiling measurements of dissolved oxygen in the area within and adjacent to the propose marina now, and after its construction.

ATTACHMENT 1
Results From The Literature review on BOD Loadings

The literature search was conducted primarily using the internet. Keywords used were: Biological Oxygen Demand, Biochemical Oxygen Demand, BOD, Dissolved Oxygen, DO, marinas, harbors, water quality, Total Daily Maximum Daily Load, TMDL, Settable Solids, SOD, Petroleum Hydrocarbons and combinations of the above keywords. Although multiple listings referencing the above parameters were available, only about fifty prompted further review by opening up their associated website and after a brief initial review, only nine (9) articles provided information remotely significant to the topic at hand and were downloaded for detailed review. Two additional studies were contained within EHI and were also reviewed. This eleven articles or reports reviewed in detail are listed below.

Overview of Current Total Maximum Daily Load - TMDL - Program and Regulations **as well as** ***Guidelines For Reviewing TMDLs Under Existing Regulations Issued in 1992*** from the EPA website (http://www.epa.gov). This information provided a better understanding of how the water bodies were ranked under Section 303(d) of the Clean Water Act and provided explanations of Load Allocations (LAs), Wasteload Allocations (WLAs), and Margin of Safety (MOS).

Alaska's 1998 Section 303(d) List and Prioritization Schedule from the Alaska Department of Environmental Conservation (ADEC) website (http:\\www.state.ak.us) Division of Air and Water Quality. This list provides a comparative look at several water bodies in the State of Alaska with their associated activity such as mining, log transfer facilities, and point sources as well as how they are ranked on the Tier System. Akutan Harbor ranks as Tier III that is a water quality-limited waterbody which have had assessments completed and now needs waterbody recovery plans compared to Dutch Harbor which is listed as Tier I that is a water-quality limited waterbody which requires water quality assessments to pollution and what controls are in place or needed. King Cove, is also listed as Tier III. A marina facility has been recently constructed and may provide comparative data to Akutan Harbor. Further research into this site may be required.

Five TMDL determination documents including;

1) ***Total Maximum Daily Load for Settleable Solid Residues in the Waters of Akutan Harbor, Alaska***
2) ***Total Maximum Daily Load (TMDL) for Biochemical Oxygen Demand (BOD_5) in the Waters of Akutan Harbor, Alaska***
3) ***Total Maximum Daily Load for Settleable Solid Residues in the Waters of King Cove, Alaska***
4) ***Total Maximum Daily Load (TMDL) for Biochemical Oxygen Demand (BOD_5) in the Waters of South Unalaska Bay, Alaska***
5) ***Total Maximum Daily Load for Biochemical Oxygen Demand in the Surface Waters of Ward Cove, Alaska***

were downloaded from the ADEC website (http://www.state.ak.us/dec/dawq/tmdl/fin_tmdl.htm) Division of Air and Water Quality. These were reviewed to help develop an understanding of the TMDLs within similar Alaskan environments and to assess the allocations that were developed as a result of current modeling and other scientific studies within Akutan Harbor.

A short paper on ***Greywater*** was downloaded (http://www.greywater.com) mainly for its direct bearing on two of the potential discharge components from each vessel and also provided general information of the breakdown time of sewage versus gray water.

A FAQ sheet of the **Clean Vessel Act by Boaters** from Florida Department of Environmental Protection (http://www.dep.state.fl.us/law/grants/CVA/CVAFAQsBoaters.htm) depicting concentrations of vessel sewage and corresponding BOD levels was downloaded.

The ***Budd Inlet Scientific Study Final Report (EHI, 1998)*** was reviewed for information regarding significant BOD loading data at Budd Inlet and how it may be applicable to Akutan Harbor. BOD5 data was collected at several stations and suggests that very seasonal influences from the freshwater lake, and algal blooms from Puget Sound contribute to the daily BOD load in this water body. Since Budd Inlet is one of the better flushed bays within the Puget Sound, and has several different geological and oceanographic characteristics than that which is reported for Akutan Harbor, it would be difficult to apply information from this study to Akutan.

The ***Review of Oceanography and Seafood Effluent Discharge in Unalaska Bay (EHI, 1993)*** was reviewed for information regarding circulatory patterns and DO levels within a similar Alaskan environment to develop better understanding of the local energetics of marine environments and considerations for numerical modeling.

An attempt to obtain ***Water Quality and Flushing of Five Puget Sound Marinas*** **(Cardwell,1980)** at the University of Washington resulted with the discovery of missing documents and publications.

ATTACHMENT 2

Results of Telephone and Email Contacts

Several contacts were made to persons with specific knowledge and may have insight into various marine issues as they relate to the engineering, biological, and operational concerns of marinas and water quality issues such as Biochemical Oxygen Demand Loading.

Vladimir Shepsis, PE - Coast and Harbor Engineering, Edmonds, WA (Phone)

Response:

He has worked extensively with marina and harbor development as well as physical and numerical modeling of currents. He was not familiar with any BOD requirements or regulations in past projects he has been part of. Most recently was the Port of Ilwaco marina where the emphasis was to reduce residence time to reduce potential pollution. He was not aware of any particular water quality standards to meet.

Glenn Grette, Biologist - Grette Associates Environmental Consultants, Wenatchee/Tacoma, WA. (Phone)

Response:

He has worked extensively with the marina development and mitigation for Port of Bellingham - Drayton Harbor Project. He did not perform the Environmental Impact Study however was not aware of BOD loading values ever being an issue there.

From a permitting point of view, Glenn would address the following:

Implement BMPs
Reallocate TMDL Distributions
Engineer for optimum circulation

Jayne Carlin - Alaska TMDL Program Manager, Seattle, WA (phone & email)

Jayne was in attendance at the coordination meeting of January 22, 2003. Most questions we asked of her were specific to the topics of that meeting and just needed elaboration or updating if possible.

Response:

Could not provide specific answers regarding when the TMDL for Akutan Harbor was established and from what total point and non-point sources was the 149,000 lbs./day derived. Response: "not sure".
She is not aware of any new modeling available or where on the EPA website that one could get an example of how to demonstrate that harbor projects would not affect Akutan Harbor DOs and TMDLs.
She was not aware of any other harbors that have been studied for BOD loading.

She did not know who kept the NPDES data records for this region but provided me with the number for Kim Ogel (EPA data management) who put me in contact with Chris Cora (EPA NPDES caseworker)

Jayne would forward my email to others within her division to see if they could provide some answers regarding this issue.

Chris Cora - EPA, NPDES Caseworker -Trident Seafoods Case worker, Seattle, WA (Phone)

Response:

It appeared to him that the 149,000 lbs./day TMDL BOD_5 was based on the 1998 NPDES data at which time Trident Seafoods was the major contributor to the loading with its allocation of 133,200 lbs./day BOD_5 along with Deep Sea Fisheries at 1,000 lbs./day BOD_5 with a 14,900 lbs/day MOS. To his knowledge, Trident Seafoods is the only remaining source of discharge within the bay and has reduced its loading down to 12 million lbs./year or 105,000 lbs./day avg.

Trident performs its own environmental monitoring but NPDES data could be obtained by submitting a FOIA. Contact person at Trident would be Earl Hubbard (206) 783-3818 or Steven Francais at Akutan Facility.

Also mentioned that since Trident now dumps its 'stick" water offshore, he would expect the fish pile to be reduced thereby reducing some of the loading.

Also mentioned abandoned military grounds leaking oil that Trident has contract to buy from the army. Since this site appears to be leaking oil into the bay (visual observations made by Trident) and as such contributing to the BOD loading by the breakdown of hydrocarbons.

Note: Chris will be in Alaska the week of August 18,2003 and may be able to make observations.

Skip Albertson - Department of Ecology, WA (phone)

Response:

He is aware of a few studies that occurred within the Puget Sound Region but could not recall specific issues. Most notably and probably the most intensive study over time he is aware of would be the Budd Inlet Study (EHI,1998).

Watershed permit manual contains guidelines for TMDLs. Several water bodies such as Hood Canal and Everett Slough are currently being studied for water quality standards. Bob Cuzomono with the Department of Ecology Watershed Development,(360) 407- 6688, may have further information regarding Port of Everett issues.

Harvey Smith - Alaska Department of Transportation and Public Facilities, AK (phone)

He was in attendance during coordination meeting of January 22, 2003. Most questions we asked of him were specific to the topics of that meeting and just needed elaboration or updating if possible.

Response:

When asked if he had run further numerical current models since the meeting of January 22 for the planned boat harbor, he had. Additional modeling has shown approximately a 300% improvement in the exchange coefficient for the boat harbor only. This would increase the numerical model coefficient from about 0.05 he achieved in January to about 0.17 by reducing the size of the entrance to the boat harbor.

From past studies that he has been a part of including Water Quality and Flushing of Five Puget Sound Marinas (Cardwell,1980), *he is confident that the resulting coefficient from numerical model, which tends to be more conservative, would be equivalent to a coefficient of approximately 0.34 on the physical model. He states that Cardwell (et.al) found that an average physical coefficient of 0.30 would provide sufficient exchange of water within marinas.*

He also clarified that his model refers to the proposed boat harbor only and does not model all of Akutan Harbor.

Mike Stoner - Environmental Officer, Port of Bellingham, WA (phone, return message)

Mike is involved with management of Squallicum Harbour, which houses about fifty, 50' to 100' fishing vessels.

Response:

The BOD issue never came up and they do not collect BOD or DO data.

Eric Lottsfeldt - Environmental Manager (Fisherman's Terminal), Port of Seattle,WA (phone)

Fisherman's Terminal houses about 350 vessels ranging in size from 30' to 340'

Response:

They are not required to perform any water quality monitoring other than their parking lot run-off that has its own NPDES permit. He recalls that the planting of trees along the shore, mitigated for the need to perform DO monitoring.

Only monitor specific parameters such as turbidity and occasionally DO during construction activities.

Leslie Socka - Environmental Permitting, Port of Seattle, WA (phone)

Leslie has prepared environmental permitting for most small marinas and larger harbor facilities as for the Port of Seattle as well as the Port of Tacoma.

Response:

The Port of Seattle is not tasked with monitoring any BOD loading or D.O. parameters at any of the Puget Sound Marinas under her jurisdiction nor has she had to address this issue in any detail for any of the permits she authors for marina development. She did mention that a couple of marinas on Lake Washington (freshwater) may be currently be monitoring for DO levels.

Jack Ward – MEC (phone)

Jack is a senior marine biologist, and has worked on numerous water quality, sediment, benthic invertebrate, and marine organism issues.

Response:

While Jack knew of marine BOD measurements that have been collected in bays and inlets, and in fact his company provides laboratory services for running BOD_5, almost all such samples have been collected for point source discharges. He is unaware of any measurements regarding BOD levels within marinas, nor does he know of any established BOD limits for, or typical BOD levels for, boat marinas.

Susan Bauer - Port Planner, Port of Port Angeles, WA (phone)

The Port of Port Angeles was contacted since it was brought up that John Wayne Marina, within the Ports' jurisdiction, may currently be under study or had BOD loading issues addressed in the past. Susan Bauer manages the Ports permitting records and has copies of Environmental Impact Statements (EIS) from John Wayne Marina in Sequim, WA.

Response:

She is aware that several water quality issues were addressed in the past during the development of the marina and the subsequent EIS in 1984. However, she mentioned that the EIS is four volumes and would be a bit of a production to review for specific information but is willing to do so if requested. Currently there is no water quality or sediment quality monitoring taking place within the marina. Battelle Labs in Sequim, WA may have data of past monitoring.

Port Angeles Harbor is under continual monitoring since it is industrialized and has significant deposits of wood chips on the bottom since the Ports' establishment.

Ralph Petorite, PE - Reid Middleton, Everett, WA (email)

Has worked on several marina and harbor designs.

No response to date.

Mary Sue Brancato, Toxicolgist - NOAA, Port Angeles, WA (Email)

Has directed work on several environmental toxicological programs such as the EPA mandated Long-Term Monitoring Program for Tributyltin that the collection on auxiliary water quality data from regions and marinas around the country. She also worked closely with Rick Cardwell on many of his studies.

Response:

She didn't have much information on BOD issues as they relate to harbors and marinas.

ATTACHMENT 3
Assessment of Corps of Engineers Reasoning

The Army Corps of Engineers (COE) takes into consideration eight (8) sources of BOD loading from marina construction and operations applicable to the boat harbor at Akutan. They have categorized these sources as "Not Significant" such as algal blooms, debris, fish waste, petroleum products, and bilge water. Sources such as boat sewage, gray water, dredging, and storm runoff have been categorized as "Significant".

Sources within Akutan indicate that algal blooms, that are a significant source of BOD loading in the lower 48 states including Puget Sound, do not occur. Therefore the COE has minimized any significant impact that an algal bloom would have. Debris, fish waste, and bilge water should not occur within the confines of the marina if Best Management Practices (BMP) are met and have been determined that BOD loading from these sources would be negligible.

Included as not significant, is the contribution of petroleum hydrocarbons from vessels within the marina to daily BOD loading. Although COE expects all fueling to take place at the Trident Seafood Dock and not within the marina, they have allowed for a daily spillage of approximately 3.3 gallons of diesel contributing to a daily BOD loading of approximately 0.03 lbs/day if it was assumed that it would take 5 years for the hydrocarbons to degrade and approximately 29 % evaporated within 30 days. A worst-case event of a 10,000 gallon spill was calculated to exert approximately 104 lbs. of BOD per day if the spill degrades over 5 years and not assuming any flushing.

Based upon the literature reviewed, the maximum BOD loading values the COE applies to sewage and gray water provides a conservative estimate of BOD loading from these sources if BMP are not met within the marina. Dredging has been included as a significant source, however will only occur during the construction and subsequent maintenance of the marina (25 years est.) and only accounts for approximately 5 % BOD lbs/day contribution of the worst-case during these times.

The most significant loading as outlined by the COE would be a result of storm water runoff in both worst-case and expected scenarios. The worst-case scenario for rain runoff maximizes the highest daily record rainfall of approximately 5 inches in Akutan with no swales or drainage on an 18 acre gravel lot. Using proper BMP by the application of graded fill with vegetative swales and based on the mean daily record high rainfall of approximately 2 inches, the BOD loading from this source is reduced to about five percent of the worst-case estimate. At an expected BOD loading of 26.21 lbs/day, storm water runoff is estimated to contribute the most to the total BOD loading from the marina.

Based upon the recovered literature and contacts made regarding BOD loadings within marinas, COE's assessment of the worst-case and expected daily BOD loading values appear to be valid and conservative.

FEIS-APPENDIX 6

404(b) (1) EVALUATION
INLAND MOORING BASIN
AKUTAN NAVIGATION IMPROVEMENTS, ALASKA

Section 404(b)(1) GUIDELINES EVALUATION (40 CFR PART 230) FOR AKUTAN NAVIGATION IMPROVEMENTS PROJECT (DREDGE DISPOSAL ACTIVITIES)

I. PROJECT DESCRIPTION

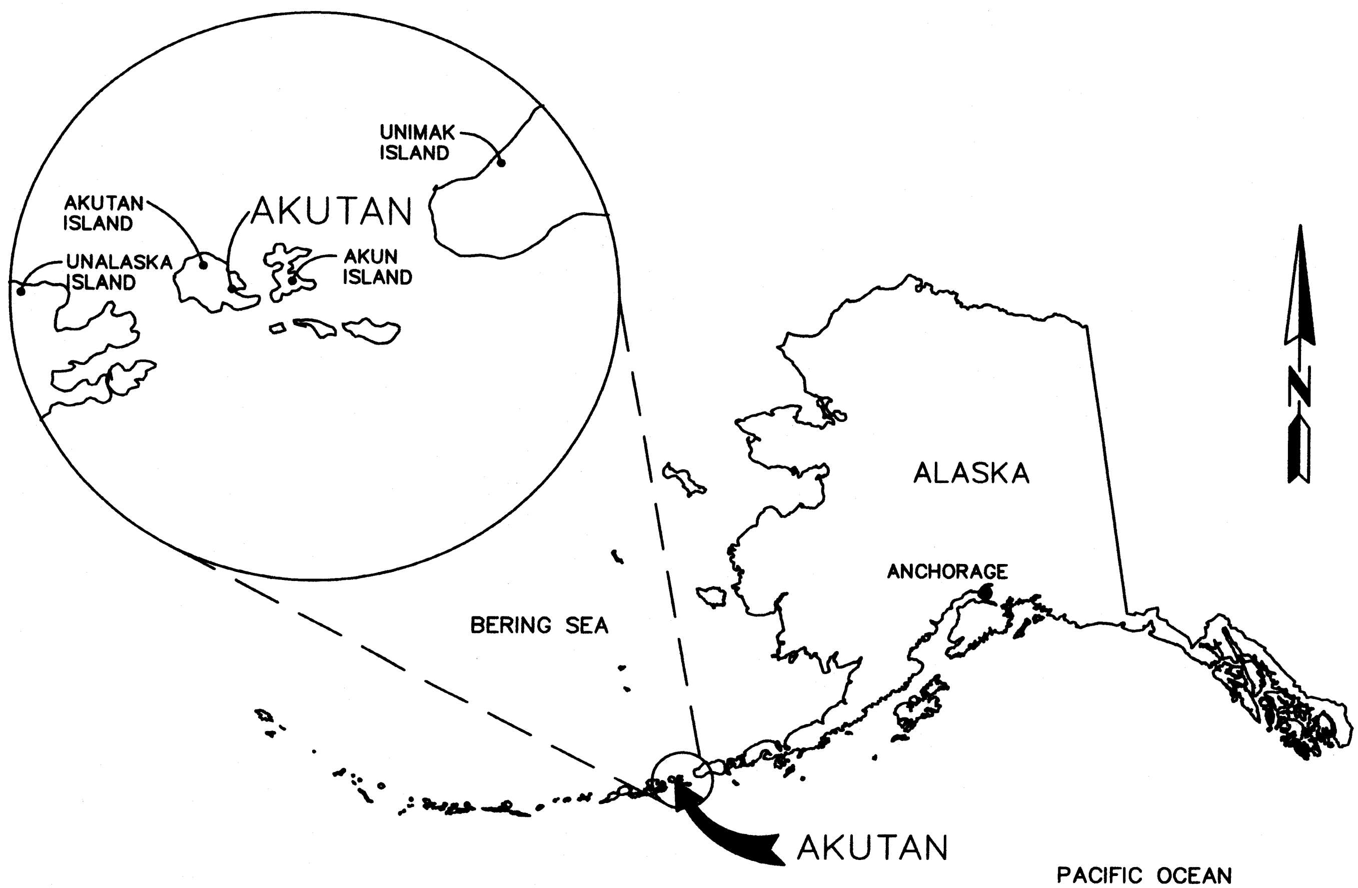
Project Authority and Purpose: The Akutan Navigation Improvements study is authorized under the Rivers and Harbors in Alaska study resolution adopted by the U.S. House of Representatives Committee on Public Works on December 2, 1970. The House Conference Agreement, dated September 12, 1996, appropriated funds to initiate reconnaissance studies of navigational needs at several of Alaska's coastal communities, including Akutan.

The purpose of the Corps' proposed action is to provide a safe and efficient harbor for the Bering Sea commercial fishing fleet and the City of Akutan. Since the early 1980s, the City of Akutan has been pursuing various means to construct a boat harbor to serve these vessels. Currently, there is no protected moorage at Akutan and these vessels must travel to other locations to obtain provisions for fishing and to moor during closed fishing periods. Portions of the crab and groundfish vessels operating in the Bering Sea that do not deliver product to Akutan also 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.

Project Location and General Description: 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 1). It is in the eastern Aleutian Islands and one of the Krenitzin Islands of the Fox Island group. Akutan Island 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. The average annual temperature is 40.9 °F, and the average winter and summer temperatures are 34.7 °F and 49.8 °F, respectively.

The City of 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. 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 proposed harbor site is in a glacially carved, steep walled, volcanic bedrock valley, or fjord, at the head of Akutan Harbor. The harbor basin would include an entrance channel and turning basin, both –18 feet mean lower low water (MLLW), and two rubblemound breakwaters designed to protect the harbor entrance. The mooring basin would have project depths of –14, –16, and –18 feet MLLW. Dredged material would be stockpiled onshore at the head of Akutan Harbor.



LOCATION MAP, AKUTAN, AK

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE 1

General Description of Dredged or Fill Material: Approximately 843,000 cubic yards of material would be dredged from an area where a harbor basin would be constructed, and disposed of adjacent to the harbor. The upper 4 to 6 feet of material to be dredged consists of silty-sand with organics. The material below this layer has been characterized as coarse to fine-grained sands (Shannon & Wilson, 2001).

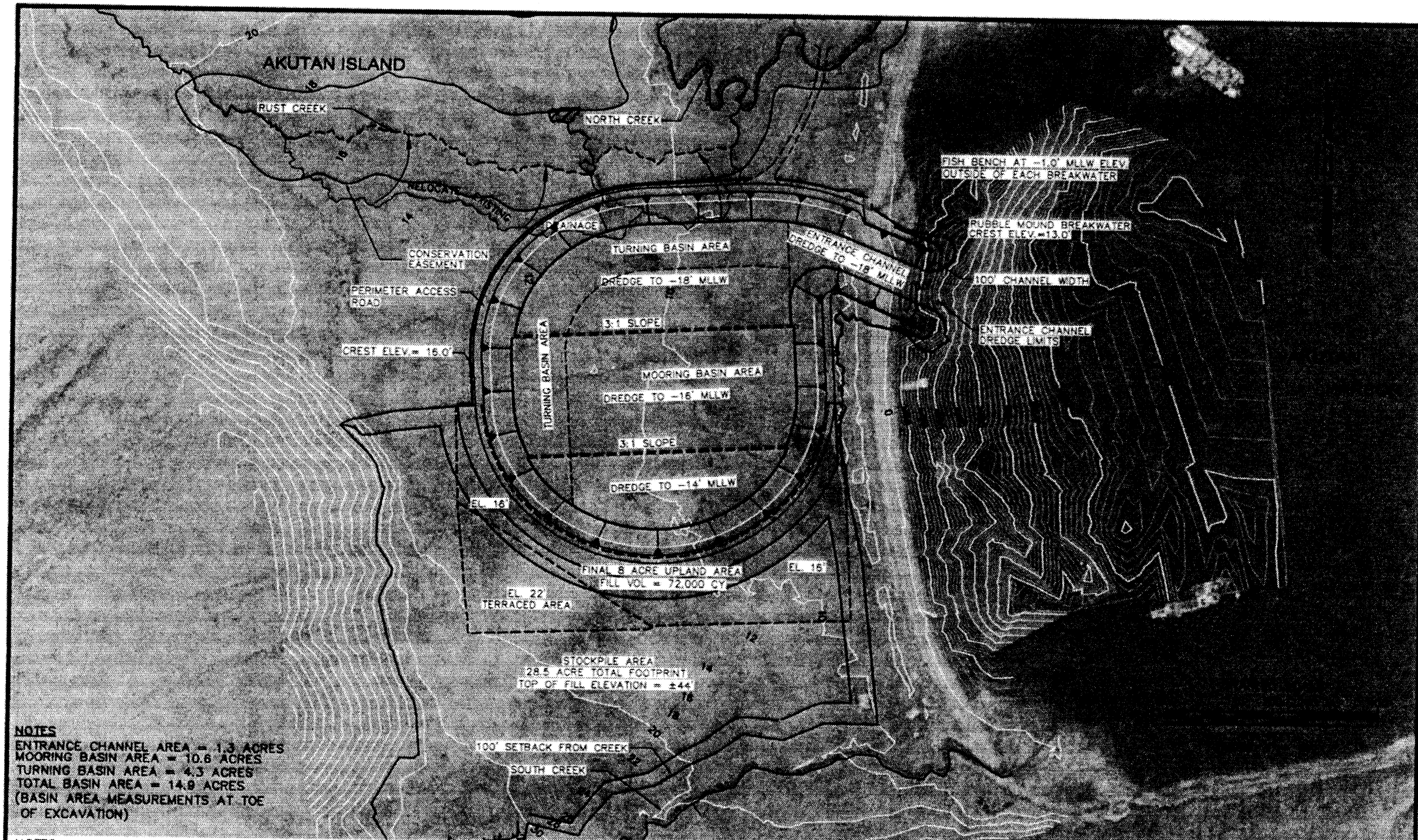
Description of the Proposed Discharge Site: The 28.5-acre, dredged material disposal site is at the head of Akutan Harbor, adjacent to the harbor basin in area wetlands and uplands (figure 2). Approximately 71,000 cubic yards of dredged material would be used to construct a harbor staging area and the balance of dredged material (772,000 cubic yards) would be used to construct a 20.5-acre stockpile area. The harbor project would be constructed over a period of 2 years.

Description of Disposal Method: 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.

II. FACTUAL DETERMINATION

A. Physical Substrate Determination

Two distinct areas would be dredged and filled. The mooring basin, turning basin, and part of the entrance channel would be excavated out of an area containing a mix of wetlands and uplands. The remaining part of the entrance channel and the foundation of the rubblemound breakwater would be dredged out of the near-shore marine environment. The undeveloped 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. The majority of the harbor basin and staging area would be between 1 and 4 meters above sea level. The dredged material stockpile would be between 2 and 9 meters above sea level. The characters of the substrate at the proposed disposal site would change from being a richly organic soil to a sandy/gravelly soil type. The top-elevation of the new substrate would rise to approximately 44 feet (13 meters) above sea level and its sides would slope down and terminate around 6 feet (2 meters) above sea level.



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 2

B. Water Circulation, Fluctuations, and Salinity Determinations

Because the proposed dredged material disposal site is onshore at the head of Akutan Harbor, it would not affect Akutan Harbor's water circulation, fluctuations, or salinity. However, the hydrology of the uplands would be unavoidably and significantly impacted by construction of the dredged material stockpile, the staging area, and the harbor basin.

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 head-ward 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 expected 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:

- 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 headward erosion to the north and the south. An extreme situation would be stream piracy, whereby an eastward-flowing stream is intercepted, causing the headward 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 expected to change providing harbor construction directly avoids these creeks.

The Corps believes that incorporating the U.S. Fish and Wildlife Service'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 will mitigate to the maximum extent practicable, the project's potential environmental impacts on the head of Akutan Harbor's hydrology.

C. Suspended Particulate/Turbidity Determinations

The large volume of material to be dredged, coupled with disposal via upland stockpiling, would likely mean that the project's construction season would extend 2 years. 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. Turbid water produced while dredging the inland mooring basin would remain isolated from Akutan Harbor until such time that the entrance channel is constructed. Upon breaching the entrance channel, an undetermined volume of turbid water would begin discharging into Akutan Harbor.

In addition to increasing turbidity, dredging activities could increase suspended solids, decrease dissolved oxygen concentrations, and increase dissolved nutrients concentrations in receiving waters. A decrease in water clarity and suspension of fine materials could be associated with increased turbidity and suspended solids. 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 will do. However, the reduction in dissolved oxygen is usually brief. A study of dredged material released in San Francisco Bay showed a 3 to 4 minute reduction in dissolved oxygen near the point of release (USACE, 1973), and another study in New York Harbor showed a small reduction in dissolved oxygen near the dredge, but no reductions in levels 200 to 300 feet away from the dredging activities (Lawler, Matusky, and Skelly, 1983). Nutrients could be released into the water column during the dredging operations, but are not expected to promote nuisance growths of phytoplankton, as water temperatures are too low and the dredging period too short to facilitate growth. Furthermore, the material to be dredged (sand and gravel) is not conducive to having toxic metals and organics, pathogens, and viruses absorbed or adsorbed to its surface and becoming biologically available to organisms either in the water column or on the substrate.

The recommended plan would construct dredged material stockpiles in wetlands and uplands adjacent to the mooring basin. It is the turbid water draining from the wet, stockpiled sediment 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 settling basins constructed adjacent to the mooring basin.

D. Contaminant Determination

An environmental site investigation was performed at the proposed harbor site at the head of Akutan Harbor (Shannon & Wilson, Inc., 2001), the results and findings of which are presented in this section. Thirty-one test pits were excavated in and near the proposed mooring basin. Subsurface soil samples were analyzed and classified from 11 of the test pits, as well as marine sediments collected along the beach at the harbor site

Approximately 40 to 50, 55-gallon steel drums were observed in and near the project site, primarily on the beach berm separating the freshwater wetlands from the head of Akutan Harbor. No intact containers with measurable amounts of waste or product were observed within the project area, so no waste samples were collected. Four former dump areas were observed on the beach berm, one of which appeared to be within the project area. The dumps appeared to contain primarily metallic debris. No stained soil or other indication of contamination was observed during the field investigation.

Low concentrations of diesel range organics (DRO) and residual range organics (RRO) were reported in most of the soil samples throughout the site. Study chemists noted that naturally-occurring organic matter was quantified as petroleum hydrocarbons in six of the samples. The soil samples contained DRO up to 10 milligrams per kilogram (mg/kg) and RRO to 28 mg/kg. These levels do not exceed the applicable Alaska Department of Environmental Conservation Method 2 soil cleanup levels contained in 18 AAC75.341 for areas with less than 40 inches of annual rainfall.

The volatile organic compound tetrachloroethene (PCE) was reported in six soil samples at up to 160 micrograms per kilogram (ug/kg). The four samples above the ADEC Method 2 soil cleanup level for PCE (30 ug/kg) were collected from the northern and central portion of the study area. Due to elevated detection limits, only two of the samples collected from the site contain less than the ADEC Method 2 soil cleanup level. The remaining samples had detection limits above the associated ADEC cleanup level, and therefore could contain concentrations of PCE above the ADEC Method 2 cleanup level of 30 ug/kg. Concentrations of PCE were not reported in the groundwater samples collected at the site. The source and extent of the PCE contamination are not known; however, there is a possibility that the detection of PCE may be a data anomaly due to contamination of the sample either in the field or in the laboratory.

Petroleum hydrocarbons (DRO and/or RRO) were reported in each of the groundwater samples collected at up to 3.7 milligrams per liter (mg/L) DRO and 2.1 mg/L RRO. ADEC cleanup levels for these compounds are 1.5 and 1.1 mg/L, respectively. The test pit and two monitoring points with groundwater cleanup level exceedances were located near the central portion of the site.

Several volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) were reported in the soil and groundwater samples. Aside from PCE, the concentrations do not exceed cleanup levels. The VOCs commonly associated with petroleum products were not reported in the soil or water samples.

Except for the detection of arsenic, which was within typical naturally occurring levels, RCRA metals, copper, and zinc concentrations in the soil samples did not exceed cleanup levels. Metals results exceeded the applicable cleanup levels in four groundwater samples. The high level of sediment in one of these samples was thought to cause the total metals concentrations to be elevated.

Additional site-contamination investigation work will be performed during the Preconstruction Engineering Design phase of the project, and all sites requiring cleanup will be prior to project construction.

Samples met testing exclusion criteria since there are no known sources of contamination within the footprint of the site; the material is considered to be in a mild current/wave energy area, and sediment is composed predominantly of sand, gravel, and other bottom material with particle sizes larger than silt. Evaluation to determine the need to test material to be dredged is based upon guidance in the *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual.*

E. Aquatic Ecosystems and Organism Determinations

The discharge of dredged and fill material into the wetlands and on the uplands at the head of Akutan Harbor would have an impact on the area's aquatic ecosystem and the animals inhabiting it. Wetlands, a Special Aquatic Site, would be most impacted by the project. Approximately 57 acres of wetland (44 acres) and upland (13 acres) habitat would be impacted by the entire project. The dredged material stockpiles would affect approximately 11 acres of wetlands and 9 acres of uplands. The plankton, benthos, and nekton inhabiting the wetlands would be unavoidably and adversely impacted, as the streamlets and small open water areas within the wetlands would be filled with dredged material. Wildlife (passerines, waterfowl, seabirds, and small mammals) associated with the affected wetlands would be permanently displaced to other wetlands at the head of Akutan Harbor. The project would not affect the following aquatic ecosystems: sanctuaries and refuges; mud flats; vegetated shallows, coral reefs, and riffle and pool complexes. No aquatic ecosystem-related threatened and endangered species would be affected by the project.

F. Proposed Disposal Site Determinations

Approximately 843,000 cubic yards of material would be disposed of on uplands and in wetlands adjacent to the project site. The total footprint of the dredged material stockpile would be approximately 20 acres, and the stockpiles' height would be approximately 44 feet above sea level. No open water disposal of dredged material is proposed for this project because it would cause more of an adverse and significant environmental impact on the marine environment than it would on the wetlands and their fish and wildlife resources. In addition, the associated costs of deepwater disposal are exorbitantly high. The Corps, project sponsors, USFWS, USEPA, and state resource agencies will continue to evaluate ecosystem restoration opportunities for the beneficial use of dredged material, 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).

No mixing zone issues are associated with this action.

The human use characteristics of the area would change as a result of the dredged material disposal activity. The area is currently totally undeveloped and is occasionally used by Akutan residents and Trident Fisheries employees for recreation (hiking, sport fishing, picnicking). With construction of the harbor and dredged material stockpiles, recreation activities in the Central Creek drainage would be eliminated; however, recreation activities in the North and South creek drainages would not be impacted. Subsistence uses of the area are primarily limited to anadromous fishing in North and South creeks, both of which are outside the dredged material disposal areas.

No municipal and/or private water supplies would be affected by the dredged material disposal activities because none exist in the area.

The aesthetics associated with the aquatic ecosystem at the head of Akutan Harbor would be altered by the harbor project and the construction of dredged material stockpiles. The beauty of the natural aquatic ecosystem would be marred by the construction of the stockpiles and the harbor development that likely would follow.

No parks, National and Historic Monuments, National Seashores, Wilderness areas, research sites, or similar preserves would be affected by the project because none exist in the area.

G. Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem.

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 disposal of the mooring basin's dredged 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.

Recent discussions with representatives from the Akutan community and the 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 can 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 could 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 was used (e.g. road construction, airport construction, or ecosystem restoration projects), suitable harbor uplands would be made available for development.

It is the turbid water draining from the wet, stockpiled sediment that has the potential to adversely impact the water quality at the head of the bay 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 settling basins constructed adjacent to the mooring basin. In addition, the stockpiles material could be used as fill material for other unforeseen development projects.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. Six dredged material disposal alternatives have been identified (table 1). 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 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. 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, these 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 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. The Corps, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game 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 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 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. Secondarily, 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 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 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 is approximately 13 acres of privately owned property that is currently being used as a crab pot storage facility. Commercial fishing vessels often use its dilapidated woodpile pier. The site is also eligible for listing on 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 843,000 cubic yards of dredged material, and for the aforementioned circumstances, the site does not appear to be practicable.

3. Approximately 30 acres of non-wetlands were identified within the survey 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.

4. 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 material 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 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.

5. The planned disposal of dredged material would not violate any applicable State of Alaska water quality standards with the exception of turbidity. Turbidity standards would be violated within the mooring basin while it is being constructed (i.e., dredged out) and while the dredged material stockpiles are being constructed (i.e., runoff from the stockpiles would flow into the harbor basin). The mooring basin would not be connected to Akutan Harbor until after it has been constructed. At that time, construction of the entrance channel would begin. A substantial amount of time would be allowed for turbidity in the mooring basin to decrease prior to it being connected with Akutan Harbor, and even at that time, the connection would only occur when it is ecologically acceptable to do so. The disposal operation would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

6. The following is the dredged material disposal mitigation plan:

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 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.

- Containing runoff from dredged material stockpiles and filtering/treating it (e.g. primary treatment settling basins) before releasing the runoff 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 would be located in the stockpile footprint area such that no additional wetlands would be 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.

6. On the basis of the Section 404 (b)(1) Guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

IV. References

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.

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.

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.

Shannon & Wilson, 2001. Environmental Site Investigation Report – Final, Akutan Small Boat Harbor, Akutan, Alaska. Submitted to Tryck Nyman Hayes, Inc. Anchorage, AK. 33 pp + appendices.

U.S. Army Corps of Engineers (USACE). 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. EPA. 1984. Effects of seafood waste deposits on water quality and benthos, Akutan Harbor, Alaska. EPA 910/9-83-114. Seattle, WA.

FEIS-APPENDIX 7

Coastal Consistency Analysis of the U.S. Army Corps of Engineers Alaska District Akutan Navigation Improvements Project

Coastal Consistency Analysis of the U.S. Army Corps of Engineers Alaska District Akutan Navigation Improvements Project

The Corps' Akutan Navigation Improvements project is 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 (Plan) policies and guidelines follows. (1) (2) The headings in this analysis correspond to those used in the Plan.

A. FISH AND WILDLIFE

A-1 ***<u>Priority Use:</u>*** *Maintenance and enhancement of fisheries habitats are considered a highly important use of local and State concern when reviewing proposals for activities or uses which may adversely affect spawning, rearing, migrating, or over wintering areas for anadromous fish. Maintenance of water quality and quantity for the continued propagation of anadromous fish stocks shall be considered a high priority water use within the AEB.*

Anadromous fish habitat in North and South creeks will not be directly affected by the Corps' project. Establishing conservation easements, especially in the North Creek drainage, would ensure the maintenance of good water quality and adequate in-stream flows. Incorporating best management practices during construction would also ensure that North and South creek's anadromous fish habitat would not be adversely impacted.

A-2 ***<u>Habitat Alteration:</u>*** *Development activities and facility sites shall meet, at the minimum, the criteria established under State regulation, including the standards for protection of habitats in 6 AAC 80.130, which include: offshore areas; estuaries; wetlands and tideflats; rocky islands and seacliffs; barrier islands and lagoons; exposed high-energy coasts; rivers, streams, and lakes; and, important upland habitat.*

The Corps's project will not affect offshore areas managed as fisheries conservation zones; therefore, the State's sport, commercial, and subsistence fishery will also not be affected. Approximately 44 acres of palustrine emergent wetlands and associated ponds would be unavoidably impacted by the project. The wetland impacts are being confined as much as possible to the central drainage area, avoiding the essential and beneficial wetland habitat in the North and South creek drainages. Constructing the mooring basin would unavoidably destroy Central Creek and associated ponds; however, North and South creeks would not be adversely impacted by the project. The following habitats will not be affected by the Corps' project because they are not present in the project area:

---

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

(2) For brevity, the AEB plan's policy and guidelines have been paraphrased in the analysis.

tideflats; estuaries; rocky islands and seacliffs; barrier islands and lagoons; exposed high-energy coasts; and, important upland habitat.

A-3 ***Mitigation:*** *All land and water use activities shall be conducted with appropriate planning, implementation, and monitoring/enforcement to mitigate potentially adverse effects and/or cumulative impacts on the following resources of local, state, or national importance: fish and wildlife populations and their habitats; commercial fishing uses and activities; subsistence and personal use resources and activities; air and water quality; cultural resources; and, recreation resources. The cost of mitigation relative to the benefit to the coastal resource will be considered in the implementation of the policy. The AEB's order of mitigation preference is: (1) avoidance; (2) minimize; (3) to the extent feasible and prudent, restore or rehabilitate the resource to its pre-disturbance condition; and (4) compensate for the loss by replacing, enhancing, or providing substitute resources or environments. Compensation can be in-kind or out-of-kind, and off-site or on-site. The preferred option is in-kind and on-site, to the extent feasible and prudent.*

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. 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 of 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 dredged material (843,000 cubic yards verses 850,000 cubic yards).

The Corps believes that incorporating the U.S. Fish and Wildlife Service's recommendations [as identified in their Fish and Wildlife Coordination Act (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 will mitigate to the maximum extent practicable, the potential environmental impacts associated with the project. Unavoidable impacts have been compensated to the extent justified.

<u>Harbor Design and Construction</u>

1. The environmentally preferred alternative (i.e., the reconfigured 12-acre, 58-vessel mooring basin) is selected as the recommended plan; not the National Economic Development Plan, which would be the 20-acre, 80-vessel or larger 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 would 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 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 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 would construct the project primarily within the Central Creek watershed.

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 be permitted between March 30 and June 15 (the period of time that no Steller's eiders and out-migrating pink salmon are present in the project area) provided it could be clearly demonstrated that the work site was 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 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 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; 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 would 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 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.

- Containing runoff from dredged material stockpiles and filtering/treating (e.g. primary treatment settling basins) it before releasing runoff 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 were 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.

9. The spur access road leading from the harbor to an existing 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 during construction, the Corps would 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 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.

13. To compensate, in part, for the unavoidable loss of wetlands and fishery resources in the Central Drainage area, a conservation easement would be established along Rust Creek and within 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.

<u>Harbor Operation</u>

1. 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 would 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 would coordinate with the landowner (Akutan Corporation) to establish a 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 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, 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.

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/conservation measures require third party (e.g. Akutan Corporation, Trident Seafoods, State of Alaska, U.S. Coast Guard, or USFWS) agreement/participation to ensure implementation.

A-4 ***<u>Instream Flow</u>:*** *Except for public water supplies and domestic use, appropriation of water from rivers, streams, lakes, or wetlands shall not decrease flow below the amount determined necessary by ADF&G and USFWS to protect fish and wildlife resources.*

No water is proposed to be withdrawn from any area water resources.

A-5 ***<u>Maintenance of Fish Passage and Stream Characteristics</u>:*** *Development activities, facilities, and structures shall be designed, sited, constructed, operated, and maintained in a manner which allows efficient passage of fish, and does not impede the use of anadromous fish spawning and rearing areas.*

Central Creek would be unavoidably destroyed by constructing a mooring basin within its drainage. Dolly Varden and threespine stickleback habitat within the creek would be destroyed. The anadromous fish streams in the area (North and South creeks) would not have their respective stream characteristics altered by the Corps' project. A small tributary (Rust Creek) that drains into North Creek would be reconstructed and enhanced to allow anadromous fish use where none was used before.

A-6 ***<u>Caribou Disturbance</u>:*** Not applicable because no caribou inhabit the area.

A-7 ***<u>Use of Explosives</u>:*** Not applicable because no explosives will be used in constructing the Corps' project.

A-8 ***<u>Seabird Colonies and Marine Mammal Haul-outs</u>:*** *Seabird colony sites and haul-outs and rookeries used by sea lions, walrus, and harbor seals shall not be physically altered or disturbed by structures or activities in a manner that would preclude or interfere with continued use of these sites.*

Constructing a harbor at Akutan Point was prohibited primarily because of the seabird colony located there. The Akutan Point seabird colony will not be affected by the Corps project, as it is located at the mouth of Akutan Harbor, some 3.5 miles away. No haul-outs and rookeries used by sea lions, walrus, and harbor seals are located in Akutan Harbor.

A-9 ***<u>Gray Whale Migration and Feeding</u>:*** Not applicable because no gray whales inhabit the area.

A-10 ***<u>Water Intake Structures</u>:*** *Water withdrawal intakes shall be designed, operated and maintained to prevent entrainment or impingement of fish.*

Water intake structures might be used to pump pooled stockpile runoff into settling ponds. No fish would be expected to inhabit the stockpile pools or settling ponds. Under no circumstances would water intake structures be placed in anadromous fish streams.

A-11 <u>Disturbance by Aircraft</u>: *Aircraft traffic shall not disturb seabird colonies between April 15 and September 30; and, identified haul-out sites between May 1 and July 31 for sea lions, between April 1 and November 30 for walrus, and between March 1 and September 30 for harbor seals.*

Aircraft access to Akutan is via scheduled commercial flights, which are governed by FAA Regulations to avoid the subject wildlife areas. Chartered flights would be instructed to avoid the Akutan Point seabird colonies and be required to adhere to FAA wildlife-protection regulations.

B. AIR AND WATER QUALITY

B-1 <u>Standards</u>: *All permits, leases or plans of operation for land or water uses which may directly affect water quality will require that these activities be sited, designed, constructed and operated to provide a reasonable assurance that discharges shall meet water quality standards for the receiving waters.*

The reconfigured 12-acre mooring basin would have limited circulation but studies indicate that water quality standards within the basin should not be violated under normal conditions. Low tidal exchange coupled with prolonged calm, wind conditions, however, could exasperate water quality conditions. Construction activities (dredging, breakwater placement, stockpiling dredged material, etc.) would cause a temporary increase in near-shore turbidity.

B-2 <u>Environmental Protection Technology</u>: *The most effective equipment and technology shall be used for limiting emissions and effluents, and handling, storing, cleaning up, and disposing of oil and hazardous materials.*

The project's mitigation plan (see section A-3 of this document) identifies the measures to be taken to ensure compliance with this policy.

B-3 <u>Wastewater Discharge</u>: *To the extent feasible and prudent, the discharge of waste-water or other effluent into fresh or marine waters shall be located in areas of least biological productivity, diversity, and sensitivity and where effluent can be controlled, contained or effectively dispersed by currents.*

The harbor would be constructed to provide reasonable assurance that any discharges from dredging and stockpiling operations would meet water quality criteria for the receiving waters uses.

B-4 <u>Refuse Disposal</u>: *To the extent feasible and prudent, disposal sites for refuse and putrescible wastes must be located in upland sites, avoid the destruction of important habitats, and designed and operated to avoid pollution of surrounding areas and to avoid creation of an attractive nuisance for wildlife.*

No on-site areas would be used for refuse disposal. Solid wastes would be collected and those not capable of being incinerated locally, would be collected and barged off-site to an approved landfill.

B-5 ***<u>Hazardous and Toxic Waste</u>:*** *Storage, transportation, cleanup, and disposal of hazardous materials (as defined in the Hazardous Materials Transportation Act) shall comply with federal, state, and local laws and regulations.*

No hazardous materials (as defined in the Hazardous Materials Transportation Act) are expected to be transported to, or used/generated at, the project site

B-6 ***<u>Siltation and Sedimentation</u>:*** *Uses and activities shall avoid causing increases in sedimentation, siltation, and the resulting turbidity that could have a significant adverse impact to aquatic productivity and habitats, marine fish, shellfish, or anadromous fish populations in marine, estuarine, and freshwater environments.*

Construction of the mooring basin would be isolated from the marine environment until such time it becomes necessary to dredge/construct the entrance channel and rubblemound breakwaters. Silt curtains would be installed to restrict the turbidity from spreading uncontrollably into the marine environment. Timing restrictions for dredging would be implemented to avoid adversely impacting over-wintering Steller's eiders and out-migrating juvenile salmon.

B-7 ***<u>Sewage Disposal</u>:*** Not applicable, as no sewage ponds and treated sewage outfalls would be constructed as part of the Corps' project.

B-8 ***<u>Storage of Petroleum and Petroleum Products</u>:*** *To the extent feasible and prudent, the storage, processing, or treatment of 500 gallons or more of petroleum or petroleum products shall be sited a minimum of 200 feet from ordinary high water or MHHW of any surface waters and bermed to retain 115% of the tank capacity.*

The Corps' contractor would likely transport bulk fuel containers to the project area to operate construction equipment. The contractor would be required to comply with the conditions of this policy.

B-9 ***<u>Discharge of Drilling Muds and Production Waters</u>:*** Not applicable, as no drilling muds and/or production waters would be generated as part of the Corps' project.

B-10 ***<u>Oil and Gas Operations</u>:*** Not applicable, as no oil and gas plans of operation and development and production plans are part of the Corps' project.

B-11 ***<u>Spill Containment and Cleanup Equipment</u>:*** *To the extent feasible and prudent, any petroleum or petroleum product transport, storage, or refueling operation of 5,000 gallons or more shall maintain or have access to oil spill containment and cleanup equipment located at or near their sites of activity. Personnel trained in the use and* *maintenance of this equipment shall be readily available in the event of a spill or accidental discharge incident.*

The contractor would be required to have oil spill prevention and cleanup supplies on site during construction, as well as personnel trained in its use. The Corps is also requiring the project sponsor to have an Akutan Harbor Management Plan, which will include a Harbor Oil Spill Prevention and Cleanup Contingency Plan.

B-12 ***Shoreline Development:*** *Harbor, port, marina, seafood processors, and other waterfront facility designs shall incorporate provisions for the proper storage, transfer, disposal, and handling of petroleum products and fuel, solid waste, waste oil, sewage, and refuse in accordance with local, state, and federal regulations.*

The Corps is requiring the project sponsor to develop an Akutan Harbor Management Plan, which will include a Harbor Oil Spill Prevention and Cleanup Contingency Plan, as well as provisions for the proper storage, transfer, disposal, and handling of petroleum products and fuel, solid waste, waste oil, sewage, and refuse in accordance with local, state, and federal regulations.

B-13 ***Planning and Coordination (Administrative Policy):*** *The AEB will participate in planning processes to identify appropriate sites for the storage, transportation, treatment, or disposal of hazardous substances, or to identify responses to emergencies resulting from accidents involving hazardous substances.*

The Corps does not expect the project to generate or use any hazardous substances. The Corps is requiring the project sponsor to develop an Akutan Harbor Management Plan, which will require that the AEB participate in planning processes to identify appropriate sites for the storage, transportation, treatment, or disposal of hazardous substances, or to identify responses to emergencies resulting from accidents involving hazardous substances.

B-14 ***Oil Spill Contingency Plans (Administrative Policy):*** *The AEB will participate in the development and review of oil spill contingency, spill containment, and cleanup plans, when such plans are required by federal or state statutes or regulations.*

The Corps is requiring the project sponsor to develop an Akutan Harbor Management Plan, which will require that the AEB participate in the development and review of oil spill contingency, spill containment, and cleanup plans, when such plans are required by federal or state statutes or regulations.

C. GEOPHYSICAL HAZARDS

Section 5.7 (Geotechnical Stability) in Appendix A (Hydraulic Design) of the project's Feasibility Report addresses in depth the issues surrounding the following AEB coastal management plan policies and guideline headings:

- C-1 Design and Siting Criteria
- C-2 Erosion
- C-3 Coastal Seiche/Tsunami Flooding
- C-4 Landslides and Mass Wasting Hazards
- C-5 Riverine Flooding
- C-6 Seismic Hazards

Synopsis: Akutan is in a very active seismic zone and has several significant features that merit special harbor design considerations. The existing soils (medium dense, well-graded, coarse, sand) at the head of the bay have been found to be only moderately prone to liquefaction. It is likely that during a major earthquake some damage would occur to the harbor slopes, making it important to carry riprap down to the reinforced toe structure. Slopes of 3:1 for the breakwater were investigated and proved to offer more stability during seismic events. Buildings around the harbor site would likely be placed on fill. All buildings should be placed on engineered foundations of piles or compacted base material.

D. COASTAL DEVELOPMENT

D-1 ***<u>Consolidation and Subsequent Use</u>:*** No cargo handling storage, or other facilities would be constructed by the Corps as part of its project. However, the State of Alaska would construct the mooring basin's mooring facilities (floats, docks, etc).

D-2 ***<u>Dredge and Fill</u>:*** *Projects that require dredging or filling in streams, rivers, lakes, wetlands, tidelands or estuaries shall:*

- ***D-2.1*** *minimize significant impacts to important fish and wildlife habitat;*
- ***D-2.2*** *avoid significant interference with fish migration, spawning, and rearing, as well as critcal life history phases of wildlife;*
- ***D-2.3*** *limit areas of direct disturbance to as small an area as possible;*
- ***D-2.4*** *minimize the amount of waterborne sediments traveling away from the dredge or fill site;*
- ***D-2.5*** *maintain circulation and drainage patterns in the area of the fill; and*
- ***D-2.6*** *dike or similarly contain and stabilize dredged materials that are disposed of onshore to prevent erosion or leaching of harmful or toxic substances into waters which provide fish habitat.*

The effects of the Corps' dredge and fill activities and associated mitigation measures are thoroughly discussed in FEIS-sections 4.0 (Environmental Consequences of the Recommended Plan) and 2.4 (Recommended Plan Mitigation and Environmental Protection Measures), and in FEIS-Appendix 6 (Section 404(b)(1) Guidelines Evaluation for Disposal Sites for Dredged or Fill Material, 40 CFR Part 230).

D-3 ***Enclave Development:*** The project location is at the head of Akutan Harbor and entirely isolated from the community of Akutan.

D-4 ***Commercial Fishing:*** The rubblemound breakwater would be sited, constructed, and operated in a manner that would not create a hazard or obstruction to commercial fishing operations. The breakwater itself would mark the entrance to the mooring basin and have navigational aids (e.g. signage, lights) placed at the end.

D-5 ***Navigation Obstructions:*** All project-related structures and buoys placed in Akutan Harbor would be visibly marked and placed in a manner to: (1) minimize navigation hazards or obstructions to other uses of coastal habitats; and (2) not create a hazard or obstruction to commercial fishing operations.

No D-6 identified in the AEB CZM Plan.

D-7 ***Floating Facilities:*** The only floating structures associated with the Corps' project are for moorage. The mooring configuration considered for the harbor basin is a rafting type parallel moorage arrangement for the larger vessels. Large vessels would be allowed to raft two deep alongside main floats. There would be no individual stall floats for vessels over 40 feet in length. Vessels under 40 feet in length would be berthed in stalls. The rafting parallel float arrangement for larger vessels would allow for more vessels per acre in the harbor. For the larger vessels, the main floats including the marginal float should be a minimum of 10 feet wide.

D-8 ***Monitoring and Compliance Enforcement**:* *State and federal agencies responsible for implementing the program policies through the coastal consistency process shall, where feasible and prudent, provide timely monitoring of authorities, stipulations, and special conditions and necessary compliance enforcement.*

D-9 ***Coordination (Administrative Policy):*** *Applicants are encouraged to enter into early consultation with the AEB Assembly to identify important activities and use areas, seasonal commercial fishing activities, and subsistence harvest activities (Administrative Policy).*

The Corps has included the AEB and City of Akutan in all its environmental scoping meetings and as a result, has received valuable resource information that is included in the FEIS. In addition, a representative from both the AEB and City of Akutan have been participating on the Feasibility Report and FEIS, Technical Review Team.

E. FISH AND SEAFOOD PROCESSING

E-1 ***Disposal of Seafood Processing Wastes:*** No land-based or floating fish processor wastes would be generated as part of the Corps' project.

E-2 <u>Siting of Facilities (Administrative Policy)</u>: No fish or seafood processing facilities would be sited as part of the Corps' project.

E-3 <u>Utilization of Seafood Processing Wastes (Administrative Policy)</u>: No utilization of seafood processing waste is part of the Corps' project.

E-4 <u>Land Use Area Designation (Administrative Policy)</u>: No areas are being proposed by the Corps for major fish and seafood processing industries.

F. MINING AND MINERAL PROCESSING

The Corps, as part of the project, plans no mineral processing activities. However, the Corps' project would require rock for lining the mooring basin side-slope and constructing the rubblemound breakwater. The project's mitigation plan (section 2.4 of the FEIS) identifies the requirement that the contractor must identify a source of rock and prepare a Quarry Development Plan (Plan). The Plan would be reviewed by federal and state resource agencies before being implemented.

G. ENERGY FACILITIES

No energy-generating facilities or pipelines would be constructed as part of the Corps' project.

H. TRANSPORTATION AND UTILITIES

H-1 <u>Transportation and Utility Corridors</u>: *To the extent feasible and prudent, state and federal land management policies shall not preclude environmentally acceptable transportation and utility corridors. Transportation and utility routes and facilities must be sited inland from beaches and shorelines unless the route or facility is water-dependent or no feasible and prudent inland alternative exits to meet the public need for the route of facility (AS 44.19.161 and AS 46.40.040).*

H-2 <u>Minimize Impacts</u>: *Transportation and utility corridors shall be sited, designed, and operated so that:*

H-2.1 *adverse impacts on biological resources and the community lifestyle shall be minimized;*

H-2.2 *transportation corridors and facilities shall be consolidated where feasible and prudent;*

H-2.3 *impacts to the free passage and movement of fish and wildlife shall be minimized with due consideration for historic migratory patterns;*

H-2.4 *phasing of construction scheduling shall be incorporated in project plans to avoid critical migration periods for fish and wildlife; and,* *H-2.5 road and pipeline crossings of anadromous fish streams shall be minimized and, to the extent feasible and prudent, consolidated at one location to reduce multiple impacts to an individual drainage.*

The head of Akutan Harbor is a biologically productive area containing a vast 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, and concentrations of over-wintering Steller's eiders. The Corps believes that incorporating the mitigation plan (avoiding, minimizing, rectifying, reducing or eliminating over time, and compensating) as described in FEIS Section 2.4 into the harbor's design and construction, operation, development, and monitoring phases, the project's overall environmental feasibility would be ensured.

I. SUBSISTENCE

- ***I-1*** ***Access to Resources:***
- ***I-2*** ***Land Use Area Designation (Administrative Policy):***

Traditional and customary access to subsistence areas used by the community of Akutan would be maintained. Sections 3.4 and 4.5 in the FEIS discuss in more detail the impacts of the Corps' project on the community's socio-economic environment, including subsistence.

J. RECREATION

- ***J-1*** ***Coordination:***
- ***J-2*** ***Protection of Recreation Values:***
- ***J-3*** ***Land Use Area Designation (Administrative Policy):***

Recreation-related project features are not part of the Corps' project, nor are there any public recreation lands in the project area.

K. COASTAL ACCESS AND EASEMENTS

K-1 ***Coordination:*** *Plans to develop access points and easement routes on public lands shall be coordinated with the Borough Assembly, Aleut Corporation, other affected land owners, and local governments of affected communities in accordance with 6 AAC 50.*

The AEB would be required to provide all lands, easements, and rights-of-way necessary for construction of the project. Public access is available to the project. Aleut Corporation owns the majority of the land within the project boundaries. Real estate requirements anticipated for the federal project are permanent easements for breakwater tie-ins and temporary easements for construction and staging areas.

L. HISTORIC, PREHISTORIC AND ARCHAEOLOGIC RESOURCES

- *L-1* ***Resource Protection:***
- *L-2* ***Data Requirements:***
- *L-3* ***Land Use Area Designation (Administrative Policy):***

The Corps has coordinated its project development with the State of Alaska Historic Preservation Officer, and has received their concurrence that no archeological sites will be impacted by the project, and that no areas within the project site are eligible to be listed in the National Register of Historic Places.

THE REMAINING SECTIONS (M THROUGH S) PERTAIN TO SPECIAL HABITAT POLICY AREAS, NONE OF WHICH ARE LOCATED IN THE PROJECT AREA.

The Corps believes that with the issuance of possible permits (as identified in section 5.0 of the FEIS) and implementation of the project's mitigation plan (as identified in section 2.4 of the FEIS), 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 Aleutians East Borough Coastal Management Plan.