APPENDIX 4

U.S. Fish and Wildlife Coordination Act Report

FINAL REVISED

Fish and Wildlife Coordination Act Report

For the

Navigation Improvements Project

Valdez, Alaska

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This report constitutes the U. S. Fish and Wildlife Service's Final Fish and Wildlife Coordination Act Report on the U. S. Army Corps of Engineers (Corps) proposed Small Boat Harbor Improvement project in Valdez, Alaska as revised, based upon updated information and coordination meetings in late 2005. The purpose of this report is to: (1) provide the Corps with planning information concerning the presence of significant fish and wildlife resources likely to be affected by the various design concepts and their alternatives of the proposed Valdez Small Boat Harbor Improvement Project; (2) define fish and wildlife resource problems and opportunities that should be addressed by further study; (3) define potentially significant impacts that could result from the project's objectives and alternatives; and (4) identify and prioritize potential mitigative design changes, alternatives and projects.

This report has been prepared in accordance with the Fiscal Year 2006 Scope of Work (using work completed in previous Fiscal Years and in consideration of prior project iterations) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.). This document constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

The following report is based on information provided by: Corps Project Biologist Lizette Boyer and Project Manager Dave Martinson, previous input from John Burns (Corps, retired), a review of pertinent literature conducted by Marcia Heer (formerly USFWS, AFWFO), consultation with state and federal biologists, staff from the City of Valdez, an assessment of potential impacts to known fish and wildlife resources, site evaluations conducted in 2000, 2001 and 2005, and facilitated brainstorming and mitigation development meetings held in late 2005.

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Appendix 1
Mitigation Options Discussion Paper

Introduction

The Alaska District of the U.S. Army Corps of Engineers (Corps) proposes to improve harbor facilities in Valdez, Alaska (Figure 1) by adding additional mooring space for vessels to meet the demand from growth in commercial fishing, recreational vessels, charter boat, excursion, oil monitoring and response, and marine freight sectors. Over the last decade, the Corps has considered two primary approaches for the harbor improvements, each having minor variations in design proposed as alternatives.

Formal coordination between the U. S. Fish and Wildlife Service (Service) and the Corps on this project was initiated in October 1998. Biological investigations were conducted in March and June of 2000. Several iterations of project design were developed during this period with a final design presented in early 2002. A scope of work to conduct a Coordination Act Report to assess impacts from this initial design and set of alternatives was completed in FY2000/2001; the resulting Final CAR was completed in April 2002 (Heer 2002). Subsequently, the Corps did not receive funding and the local sponsor, the City of Valdez, continued to reassess the proposed design to better address local needs. In late 2005, the City and the Corps approached the Service with a new design concept relocating the initially preferred alternative from west of the SERVES pier to a region east of this facility. This new approach was recognized to pose increased impacts to Service trust resources from the revised design concept. The three key partners (Corps, City, and Service) agreed to work together to develop appropriate and adequate mitigation measures for these impacts. A series of small and large meetings, one facilitated, were held over the next few months to identify, explore, develop, and establish consensus on measures to avoid, minimize, mitigate and compensate for impacts to fish and wildlife resources in such a way that the proposed harbor expansion could proceed without having to commit limited and precious financial resources to development of a full Environmental Impact Statement. A number of local, State, and Federal agencies were involved in these discussions.

This Fish and Wildlife Coordination Report represents the Service's biological investigation and impact assessment of the initial and current design concepts and alternatives for harbor improvements in Valdez. This report will discuss fish and wildlife resources in the project area, describe in detail the potential adverse impacts of project alternatives, and recommend measures for mitigating those impacts.

Study Area

The proposed alternatives for harbor improvements are located south of the existing harbor facilities in Valdez, Alaska (Figure 1). Valdez is located approximately 115 miles (185 km) from Anchorage at the northeastern end of Valdez Arm in Port Valdez. Winter temperatures range from 21 to 30 degrees Fahrenheit. Summer temperatures range from 46 to 61 degrees Fahrenheit. Annual precipitation is 59.3 inches. The average snowfall is 25 feet annually.

Port Valdez, a deep-water fjord, is approximately 3 miles (5 km) wide by 14 miles (23 km) long. Port Valdez tides are mixed, semi-diurnal, and range from an extreme high of 16.5 feet to an extreme low water of -5.8 feet (Dames and Moore 1978). The mean tidal range is 9.4 feet with a

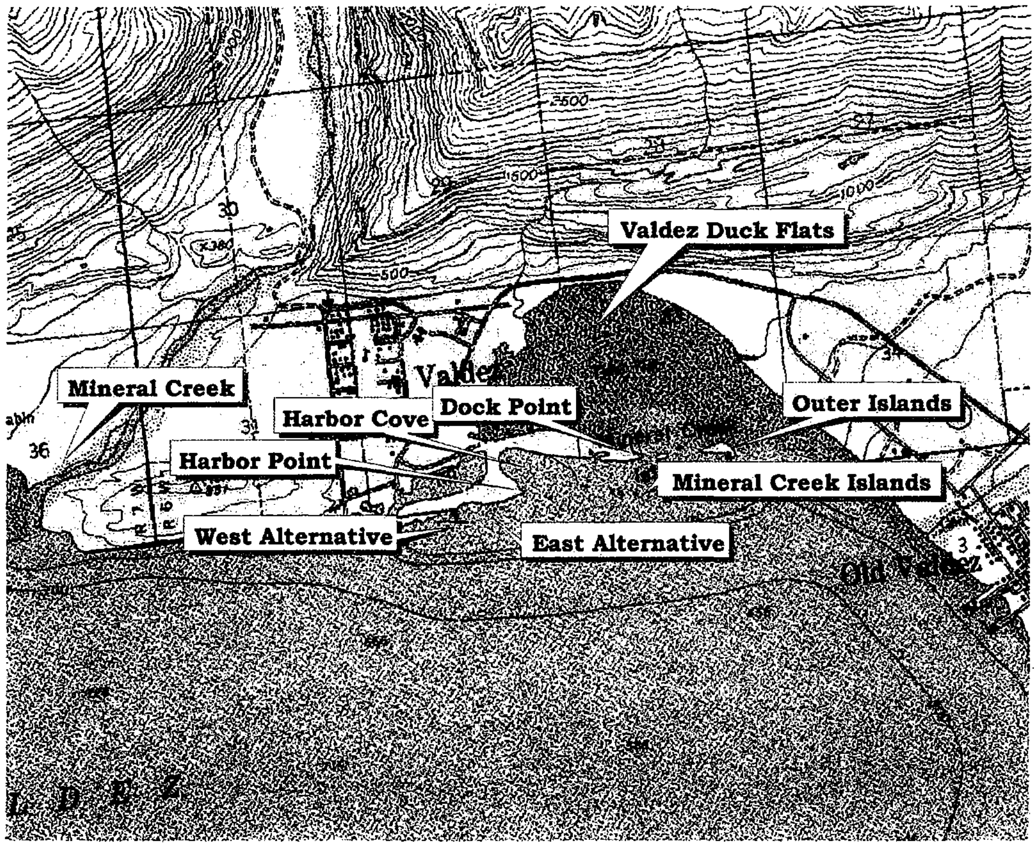

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Figure 1. Vicinity map for proposed harbor improvements in Valdez, Alaska.

diurnal range of 11.8 feet. Extreme tidal fluctuations occur in the spring. Tidal circulation in and adjacent to the Valdez Duck Flats has been described as irregular and complex (USFWS 1981). Current measurements at the eastern end of Port Valdez have been characterized as stagnant much of the time (City of Valdez 1986). Information on circulation patterns within eastern Prince William Sound (PWS) is limited.

The oceanographic regime of Port Valdez is strongly stratified both in temperature and salinity during the summer and is typically unstratified in the winter. Port Valdez is classified as a positive estuary with the circulation of the deeper layers of saline water towards land and a seaward movement of brackish waters. Freezing air temperatures and minimal fresh water runoff in the winter result in renewal of the entire water structure (Feder et al. 1976).

Detailed Plan Description

The purpose of the proposed Valdez boat harbor improvements is to increase moorage space and parking facilities and improve areas of congestion such as launch facilities. Additional justification for the project's purpose and need is provided by the ACOE (Boyer/Peterson e-mail to Seagars March 27, 2006 - in Service, AFWFO files).

<u>Harbor Design Concept</u>: The initial design proposed accommodating vessels in an area south of the existing harbor facilities or in Harbor Cove to the east of the harbor. Design concepts considered to date south of the existing harbor have generally included two alternatives, one to the west and another to the east of the Alyeska Ship Escort Response Vessel System (SERVS) dock.

<u>West Side Alternatives</u>

In both the 2002 and 2005 west side alternatives, one of two outfalls from existing fish processing plants passes through the harbor site and would require relocation to the east around the dredged basin. Both the relocated and other existing outfall would have been positioned under the eastern disposal area/staging area fill. The 2002 West Alternative was the environmentally preferred option addressed by the initial CAR (Heer 2002).

<u>2002 (Initial) West Side Design</u>. As described by Tryck Nyman Hayes, Inc. (pers. comm. to Heer, 2002), the initially considered approach was designed to create a 3.7 ha (9.14 acres) basin by excavating the "uplands," extending the facility (previously deposited fill) area and an additional, newly dredged, subtidal area to be protected by two rubble mound breakwaters (Figure 2). The mooring area was designed to accommodate a fleet of 153 vessels ranging in size from 9 m to 30 m. The 40 m wide entrance channel would be sufficient for two way traffic for all except the largest vessels. The entrance channel depth was anticipated to be – 4.3 m MLLW. Basin depths would have varied from – 4.3 MLLW at the entrance to – 3.2 m MLLW at the far end of the basin. Dredged material would include primarily sands and gravels in the "off shore" areas and "fill" from the upland areas. Some trash was expected in the old fill material. Approximately 265,000 m^3 of material was anticipated to be dredged from the basin with an unspecified portion planned to be disposed of in an adjacent upland fill to the east of the new

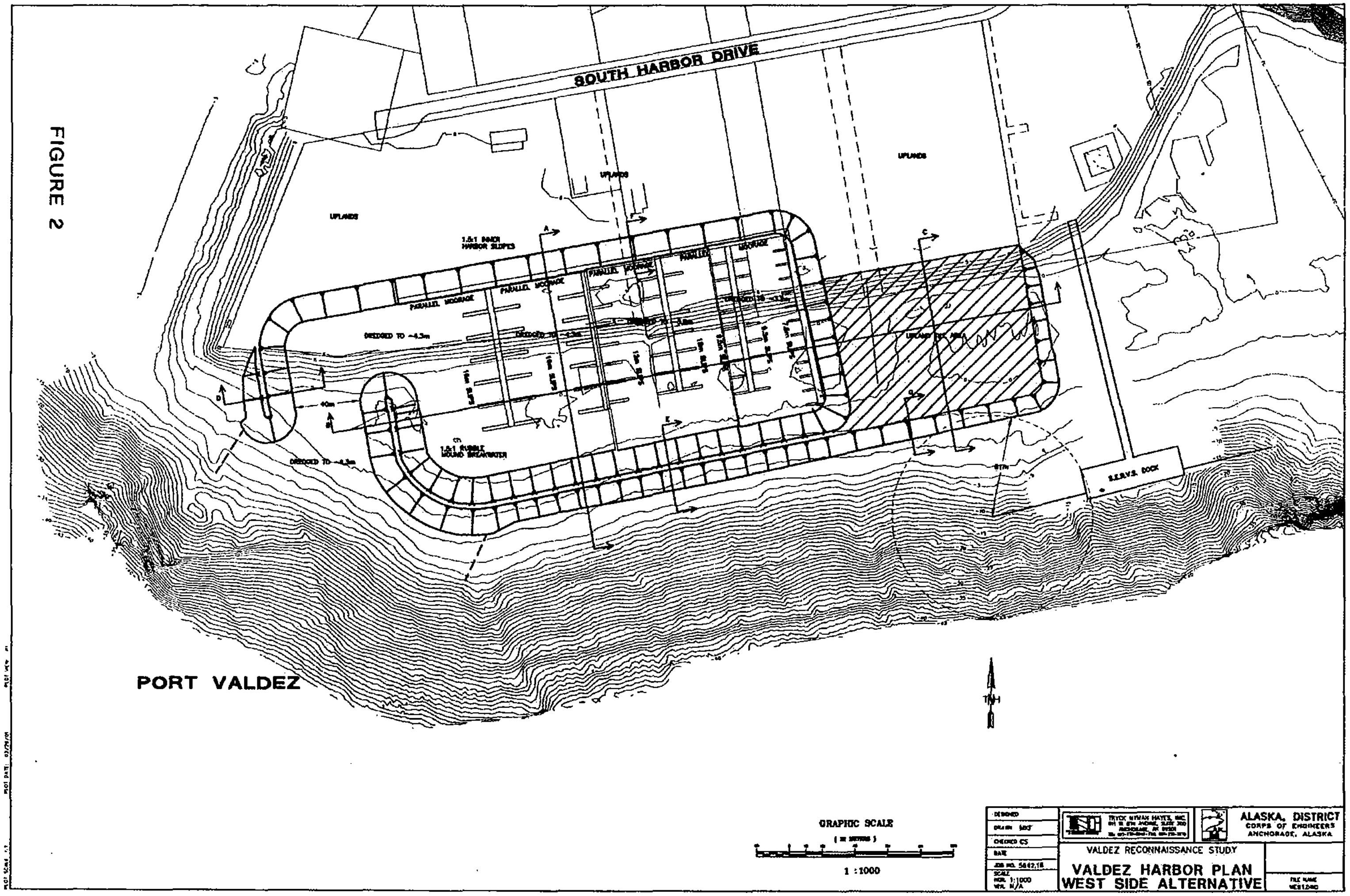

SOUTH HARBOR DRIVE
UPLANDS
UPLANDS
UPLANDS
PARALLEL MOORAGE
S.E.R.V.S. DOCK
PORT VALDEZ
GRAPHIC SCALE
1 :1000
ALASKA, DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA
VALDEZ RECONNAISSANCE STUDY
VALDEZ HARBOR PLAN
WEST SIDE ALTERNATIVE

FIGURE 2

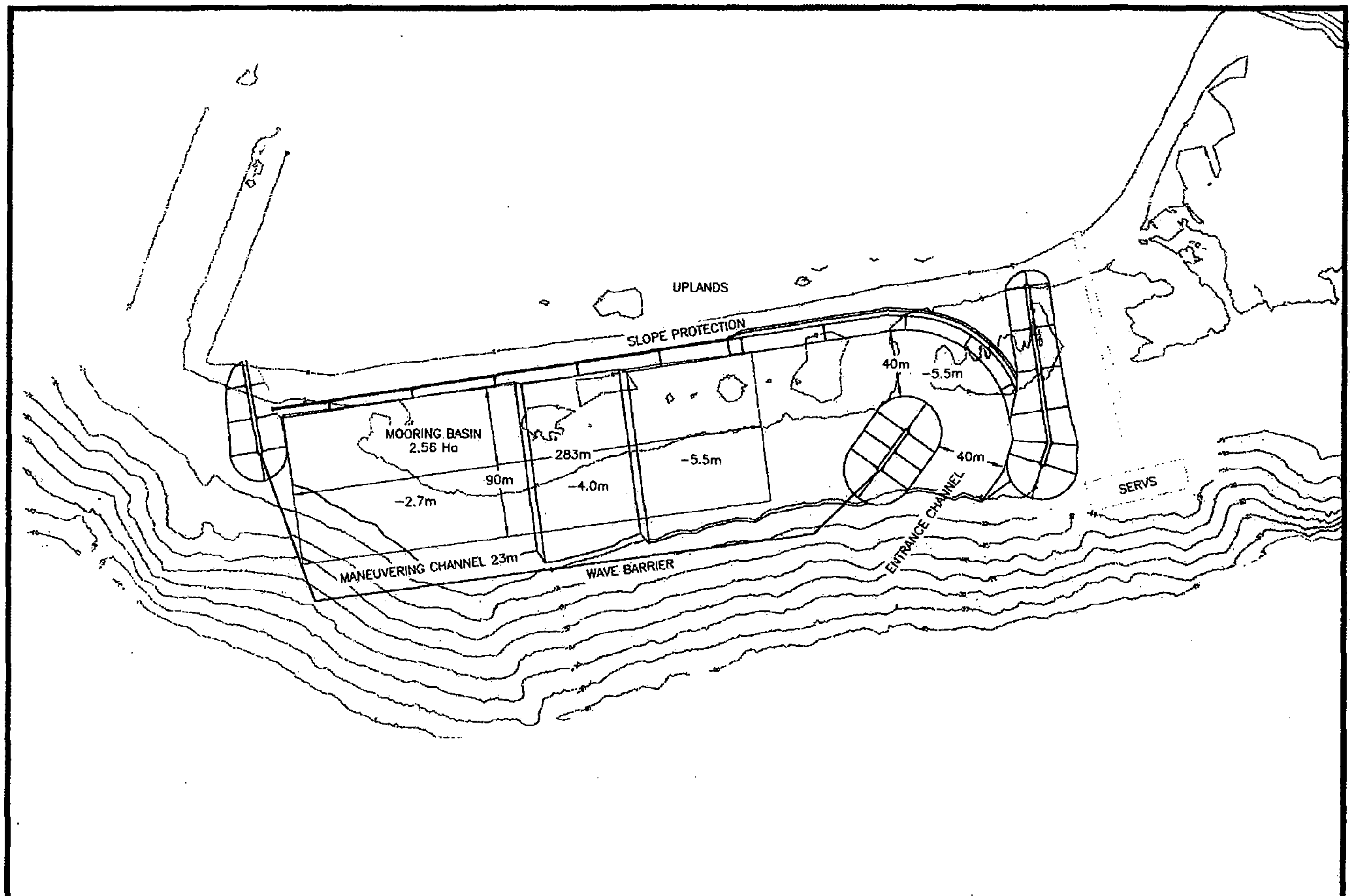
harbor. The remainder was likely to have been disposed of off shore at an undetermined location. Rock quantities for the early breakwater design included the following type and amount of rock: armor (23,300 yd^3), secondary (14,300 yd^3), core (26,200 yd^3).

The south breakwater was to be approximately 460 m long, including the south side of the upland fill area and on the westerly end turned to the north to form the east side of the entrance channel. The west breakwater was only 45 m long and was to form the western side of the entrance channel. The breakwaters were designed to protect the basin from waves in the southern quadrant from west to east. The largest anticipated wave, 1.4 m high and 4.3-second period, would be from the westerly direction. Natural depths of about 0 to –2 m MLLW would have formed the foundation to the breakwaters. Subsurface materials were sands and gravels with surface fines. The breakwater crest elevation was to be + 6 MLLW with a crest width of 4 m. The previous Coordination Act Report addressing this west alternative did not recommend compensatory mitigation.

<u>2005 (Current) Alternatives for West Side</u>. The west alternative was revised in mid-2005 at the request of the City of Valdez. The City re-evaluated the use of the filled "upland" area forming the southern margin of the existing harbor. A number of tenants had established facilities on this site, providing income to the City. Furthermore, the City had been approached by additional clients (camper park, facilities related to fish processing plants, etc.) and foresaw a future expansion need for commercial/industrial space on this land adjacent to the waterfront. Expansion of boat facilities at the loss of this upland space was not considered to be an economically desirable approach. Recent designs include addressing west side expansion through either a rubble mound breakwater system or a Wave Barrier Design. However, the steeply declining bathymetry on the southern margin of this site limits the available developable area for mooring facilities and necessitates implementing an innovative approach to providing "breakwater" protection. Hence the ACOE selected the Wave Barrier Design for further design analysis; this approach is what is evaluated further here (Figure 3).

Under this plan, approximately 451.2 meters of partial penetration wave barrier would be constructed as 8 pre-cast, pre-stressed concrete panels, and lowered into slots between 82 steel pipe pile frames placed at 6 meters on center. The top of the wave barrier would be at 6.5 m above MLLW, to prevent over-topping, and the bottom would be approximately –5 m MLLW to limit transmitted waves to less than 1 foot. (Actual depth will vary based on predominant wave direction and depth of water at wall location). Approximately 270 m of the wall would be placed at the –35 m contour line. Pipe piles would be 36-inch diameter by 5/8-inch thick and driven to a depth of 12 m below the mud line. Batter piles would be sloped at 4 on 12, and placed on the outside of the harbor. All steel would be galvanized, and protected with underwater anodes. The east breakwater would be 182.1 m, the west stub breakwater 91.9 m and the east breakwater 360.9 m. The harbor basin would be 4.4 ha. The dredging volume is 175,600 m^3. (Description provided by ACOE by email, Boyer to Seagars, March 27, 2006).

Shoaling in the entrance under any of the west side alternatives discussed above is expected to be minimal. Long shore sediment movement would be very small. The existing entrance just to the west of the new entrance has experienced only very minor shoaling. Maintenance dredging in the



ALASKA DISTRICT
CORPS OF ENGINEERS
CIVIL WORKS BRANCH

WEST SITE ALTERNATIVE 3 – 228 BOAT HARBOR
SERVS DOCK ENTRANCE
VALDEZ HARBOR EXPANSION, VALDEZ, ALASKA

Figure 3

entrance and in the basin is anticipated to be infrequent, if necessary at all.

East Side Alternatives

This site and its related alternatives (Figure 4) are situated on the east side of the SERVS dock on the tidal flats south of Hotel Hill. Plans for the east site have typically described a harbor bounded by two rubble mound breakwaters; one on the south side and one on the east side to protect this basin. The basin is physically constrained on all sides except the east; however, strong environmental constraints prevent further easterly expansion. Originally the East Side alternative was not the preferred alternative because it was believed to pose a greater risk and impacts to sensitive wildlife and other Service trust resources. Subsequent review in 2005 and 2006 by the City of Valdez and the ACOE identified the need to design a larger harbor that could accommodate more vessels than could be reasonably placed in any of the western harbor designs. There is the potential for blasting in the moorage basin; a geophysical survey will be conducted to determine the need for additional space and material. Recognizing the greater resource sensitivity of the eastern side, the City, the ACOE, the Service, and other partners worked together to incorporate design considerations and a detailed, expanded approach for mitigating for resource impacts from the East Side project design.

For both the initial and current East Side designs the following holds true: there is little movement of surface sediments in this area due to wave or current action. Therefore little or no maintenance dredging is expected to be necessary. A fiber optic communications cable is shallowly buried at the west end of the basin. This cable serves the interior of Alaska with telephone and data service. Relocating the cable would be costly. A pair of open conduits would be buried in the upland fill to serve as emergency repair or expansion ports into the onshore communications manhole. Constructed beaches will be provided on the east and west sides of the basin to provide a more natural curved, environmentally sympathetic plan.

2002 (Initial) East Side Design. The proposed harbor was to include a basin of 4 ha (9.88 acres), including the entrance and maneuvering channels (Figure 4). The mooring basin was to accommodate 153 vessels ranging in size from 9 m to 30 m. The entrance channel would be 40 m wide, sufficient for two way traffic, except for the largest vessels. The entrance channel depth would be – 4.25 m MLLW and decrease to – 3.2 m at the far end of the basin away from the entrance. Basin dredging would have totaled 105,700 m^3, including the entrance and maneuvering channels. Disposal was originally planned for adjacent disposal areas forming the staging area. No offshore disposal was anticipated. The dredge material was expected to consist of sands and gravels; however, large rock slabs and boulders will be present closer to Hotel Hill.

The south breakwater was designed to be approximately 390 m long, including the part by the upland fill area. The east end curved slightly to the north at the entrance channel. The east breakwater curved in a north-south direction from Hotel Hill to the entrance and was approximately 294 m long. The seaside slope of the east breakwater had a 1 vertical (V):2 horizontal (H) slope to simulate a more natural condition. The foundation materials were sands and gravels with a thin muddy layer on the surface. Foundation and stability aspects were considered good by the ACOE. The elevation of the foundation of the breakwaters varied from

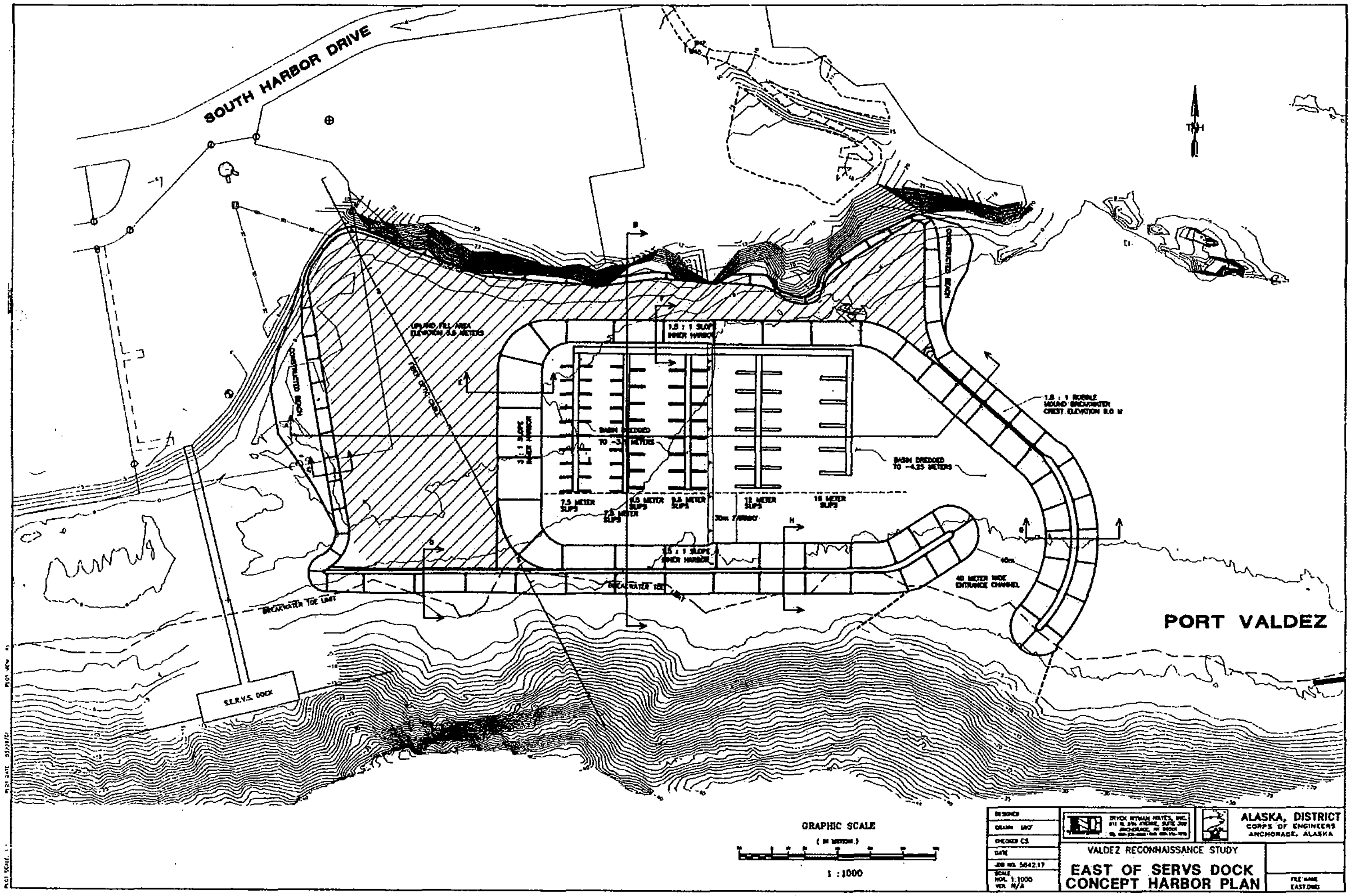

SOUTH HARBOR DRIVE
PORT VALDEZ
S.E.R.V.S. DOCK
BREAKWATER TOE LIMIT
BASIN DREDGED TO -4.35 METERS
40 METER WIDE ENTRANCE CHANNEL
1.5 : 1 SLOPE INNER HARBOR
GRAPHIC SCALE
1 :1000
ALASKA, DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA
VALDEZ RECONNAISSANCE STUDY
EAST OF SERVS DOCK
CONCEPT HARBOR PLAN
CHECKED CS
JOB NO. 5642.17
SCALE
HOR. 1:1000
VER. N/A
FILE NAME
EAST.DWG

Figure 4

about 0 to – 2 m MLLW. The crest elevation was + 6 m MLLW and the crest width was 4 m at the entrance and decreased to 2.3 m away from the entrance. Rock quantities anticipated for the breakwater included: armor (23,300 yd^3), secondary (14,300 yd^3), and core (26,200 yd^3).

2005 (Current) Alternatives for East Side (Preferred Alternative). The East Site is located east of the SERVS Dock and to the south of Hotel Hill on the existing tidal flats. There are two harbor plans for the east site; the smaller plan is potentially the National Economic Development (NED) Plan that maximizes project benefits with costs (Figure 5). The larger, locally preferred plan (Figure 6) accommodates more vessels matching the local demand for boats. Both designs would have near shore breaches for fish passage and intertidal staging areas created by dredged material. Disposal of dredged material would be in Two Moon Bay for habitat restoration. No maintenance dredging is anticipated for either plan. Table 1 summarizes the harbor features and quantities in both metric and English for all of the current design alternatives.

National Economic Design (NED) Plan. The 4.5 ha basin would accommodate 186 vessels. The south breakwater is 396.2 m, the east breakwater is 183.2 m, and the stub breakwater is 29.1 m in length. Dredge depths would vary from –5.5 m to –4 m to –2.7 m as the draft of the vessels dictated

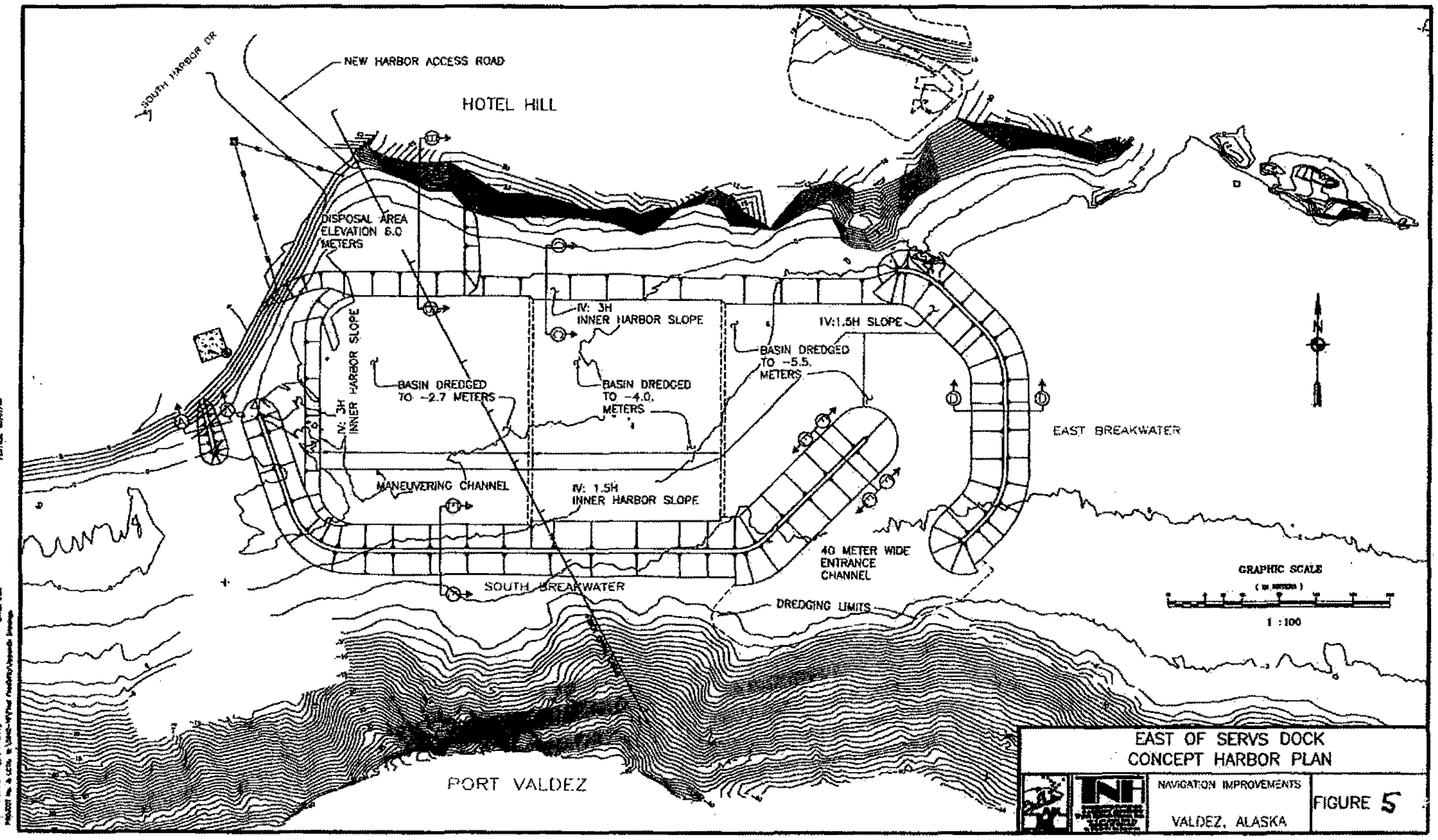
The western edge of the basin would be established as close to the SERVS Dock as possible. This location would require the relocation (i.e., deepening the burial depth below the harbor bottom) of the cable. Hotel Hill to the north and the steep drop off into Port Valdez would establish the north and south harbor feature limits. The only practical potential for harbor expansion would be in the eastern direction.

The entrance to the harbor is to be located on the eastern end of the harbor, away from potentially conflicting navigation at the SERVS Dock. Vessels would normally arrive from the west and enter in a northeasterly direction turning 90 degrees to 180 degrees to enter the maneuvering channel and floating docks in the inner harbor.

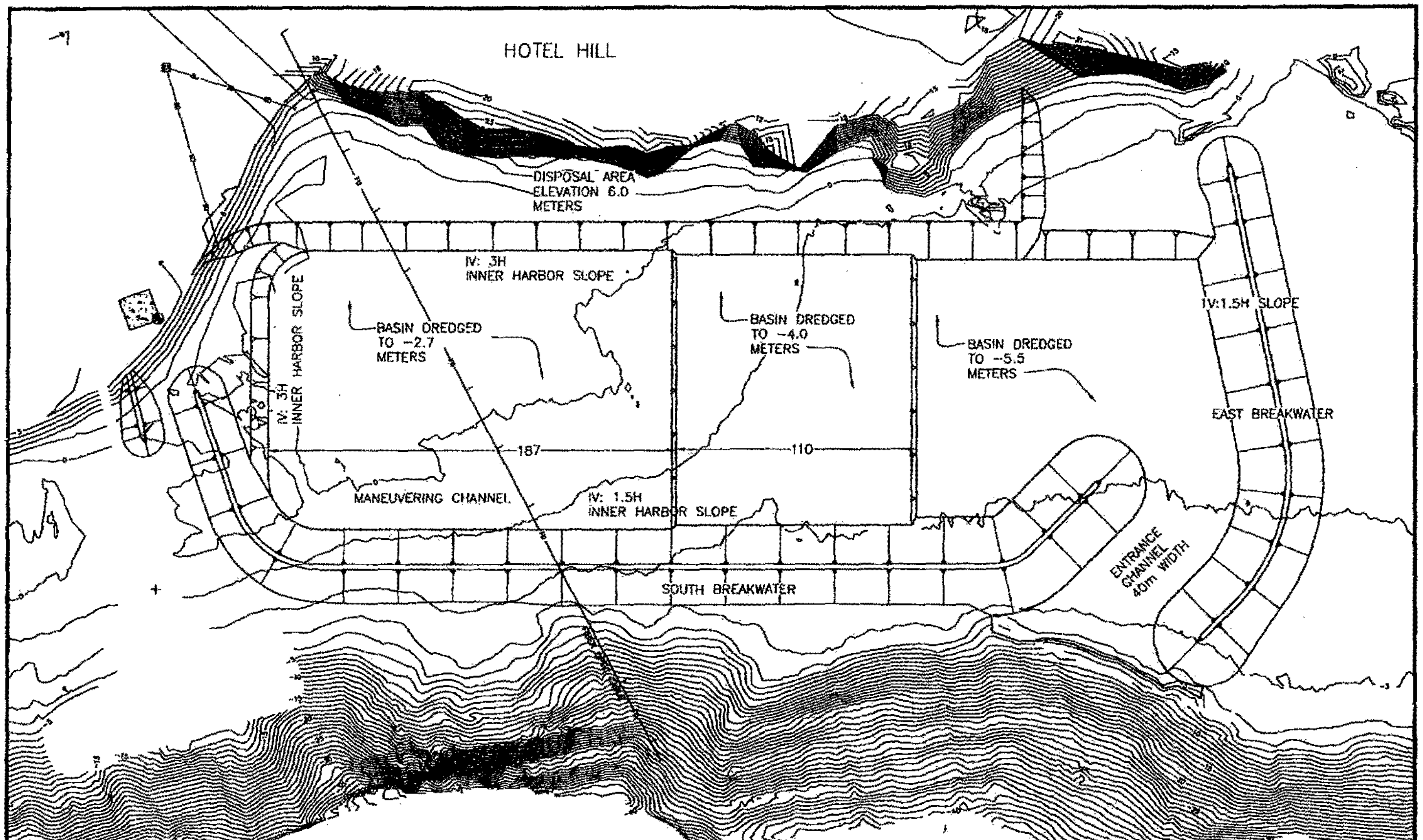
All dredging for the East Site would be in the tidal flat to the south of Hotel Hill and east of the SERVS Dock. Most materials are expected to be similar to the West Site with the exception that closer to Hotel Hill on the north, larger rock slabs would be encountered. The blasting of rock may still be needed in this alternative; a geophysical survey will be done to determine the need for blasting and additional material. A total of 175,600 m^3 of dredging would be required for the entrance channel, maneuvering channel and mooring basin. Slope protection for the basin would be afforded by 1,975 m^3 of material.

A fiber optic communications cable is buried at the west end of the basin. This cable serves the interior of Alaska with telephone and data service. Relocating the cable is very costly; therefore, a pair of open conduits would be buried in the upland fill to serve as emergency repair or expansion ports into the on-shore communications manhole.

Existing uplands in this area are limited. A small dredge material disposal area is planned at the



NEW HARBOR ACCESS ROAD
SOUTH HARBOR DR
HOTEL HILL
DISPOSAL AREA ELEVATION 6.0 METERS
IV: 3H INNER HARBOR SLOPE
IV: 3H INNER HARBOR SLOPE
IV:1.5H SLOPE
BASIN DREDGED TO -2.7 METERS
BASIN DREDGED TO -4.0 METERS
BASIN DREDGED TO -5.5 METERS
EAST BREAKWATER
MANEUVERING CHANNEL
IV: 1.5H INNER HARBOR SLOPE
40 METER WIDE ENTRANCE CHANNEL
SOUTH BREAKWATER
DREDGING LIMITS
GRAPHIC SCALE
1 : 100
PORT VALDEZ
EAST OF SERVS DOCK
CONCEPT HARBOR PLAN
NAVIGATION IMPROVEMENTS
VALDEZ, ALASKA
FIGURE 5



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EAST SITE LOCALLY PREFFERED PLAN
RUBBLEMOUND BREAKWATER ALTERNATIVE WITH 3:1 ASPECT RATIO
VALDEZ HARBOR EXPANSION

Figure 6

northwest corner of the basin to provide minimum access requirements for construction and during operation of the harbor. Areas on Hotel Hill would be used for access and associated harbor development in the future.

Wave heights of up to 1.1 m would also be expected in the East Site entrance channel during the design storm event. These waves would again dissipate as they enter the inner entrance channel and basin area, quickly reducing to 0.3 m or less. The entrance channel alignment would provide a good circulation pattern to develop in the basin. Currents would be low and should not effect navigation. Shoaling has not been a problem at the existing harbor entrance or within the existing harbor and is also unlikely to be a problem at the East Site.

The 1V:1.5H harbor side slope would follow down to the basin depth, except for the western basin side, which has a 1V:3H slope. A toe trench would be excavated adjacent to the breakwater at a 1V:3H slope down to the basin depth. Then the breakwater core and secondary rock would be placed in the trench at the 1V:1.5H slope as the breakwaters are fully constructed. This approach would maximize the basin width in the north-south direction.

Locally Preferred Plan for the East Side. The proposed harbor has a basin of about 5.6 ha. The breakwater would be placed as far east as possible for maximum moorage basin capacity and to maintain plan form geometry ratios for good circulation. The mooring basin would accommodate 244 vessels ranging from 9 m to 30 m.

The basin dredging would total 202,700 m^3 including the entrance and maneuvering channels. Dredged material would be used to form the staging area. The majority of the material to be dredged is sand and gravel with large rock and boulders close to Hotel Hill. Blasting would be avoided by placing fill into the near shore as a 1.93 ha staging area. Large boulders would be removed and placed near the east breakwater. The south breakwater would be 475.2 m long. The east breakwater would curve in a north-south direction from Hotel Hill to the entrance channel and would be approximately 229.2 m long. The seaside slope of the east breakwater would have a 1V:2H slope to simulate a more natural condition. The crest elevation would be 6 m MLLW and the crest width would be 4 m at the entrance and decrease to 2.3 m from the entrance.

The local sponsor has the option to select the locally preferred alternative if they pay any increased costs over the NED plan and the alternative is environmentally acceptable.

Biological Resources

The existence of several sources of biological data precluded the need for the Service to conduct additional SCUBA-based sampling dives or detailed benthic sampling within the project region. These sources include biological data from a 1993 SCUBA dive (Feder 1993) and benthic sampling conducted in 1994 (Feder 1995) to establish an environmental baseline for the proposed SERVS dock. Initial site visits to observe biological conditions and resources were conducted in March and June of 2000 by Service staff. These field investigations focused on documenting bird and marine mammal use in the vicinity of the proposed alternatives. As a result of the revised design concept and a revitalized interest in advancing new project alternatives, the ACOE and the National Marine Fisheries Service conducted additional on-site habitat observations during a low tide period in August 2005 (see "trip reports/memoranda" detailing these observations, included in Bartlett (2005) and Eagleton (2005). Information on the variety of substrates, plants, invertebrates, fish, birds, and marine mammals within eastern Port Valdez also is available from numerous sources and is included or referenced in this report.

Topography, Sediment, Marine Plants, and Invertebrates

Substrate within the intertidal areas of both the west and east alternative regions includes both rocky and mud/sand flats (USFWS 1981). There is a high silt load traveling via the slow, predominantly west flowing current, resulting in moderate deposition and high turbidity throughout the project area. Substrate within the subtidal areas includes muddy sands, cobbles and a mixture of shale rock, mud, and sand. Adjacent slopes are composed of muddy rock (USFWS 1981, Eagleton 2005).

The rocky intertidal habitat supports dense patches of rockweed (*Fucus distichus*) along a band at the -1 m contour, green algae (*Monostroma sp.*), blue mussels (*Mytilus edulis*), and various barnacles and snails. Mussels observed were predominately small in size, indicating either marginal growth conditions or overgrazing by sea otters. The intertidal mud and sand flats support ribbon kelp, brown algae, polychaetes, various crustaceans, and gastropod and bivalve mollusks (e.g., Myidae). During the August 2005 site visit, it was noted that a large quantity of shale had exfoliated from the side of "Hotel Hill" and had settled into the high intertidal zone. These large (in some cases, "car-sized") slabs appear to be well conditioned to the marine environment and have been colonized densely by marine algae and an associated invertebrate faunal assemblage (Bartlett 2005). Subsequent comments by NMFS and ACOE staff biologists noted that it would be highly desirable to ensure these materials are not covered by harbor construction (e.g., new rock bulwarks, dredge spoil) or otherwise destroyed. It would be best to remove them prior to harbor development for subsequent replacement as "seed material" on top of new harbor rock (e.g., breakwaters), or to be transferred for use at mitigation sites away from the new harbor.

The rocky subtidal habitat supports sea anemones, bryozoans, hermit crabs, small rock crabs, juvenile cancer crabs, macoma, butter, and littleneck clams, and marine fish that include greenling, Pacific tomcod, sculpins, and gunnels. Small circular mussel beds occur throughout the eastern project site; the western site also has small, patchy mussel beds. The subtidal mud slopes support bivalve mollusks and polychaetes, Subtidal mud slope habitat is used by Tanner crabs for foraging, mating, and rearing. Depending on the season, kelp cover can range from 15 to 55 percent (Issacs 1990). A noteworthy band of laminaria (*Laminaria saccharina*) kelp runs along the lower margin of the tide line (deeper than 2 feet MLLW) nearly continuously through the project region. Several small (4 meter^2) eelgrass (*Zostera* sp.) patches are present in the subtidal regions both west and east of the SERVs pier.

Sediment and invertebrate samples were collected at three different transects near the SERVS dock during a SCUBA dive conducted in 1993 (Feder 1993). Transect #1 located 25 feet to the west of the SERVS dock extended from 10 to 65 feet in depth. Transect #2 ran along the western edge of the SERVS dock. The sediment at 10 feet was fine gray mud with scattered gravel. From 10- to approximately 25-foot patches of brown algal detritus covered the sediment and barnacles, hermit crab, brown algae (kelp) attached to gravel or rocks, and clam and polychaete worm holes were observed. A number of larger holes were also observed in this zone and were presumed to be the result of sea otter foraging. (Several sea otters were observed in the vicinity of transect #1 during the FWS site visit in 2002.) At 30-65 feet, a very fine soft mud was observed. The bottom dropped off steeply towards the end of the transect line. The sediments and species documented at transect #2 were very similar to transect #1. Transect #3 ran parallel to and was approximately 25 feet east of transect #2; extending 18 to 70 feet in depth. Sediments, plants, and invertebrates were similar to the other two transects. Many small worm and clam holes were observed. Transect #3 paralleled shore east of the pier running to approximately 70 feet in depth. Soft gray sediment was observed throughout this region. Large clam holes were common; more common than at transects occurring in shallower areas. Active polychaete worms were also observed along this transect. Feder's transect summary describes a healthy, undisturbed bottom with many worm and clam holes present and signs of otter digging activities.

Benthic surveys were conducted in 1994 near the SERVS dock (Feder 1995). Taxa observed in the 1994 survey and a ranking of their abundance is included in Appendix 1 of this report. Sampling stations occurred east, west, and south of the SERVS dock. Some of the more abundant species documented during the surveys include *Capitellidae*, *Cirratulidae*, *Melinna cristata*, *Pista cristata*, *Polydora spp.*, *Sternaspis scutata*, *Nuculana fossa*, *Axinopsida spp.*, and *Macoma spp.*

The East Alternative encompasses a larger area of shallow intertidal habitat than the West Alternative. Relatively speaking, the East Alternative intertidal and subtidal regions are broader and more topographically variable than the West Alternative area; species diversity and abundance is similar throughout the project area, although the shallow eastern intertidal areas appear to be somewhat more biologically productive for commercially important species.

Fish

Marine waters within the area of the proposed harbor alternatives provide rearing and migration habitat for Dolly Varden, and sockeye, coho, chum, and pink salmon. The estuarine waters of the Valdez Duck Flats, and the nearshore coastlines of Dock Point and Mineral Creek Islands provide important habitat components for the early stages of fry development and feeding for chum and pink salmon (Issacs 1992). Outmigrating salmon fry feed on benthic and planktonic crustaceans within the intertidal habitat of Port Valdez.

Visual surveys conducted in nearshore habitats of eastern Port Valdez indicate that chum salmon fry outmigration was the greatest in late April and tapered off over a period of five to six weeks. In the surveys conducted along Inner Point, Southwest Cove, Dock Point, Mineral Creek Islands, Ammunition Island, Harbor Cove, and Harbor Point, salmon fry were observed in schools ranging from 10 to 500 fish, and were usually observed within 3 feet of the shore. The greatest numbers of fry were continually observed along the south shore of Dock Point, followed by Harbor Point/Harbor Cove, and the Mineral Creek Islands (Morsell and Perkins 1979).

The Valdez Duck Flats contain large areas of intertidal mudflats cut by six freshwater streams that drain into the mudflats. All six streams that flow into the Duck Flats are anadromous and are classified by Alaska Department of Fish and Game as sensitive habitat. During spring, salmon fry from Siwash Creek, Ess Creek, Sewage Lagoon Creek, and the Loop Road Creek system forage on insect larvae in the mudflats (USEPA 1980).

Upon release from the Solomon Gulch fish hatchery across the bay from the Valdez Duck Flats, millions of juvenile pink, chum, and coho salmon are carried toward the Duck Flats and proposed harbor areas by the counter-clockwise currents in Port Valdez. Annually, 10 million fry are released from the hatchery; however, the precise number of juveniles that utilize the Duck Flats as a nursery is unknown (Valdez Aquaculture Association 1993).

Siwash Creek is the most important pink salmon producer in Port Valdez (Dames and Moore 1977). From 1971-1978, roughly twice the number of adult pink salmon returned to Siwash Creek (173,175) than to the nearby Lowe River system (86,852). The Duck Flats streams provide a high percentage of the pink salmon taken in the Valdez Arm commercial fishery during odd-year runs. In 1973 and 1975, Siwash Creek had the largest escapement of any stream in the eastern management district of Port Valdez. The Duck Flats also contribute about one percent of the chum salmon to this fishery.

Harbor Cove is an important estuary for juvenile pink and coho salmon (Gnath, 1999, pers. comm.) Substrate within the subtidal areas includes subtidal rock and mud slopes (USFWS 1981). The rocky subtidal habitat supports marine fish including greenling, Pacific cod, sculpins, and ronquils (Issacs 1990). The marine waters of Port Valdez also support arrowtooth flounder; flathead, rock, and yellow fin sole; sablefish; sculpin; walleye pollock, and Pacific herring (NOAA 2000). Eulachon also occur in Port Valdez and are reported to enter Siwash Creek in early spring (City of Valdez 1986).

<u>Birds</u>

The eastern portion of Port Valdez, including locations within the proposed harbor alternatives, has been identified as a sensitive biological resource area for birds (NOAA 2000). Marine birds are relatively abundant in Port Valdez, especially during the winter. A total of 26 species of birds, of which 22 species were marine birds, was observed in Port Valdez during winter shoreline surveys conducted in 1979 (Hogan and Colgate 1980). The four highest densities of winter birds documented during these shorelines surveys were goldeneyes (*Bucephala sp.*), rock sandpipers (*Calidris ptilocnemis*), common murres (*Uria aalge*), and mallards (*Anas platyrhynchos*).

Diving ducks are the most abundant group of birds that utilize Port Valdez during the winter (Sangster 1978). Diving ducks such as Barrow's (*B. islandica*) and common goldeneye (*B. clangula*), bufflehead, harlequin duck (*Histrionicus histrionicus*), and white-winged scoter

(*Melanitta fusca*) feed on pink shelled clams (*Macoma balthica*) that occur within and adjacent to the proposed harbor alternatives.

A total of 45 species of marine birds was recorded during the summer in Port Valdez (Hogan and Colgate 1980). Gulls and terns comprised over 70 percent of the total bird population in the summer. Glaucous-winged gulls (*Larus glaucescens*) and black-legged kittiwakes (*Rissa tridactyla*) were the two most abundant species. Arctic terns (*Sterna paradisaea*) were the third most abundant species.

Inventories conducted by the Service in 1993 and 2000 (North 1993, Stackhouse 1993, Heer and Connor 2000), documented birds within or adjacent to the proposed harbor alternatives in three different transects (Figure 7). Transect locations occurred within marine waters seaward of the mudflats to 300 feet in depth. Transect 1 was located west of the existing harbor, extending up to (but not including) the mouth of Mineral Creek. Transect 2 was located within the existing Valdez Harbor and entrance channel. Transect 3 was located east of the existing harbor entrance up to the Old Valdez town site. A summary of this bird data is included in Table 2.

Based on this limited data, transect 3 shows greater bird diversity and abundance than transects 1 and 2 combined. However, transect 3 covers a larger area than transects 1 and 2 and the inventories did not allow for statistical analysis. Therefore, no conclusions backed by statistics can be made that Transect 3 supports higher diversity and abundance on a per unit basis than Transects 1 and 2. Transect 3 does have more diverse habitat features such as shallower intertidal zones, islands, and protected areas so it is likely to attract a higher abundance and greater species diversity than the other transects. The low bird diversity and abundance in Transect 2 is likely caused by low habitat values that occur within the Valdez Harbor.

Bird species observed (Heer and Connor 2000) within or adjacent to the proposed alternatives during the Service's February 29-March 2, 2000, site visit include northern pintail, Barrow's goldeneye, bufflehead, harlequin duck, common eider, long-tailed duck, surf and white-winged scoter, red-breasted merganser, gadwall, pelagic cormorant, and marbled murrelet. During the Service's June 23, 2000, site visit, birds observed within or adjacent to the proposed alternatives included black-legged kittiwake, herring and glaucous-winged gull, marbled murrelet, arctic tern, harlequin duck, long-tailed duck, mallard, American wigeon, black oystercatcher, and pigeon guillemot.

A seabird colony occurs within approximately 0.75 miles of the proposed East Alternative (Figure 8). This colony of approximately 195 arctic terns and 5 glaucous-winged gulls was documented July 20, 2000, on one of the Outer Islands just south of the Mineral Creek Islands (Stephensen 2001, pers. comm.).

The East alternative is located adjacent to Harbor Cove. Harbor Cove is within one of the two primary sea duck feeding areas identified in Port Valdez and has been identified as a sensitive habitat area for feeding sea and diving ducks (Hemming and Erikson 1979).

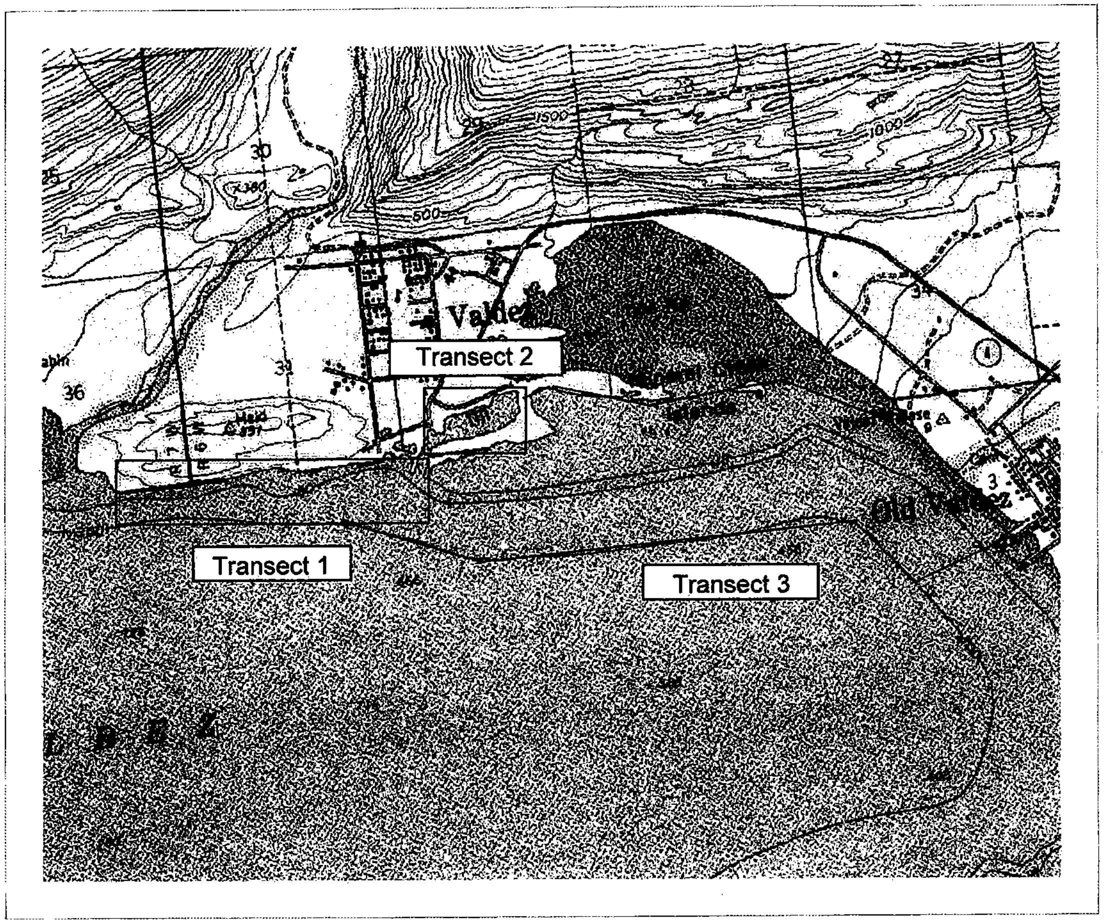


Figure 7. Transect areas 1-3 for 1993 and 2000 bird surveys conducted in Port Valdez.

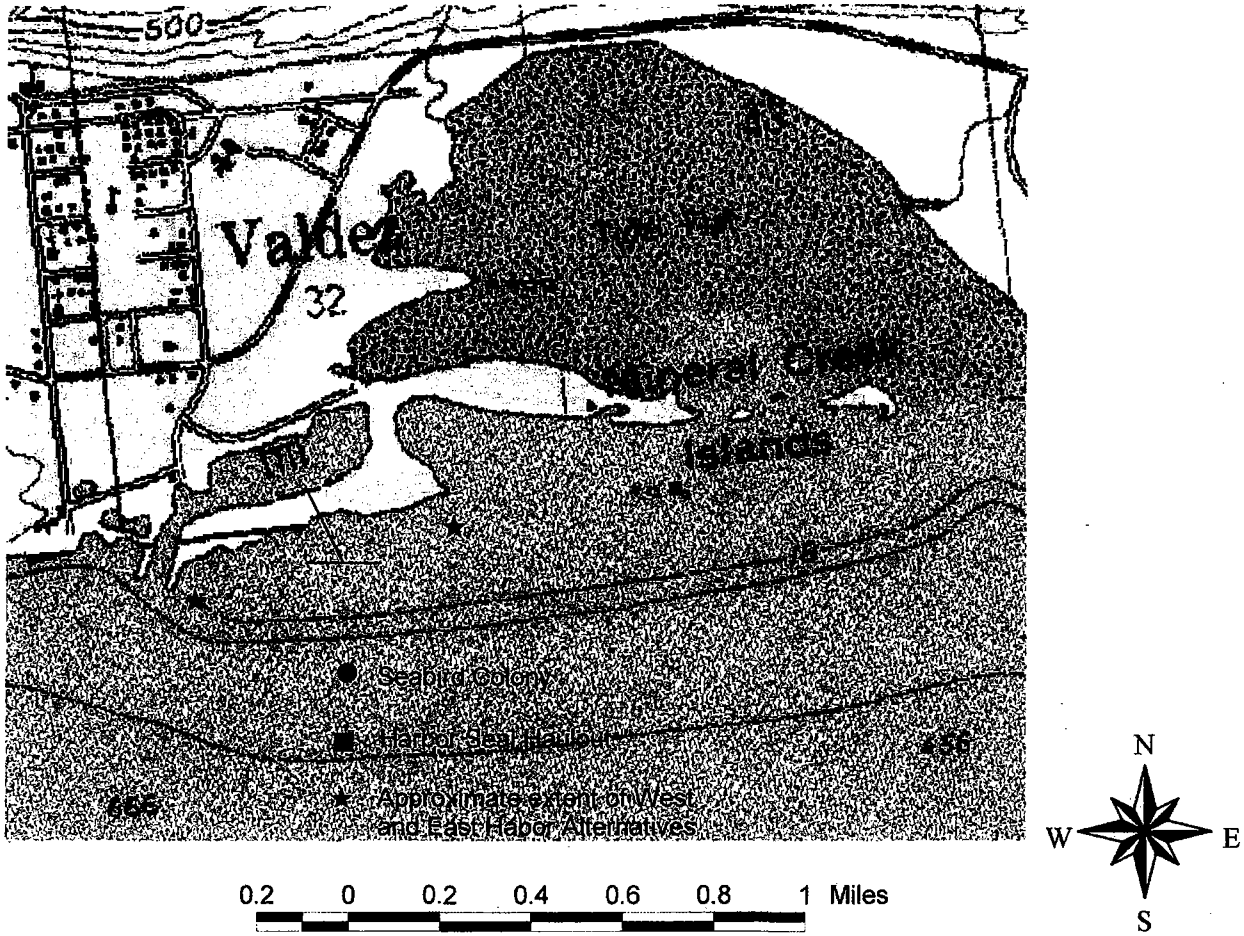


Figure 8 Seabird Colony and Harbor Seal Haulout.

Table 2. U.S. Fish and Wildlife Service Bird Surveys conducted in 1993 and 2000 within 3 transect areas of Port Valdez within and adjacent to the Valdez Harbor. Transect areas are indicated in Figure 7.

	Transect 1			Transect 2			Transect 3		
Survey Dates	02/93	05/93	02/00	02/93	05/93	02/01	02/93	05/93	02/00
Pelagic cormorant	2	------	3		------				3
Mallard		------			------		8		
Gadwall		------			------			4	
American widgeon		------			------			4	
Greater scaup		------			------		4	11	
Long-tailed duck		------			------		26		45
Common eider		------			------				4
Bufflehead		------			------		12	2	32
Pintail		------			------				1
Harlequin Duck		------			------				3
Common merganser	3	------		1	------				
Common murre	498	------		542	------		814		
Common goldeneye		------		1	------		35		
Barrow's goldeneye		------	57		------	5	1	33	184
Surf scoter		------			------			48	33
White-winged scoter		------			------	1			7
Red-breasted merganser		------	6		------				9
Artic Terns		------			------			37	
Mew Gull		------			------			28	
Larus sp.		------			------			248	
Sea Otter	1	------	1	12	------	5	25		2
Harbor Seal		------	1	28	------		39		1

------Indicates survey was not conducted in these transects. Due to ice and adverse weather conditions inventories were only partially completed in survey areas 1 and 3 in 2000.

The Duck Flats, located southeast of the proposed harbor improvements, consist of 1000 acres of extremely productive intertidal fish and wildlife habitat providing high levels of nutrient availability. The predominant wetlands type within the Duck Flats is intertidal estuarine salt marsh, which depends on daily tidal inundation and fresh water input from streams. The salt marsh within the Duck Flats is the largest salt marsh in Valdez Arm and one of the larger marshes in PWS. The Duck Flats are noteworthy for their size not only in PWS but in Alaska (Crow 1977). Salt marshes are relatively rare in Alaska.

Since the early 1970s, this area has been regarded by federal and state resource agencies and the scientific community as the most productive ecosystem in Port Valdez, containing unique habitat with high natural productivity, plant and animal diversity, and essential habitat for biological resources. The Valdez Duck Flats have been recognized as an Aquatic Resource of National Importance by the U.S. Army Corps of Engineers.

The Valdez Duck Flats provide significant waterfowl production, including important nesting and brood rearing habitat for a variety of birds, notably ducks, geese, gulls, and terns (Hogan and Colgate 1980). The Duck Flats also provide important feeding, nesting, molting, and staging habitat for numerous species of marine birds, waterfowl, shorebirds, passerines, and raptors.

In previous breeding bird surveys (Hogan and Colgate 1980), mallards were the most abundant waterfowl species counted at the Duck Flats, followed by green-winged teal (*Anas crecca*). Mallards (*Anas platyrhynchos*), green-winged teal, pintail (*Anas acuta*), and American wigeon (*Anas americana*) nest on the Duck Flats and use the numerous channels and pools for feeding and brood rearing.

The August 2005 site visit by the ACOE and the NMFS noted both sides of the Alyeska service dock serve as nesting sites for a colony of blacklegged kittiwakes. One hundred twenty birds were estimated to utilize the east side of the SERVs pier . Nests were built on the lower, outside web of the main steel girder (see photos in Bartlett 2005).

Marine Mammals

Marine mammals, primarily harbor seal (*Phoca vitulina*) and sea otter (*Enhydra lutris*), use Harbor Cove, the Duck Flats, adjacent islands, and the surrounding marine waters for feeding and resting. Intertidal habitat located between the Valdez Duck Flats and Mineral Creek has been identified as a high concentration area for sea otters (NOAA 2000). Sea otters have been observed to make feeding dives along the outer margin of the east site. Sea otters forage on clams and mussels in this area. A recent sea otter dig into the substrate was observed during the low tide site inspection on August 19, 2005 (Bartlett 2005). The proposed project is expected to eliminate or reduce these feeding habitat areas for sea otters. The western population of sea otter (*Ehydra lutris kenyoni*) has been listed as threatened under the Endangered Species Act; however, that stock does not occur east of western Cook Inlet. Sea otters in Valdez Arm were not protected under the Endangered Species Act at the time this CAR was being prepared. Under the Marine Mammal Protection Act, sea otters are afforded protection from harassment.

Harbor seals in the project area are likely to feed on starry flounder, salmon, and shellfish located along the barrier islands and the Valdez Duck Flats during high tides (Issacs 1990). As many as 27 harbor seals have been observed hauled out at the east end of the Mineral Islands (Issacs 1992). On the Service's February 29, 2000, site visit, 20 harbor seals were observed hauled out in this same area which is located approximately one-half mile from the proposed East Alternative. Harbor seals move in over the subtidal shelf and mudflats to feed on starry flounder and seasonally when spawning salmon are available (Lees et al. 1979).

Threatened and Endangered Species

The Kittlitz's murrelet (Brachyramphus brevirostris) throughout its range was designated a candidate species for threatened status under the Endangered Species Act (ESA) on March 4, 2004. This is a small diving seabird that lives in Alaskan coastal water from Point Lay to southeast Alaska. It is a secretive breeder, laying a single egg in a depression on bare, often alpine ground. Only about two dozen nests have ever been found (Day et al. 1999). They tend to forage around tidewater glaciers among icebergs and brash ice, but avoid areas that contain heavy ice. They also feed along coasts where waters are influenced by glacial outwash. Kittlitz's murrelets are known to occur in Valdez Arm, potentially in the project area. Surveys should be undertaken to determine if this species uses the area for feeding, or as a transitioning corridor between feeding, nesting and brood rearing areas, or as a travel route during migration between winter and spring-summer habitats.

Steller's eiders (*Polysticta stelleri*), listed as threatened under the ESA, are sighted only very rarely during the winter in the Valdez Arm. This project is not expected to have any effect upon the species.

Our records indicate that there are no other listed threatened or endangered species for which the Service has authority known to occur within any of the proposed alternatives. Based on the Corps project description, we concur with their assessment that the proposed action is not likely to adversely affect species listed as threatened or endangered under the Endangered Species Act of 1973 (Act), as amended. This constitutes informal consultation under the Act; for reference note this is consultation number 2006-086. Further consultation regarding this project is not necessary at this time. Consultation should be reinitiated by the Corps if: 1) project plans change; 2) new information becomes available that would indicate listed or proposed species may be affected by the project in ways not previously addressed; 3) new species are listed or proposed for listing that may be affected by the project; or 4) listed or proposed species are observed on the project site.

The NMFS has responsibility for all other threatened and endangered marine mammals. The Corps should contact NMFS to determine if future consultation regarding marine mammals is required for this project.

Future Resource Conditions Without the Project

Without the project, we would expect resource conditions to remain largely as they are today. Consequently, the habitat is likely to remain in its current condition for the most part.

Future Resource Conditions With the Project

Impacts Related to the Breakwater and Staging Area

The dredging and structures associated with the Valdez Small Boat Harbor Improvement project will cause shallow intertidal habitat losses in both of the newly proposed alternatives. However, these losses are much greater in the East Alternatives, which encompass a larger area of shallow intertidal habitat, 7.33 – 10.56 ha (18.12 – 26.08 ac) respectively for the NED and locally preferred plans, than for the West alternative which would involve 5.14 ha (12.71 ac), see Table 1. These shallow intertidal areas provide an important habitat zone for plants, invertebrate, fish, seabirds, and marine mammals that does not occur in adjacent subtidal areas.

Bird surveys conducted by the Service in 1993 and 2000, documented numerous birds using these areas for feeding. They also use the nearshore habitats for protection from harsher wind and wave conditions that occur in deeper waters. In addition, nearshore habitat losses will reduce available sea otter foraging areas and nearshore anadromous fish migration and feeding habitat. The breakwater and other structures associated with the harbor improvements would displace fish and wildlife from foraging in these areas.

A solid fill breakwater extending from shore to deep water can interrupt nearshore anadromous fish migration (Starr et al. 1981). Sloped topography, unconsolidated rocks and sediments, vegetation, fresh water seeps, and shallower habitat along the shoreline provide juvenile fish with important rearing and migration habitat. This nearshore habitat provides food, and escape cover that helps protect salmon fry from predation by larger fish. The placement of inwater structures, such as the breakwater and staging area, adjacent to the shore will force juvenile fish that migrate along the shore further seaward. Juvenile fish in deeper waters will be more susceptible to predation, where predatory fish are more abundant than in shallower nearshore waters. The steeper slopes associated with breakwater structures may also increase predation on juvenile salmon because no habitat is available for them to hide from predators. In addition, fish forced to go around the breakwater structures, are susceptible to increased wave action and turbulence. During project construction, juvenile fish could also be more susceptible to predation if they are forced out into deeper water to avoid construction impacts such as increased turbidity or blasting.

Some juvenile fish, salmon in particular, either prefer or become trapped within some harbor configurations (Cardwell and Koons 1981). Juvenile salmon may 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 related directly to the harbor design and its proximity to salmon migration routes.

Both of the proposed harbor alternatives support benthic invertebrate food resources that attract birds and marine mammals. Some of the more important food resources for sea otters and sea ducks include mollusks and crustaceans. The East Alternative supports a greater abundance of invertebrates than the West Alternative because the shallow intertidal habitat encompasses a larger area. Therefore, impacts to invertebrates would be greater in the East Alternative. The additional invertebrate losses associated with development of the East Alternative would also have greater impacts than the West Alternative on birds and marine mammals, since invertebrates are an important part of their diet.

Structures from the proposed breakwater and staging areas will bury and smother invertebrates causing direct mortality (see Table 1 for acreage to be lost due to each facet of each alternative). Invertebrate mortality can also be expected to result from increased hydrocarbons and other contaminants that are associated with marine vessels. The structures will also cause invertebrate habitat losses and alterations, resulting in reduced diversity and abundance which will diminish food supplies for birds and marine mammals. Construction activities such as dredging will bury benthic organisms and interfere with filter feeding activity of invertebrates.

Although some breakwaters could be re-colonized by marine organisms, there is little evidence to document to what degree it would occur and how long it could take. The constructed breakwater may, over time, support some marine habitat, but at a much reduced level compared to pre-existing habitat conditions.

<u>Dredging Impacts</u>

Dredging will result in unavoidable suspension of large quantities of sediment into the water column, degradation of water quality for a short period of time, and physically altered benthic habitat. Excessive sedimentation and turbidity can clog fish gills, interfere with along-shore fish movements, lower dissolved oxygen concentrations, bury benthic organisms, and interfere with filter feeding activity of invertebrates. Juvenile outmigrating salmon are highly sensitive to turbid water conditions. Consequently, if dredging were to occur during the juvenile outmigration, thousands of salmon smolts may be injured.

<u>Environmental Contaminants/Water Quality Impacts</u>

Leaching of trace contaminants from marine vessels can contribute to contamination of coastal waters. For example mercury and tin have been used extensively as toxicants in antifouling paints, while chromium, lead, and zinc are used in bottom primers.

Since the proposed harbor will increase vessel use in eastern PWS, the potential for fuel spill incidences will also increase. Chronic residual oil and petroleum products that enter marine waters from daily vessel operation will also increase. Although not currently proposed, the construction of a new fuel facility associated with any new harbor will increase the potential for the number of acute and chronic fuel spills which could have devastating impacts on fish and wildlife.

Chronic discharges may be less noticeable than large spills; however, they could be introducing more hydrocarbon by-products into the marine environment and causing longer term damages (Breuel 1981). 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 (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 fuel may be released from leaking tanks and valves, accidents during loading and off-loading, flushing of tanks and bilges, accidental tank overflow during vessel refueling, etc.

Petroleum can be ingested by birds and mammals through feather preening, grooming, 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).

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. 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 East Alternative is closer to sensitive fish and wildlife habitats of Valdez Duck Flats, Harbor Cove, and adjacent islands, than is the West Alternative. Therefore this alternative may result in an increased exposure of trust resources inhabiting those sensitive adjacent regions to hydrocarbons and other harbor induced contaminants. Since information on circulation patterns for east Port Valdez is not available, it is hard to project surface water movement patterns. Fish and wildlife using Harbor Cove could be the most vulnerable to fuel spills within or near the proposed East Alternative because fuel may be more concentrated and less dispersed.

Mortality and sublethal effects on invertebrates are caused by smothering, contact 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 amphipods. A concentration of 20 mg/L gasoline was lethal for crabs (Kasymov and Gasanov 1987).

Vessel Disturbance Impacts

The proposed Boat Harbor Improvement project will increase marine vessel use in areas adjacent to the project and throughout PWS. Increases in boat traffic, human access, and developments within PWS are a cause of major concern within a biologically rich, sensitive, and fragile environment containing many species that have not yet recovered from the1989 Exxon Valdez oil spill. Potential impacts resulting from the increased vessel use include:

1. Noise, boat traffic, and other human disturbances (i.e., onshore trampling in previously disturbed areas) may cause birds and marine mammals to abandon habitats and abort/abandon young. Increased numbers of large fishing boats using a harbor constructed in certain areas could result in disturbance to those species that are sensitive to the presence of humans or vessels, forcing them to other areas where food or shelter could be less optimal. Of particular concern is vessel disturbances to the harbor seal haulout located approximately ½ mile from the East Alternative.

2. Increased boat landings and access into protected non-rocky shallow shores that support sensitive habitat such as eelgrass beds and black oystercatcher nesting areas.

3. Increase in chronic spills and residual hydrocarbons from vessels.

4. Increased potential for larger fuel spills which could have devastating effects on invertebrate, fish, birds, and marine mammals.

5. Increase of other pollutants such as bilge and grey water into marine waters.

6. Increased litter in the marine environment.

7. Loss and alteration of terrestrial and aquatic vegetation caused by anchoring, hiking, trampling, camping, firewood use, etc.

8. Increased transport of non-native aquatic species. Although not currently documented in Alaska waters, but expanding north along the Pacific Northwest coast, species like the green crab compete for prey food sources such as small clams. They have been known to totally take over habitats used by other crabs.

9. Increased fishing pressure on fresh and salt water fish and other aquatic species (i.e, clams) could deplete or reduce local populations, further impacting species that prey on them.

Recommendations

Under the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.), the Service is responsible for identifying potential project impacts and recommending actions which would mitigate negative project effects on fish, wildlife, and their habitats.

Habitat impacted by the proposed harbor within the East Alternative is of high to moderate value and is relatively abundant in the region (Resource Category 3). Shallows closer or adjacent to the Duck Flats have increased biological productivity. Based on the Service's Mitigation Policy (FR Vol. 46, No. 15, January 23, 1981) our mitigation goal for projects within Resource Category 3 habitat is no net loss of habitat value while minimizing loss of in-kind habitat value. Habitat impacted by the proposed harbor within the West Alternative is of medium to low value (Category 4). The mitigation goal for Resource Category 4 is to minimize loss of habitat value.

In order to meet these goals, 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. Should subsequent design changes result in either more or less significant impacts than predicted for the current proposed alternatives, then the Service will need to review these recommendations for potential changes needed.

Alternatives and Recommended Mitigation Actions:

The West Alternative is recognized as being the least environmentally damaging alternative due primarily to its distance from Harbor Cove and the Duck Flats. It will cause less intertidal habitat loss, such as highly productive food sources for birds and marine mammals. A West Alternative harbor would result in a lessened level of boat disturbance impacts to species within these habitats and less direct exposure to hydrocarbons and other contaminants originating from the harbor. However, it is also recognized that pursuing the West alternative alone will not adequately address either the short term, or long term, need for expanded boat moorage in the greater Valdez Arm region.

Consequently, at meetings held in late 2005, the ACOE, the NOAA Fisheries, a variety of state and local agencies including the City of Valdez, and the Service, "brainstormed," evaluated, and collaborated in the design of a variety of mitigation measures. These focused on reducing impacts to, or otherwise compensating for, loss of trust resources from development of either of the two East harbor alternatives (locally preferred or NED). The following recommendations are divided into two categories: (1) measures to avoid and minimize adverse impacts, and (2) measures to compensate for remaining adverse impacts.

Synopsis of Recommendations for Additional Information and Steps to be Taken to Avoid and Minimize Impacts - Applicable to Development of the Eastern Harbor Expansion (both alternatives).

1 The harbor channel entrance should be located as far as possible away from sensitive bird, fish, and marine mammal habitats to reduce vessel disturbances to these resources.

2. To reduce fish migration obstructions, the in-water portions of the breakwater and staging area should be contoured with a slope of 2:1. The use of different types of rock should be further investigated to determine what size and type of rock or combinations of rock can be used to maximize juvenile salmon cover along breakwater structure. Additional measures (i.e., breaches) have been incorporated into breakwater design to avoid fish migration impacts. All breaches need to be designed to prevent dewatering: breaches and breakwaters need to be designed to ensure at least 1 foot of sea water remains at all "lowest low water (LLW)" tides to facilitate fish passage. At this time, it is assumed that the breaches will not need maintenance dredging; however, depending on the final elevations and configurations of breaches, dredging needs for breaches will need to be addressed during later design phases.

3. The harbor will include an approved waste oil disposal site with adequate containment and maintenance measures to ensure proper disposal. The new harbor will contain a new fuel dock designed and equipped with state-of-the-art protection equipment and measures (e.g., fuel collars, clean up equipment and facilities).

4. To reduce the potential for accidental fuel spills, heighten vessel operators' awareness of hydrocarbon impacts to species in the marine environment, and provide tips to help boaters prevent and report fuel spills, signs with large and bold text shall be provided by the local sponsors and installed at the Harbor Master's office and at the new and existing fuel docks; final design will require approval from the Service. Additional signage is recommended along walkways and other locations. Signs should clearly communicate the need for using provided facilities to ensure safe and legal deposition of litter, oil products, or other chemicals so that marine waters and resources are protected.

5. Interpretive signs shall be installed in high traffic areas (such as outside the entrance of the Harbor Master's office) to inform harbor users about the hazards of litter and marine debris impacts to fish and wildlife in the marine environment. The sign contractor will work with the Service to develop text for the sign that will meet or exceed the requirements of MARPOL; final design will require approval from the Service. A clearly identified and easily accessible collection station will be located within the new harbor area (e.g., fuel dock or entrance to the boat launch) to collect discarded marine boating related debris (e.g., fishing nets, packing bands, ropes, buoys, gas cans, etc.).

6. An existing bilge water treatment plant is located 4 miles away from the current harbor. It is highly recommended that a new, state-of-the-art bilge water treatment facility be constructed within the immediate footprint of the existing and proposed new harbor sites. Design, construction, and signs "advertising" the existence of this facility need to done to meet or exceed MARPOL regulations to ensure this facility is utilized to its maximum potential.

7. To reduce the biological impacts of dredging generated turbidity and suspended sediments on out-migrating juvenile salmon, dredging or fill activities should not occur from April 15 – May 15 (fry out-migration) and from June 20 – July 20 (adult return harvest period). It may be possible to arrange to continue construction activities during the "closed timing window" periods if activities can be timed to occur during low tide periods when the site is "de-watered." This will require careful consideration of seasonal and daily cycles and flexible work schedules for contractors. Further consultation with the Alaska Department of Natural Resources – Office of Habitat Management and Permitting may be necessary to ensure all work is completed within and is consistent with the fish passage timing window for this region (M. Sommerville, pers. comm.).

8. Disposal of dredged materials into selected (see below) intertidal/subtidal areas should include methods to filter or settle out silt-laden water (i.e., the use of silt curtains, where feasible) prior to their discharge at a disposal site. Dredged materials shall be discharged below the water surface to minimize the spreading of suspended particles.

9. Valuable "preconditioned" shale and its attached marine infaunal community found along the base of southern and eastern shore of Hotel Hill should be collected prior to harbor construction. This material should be carefully collected and stored in-water so attached fauna does not die. The material would then be placed at the toe of the newly constructed harbor bulwarks or breakwaters as "seed" material to provide some habitat value.

10. To reduce adverse impacts to nesting kittiwakes and their young located on the SERVs pier and to comply with the Migratory Bird Treaty Act, the Service recommends construction activities <u>be initiated</u> *after* August 21 (when chicks will have fledged or have left the area) or *before* May 7 (prior to egg laying). Once construction begins it should be able to continue with no date restrictions because it is likely the birds will avoid the area and will relocate to nearby colonies elsewhere within the Valdez Arm region. Following these guidelines will reduce the potential for loss of young of the year. It is unknown whether the birds will continue utilizing or will abandon the site in the presence of harbor related construction activity.

11. To reduce adverse impacts to sea otters, the Service recommends that Corps Quality Assurance personnel/observers be stationed at the project site during dredging, in advance of when any blasting might be anticipated, and during breakwater rock installation/construction phases of this project. Such construction related activities should be suspended when sea otters are observed within 0.25 mi of the project site.

12. As planning and design of the east harbor expansion progresses, the Service will use our Migratory Birds Management annual surveys conducted throughout Prince William Sound to ascertain the presence of Kittlitz's murrelets in the Valdez Arm and project areas, subject to funding limitations. The Service will provide any updated information to the Corps for use in harbor planning.

13. Updated studies to determine circulation patterns within eastern Port Valdez would be useful to assess cumulative changes resulting from the potential expanded harbor, SERVS dock, Alyeska Marine Terminal, and the Container Terminal dock. This information would help assess resource impacts associated with water quality issues and potential fuel spills within the proposed harbor and adjacent valuable habitats, such as the Valdez Duck Flats. Information on circulation patterns within Eastern PWS could also assist in defining additional mitigation measures to offset new harbor impacts. The Service will work with the City of Valdez and resource agencies to update all local spill prevention plans.

14. Preliminary water circulation modeling has been conducted for the proposed harbor designs. However, the Alaska Department of Environmental Conservation has indicated additional modeling and reviews may be necessary and appropriate prior to finalizing the ACOE design and before State of Alaska permits are issued for the proposed project. The Service encourages and supports further review and analysis because continuance of high water quality is necessary for the protection and maintenance of trust resources present in the project area.

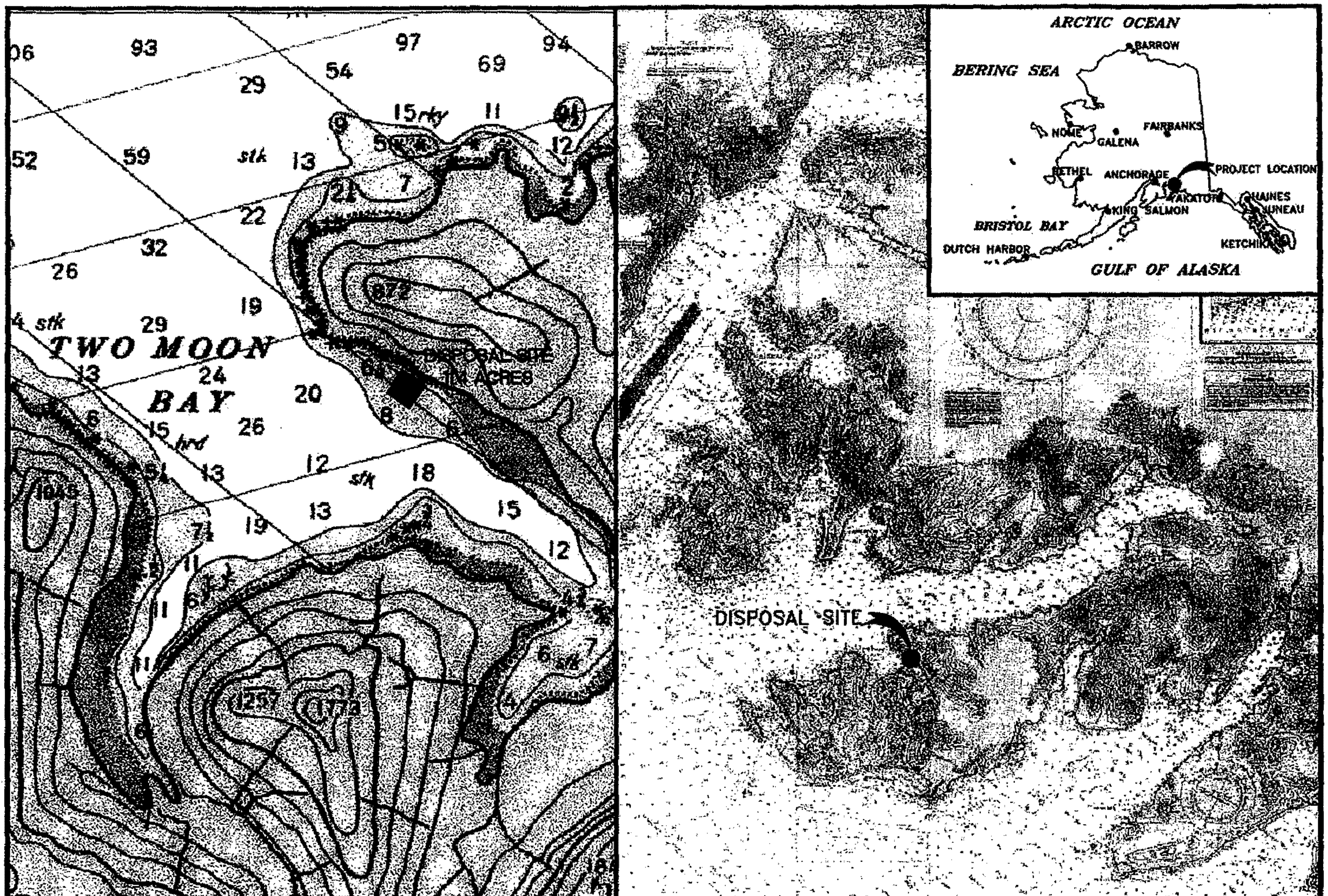
Recommended Compensatory Mitigation for Unavoidable Habitat Losses - Applicable to both East Harbor Alternatives.

The Fish and Wildlife Service, in collaboration with the ACOE, the City of Valdez, the National Marine Fisheries Service, the Alaska Department of Fish and Game, and the Alaska Department of Natural Resources – Office of Habitat Management and Permitting developed a "Mitigation Options Discussion Paper" for this project. In this paper, a wide range of mitigation concepts and alternatives were reviewed as potential compensation for unavoidable losses to fish and wildlife resources and their habitats due to implementation of the proposed action. This review is attached as Appendix 1 and is incorporated into this CAR by reference. A number of options were considered and evaluated at the November and December, 2005 meetings. Some of these options were set aside as not desirable or appropriate at this time by one or more of the participants at the meeting. The following synopsis is a list of remaining options recommended for further consideration as compensatory mitigation. Additional details and discussion can be found in Appendix 1.

1. ***Restore habitat impacted by bark debris accumulated from previous log transfer facilities located within Two Moon Bay.*** The Service recommends a phased restoration project be developed and implemented over time as fill and project funds become available. The ultimate restoration goal for this site will be to restore the area to high quality habitat including eelgrass beds. There would be four phases to this restoration project: site surveying and design, capping, vegetative restoration, and monitoring to determine "success."

The initial phase would involve conducting bathymetric and biological surveys of Two Moon Bay (Figure 9) to determine the precise extent of the debris field, assess current and tidal patterns, and the location of existing important subtidal marine resources adjacent to the debris field (such as eelgrass beds, rocky outcropping, etc.). Secondly, as much of the existing bark field at Two Moon Bay as possible would be capped using dredge spoil from the proposed Valdez harbor expansion (Figure 10). While there may not be enough fill from harbor dredging to fully bring the debris field up to grade, the Service recommends that the restoration plan developed as part of harbor development account for this final goal. Subsequent projects in eastern PWS could provide additional fill for Two Moon Bay. Additionally, any large slabs of colonized substrate harvested from the harbor development site and not used as seed material on top of new harbor rock should be considered for moving to Two Moon Bay as part of the habitat restoration there.

Once the filled substrate is an adequate depth for eelgrass, the third phase of restoration would involve harvesting eelgrass shoots from existing eelgrass beds in Two Moon Bay and adjacent coves for transplanting on the fill. Additional habitat value and stabilization of the fill slopes might be achieved by the placement of "reef balls" in a double row around the perimeter of the project site (Figure 11). "Reef balls" are cement structures which provide habitat complexity and substrate for colonizing mussels, oysters, and marine algae. They have been effectively used as mitigation in many locations around the world and were installed near Whittier, Alaska, in



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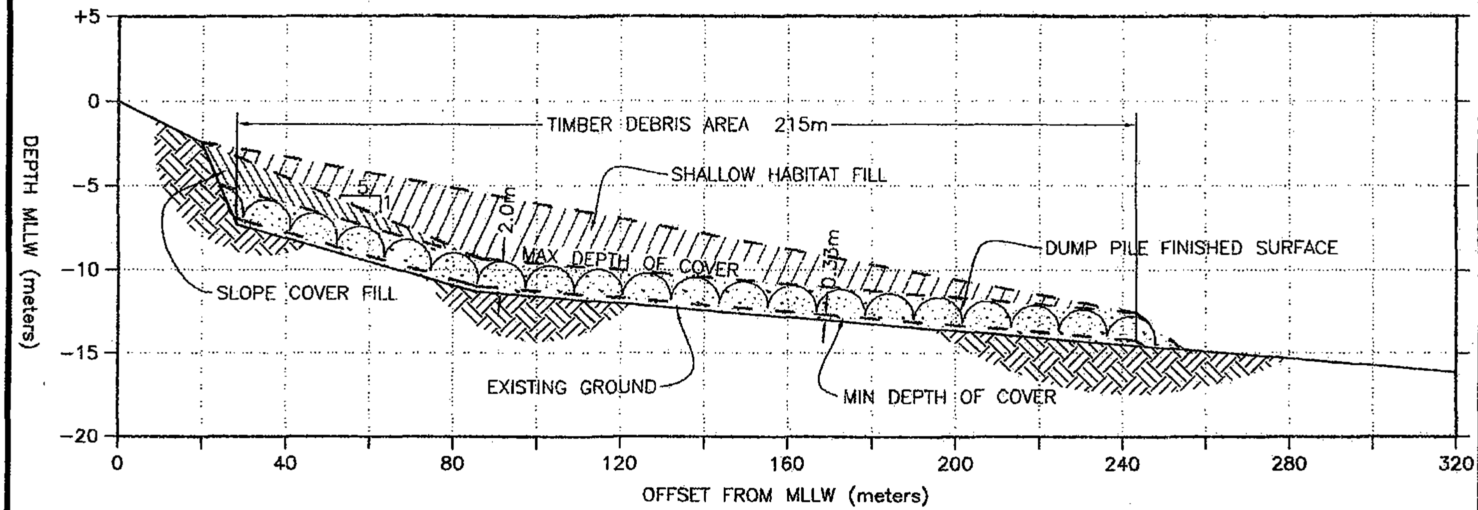
TWO MOON BAY DISPOSAL SITE
VALDEZ HARBOR EXPANSION, VALDEZ, ALASKA

Figure 9



DISPOSAL VOLUMES:

MINIMUM DEPTH OF COVER	15,700 CM
MAXIMUM DEPTH OF COVER	97,000 CM
SLOPE COVER FILL	15,000 CM
SHALLOW HABITAT FILL	93,300 CM

NOTES:
1. DREDGE MATERIAL SHALL BE USED TO CAP TIMBER DEBRIS. DREDGE MATERIAL SHALL BE DUMPED FROM THE BARGE IN SUCH A MANNER TO ACHIEVE AN ACCEPTABLE CAP THICKNESS OVER THE ENITIRE SITE.
2. DUMP PILE COVER SHALL NOT BE SMOOTHED OR LEVELED. FINISHED COVER SURFACE SHALL BE BUMPY AND IRREGULAR.
3. TIMBER DEBRIS AREA ASSUMED TO BE 215m SQUARE (11.4 ACRES).
4. BATHYMETRY TAKEN FROM TRANSECT 3 – TWO MOON BAY.

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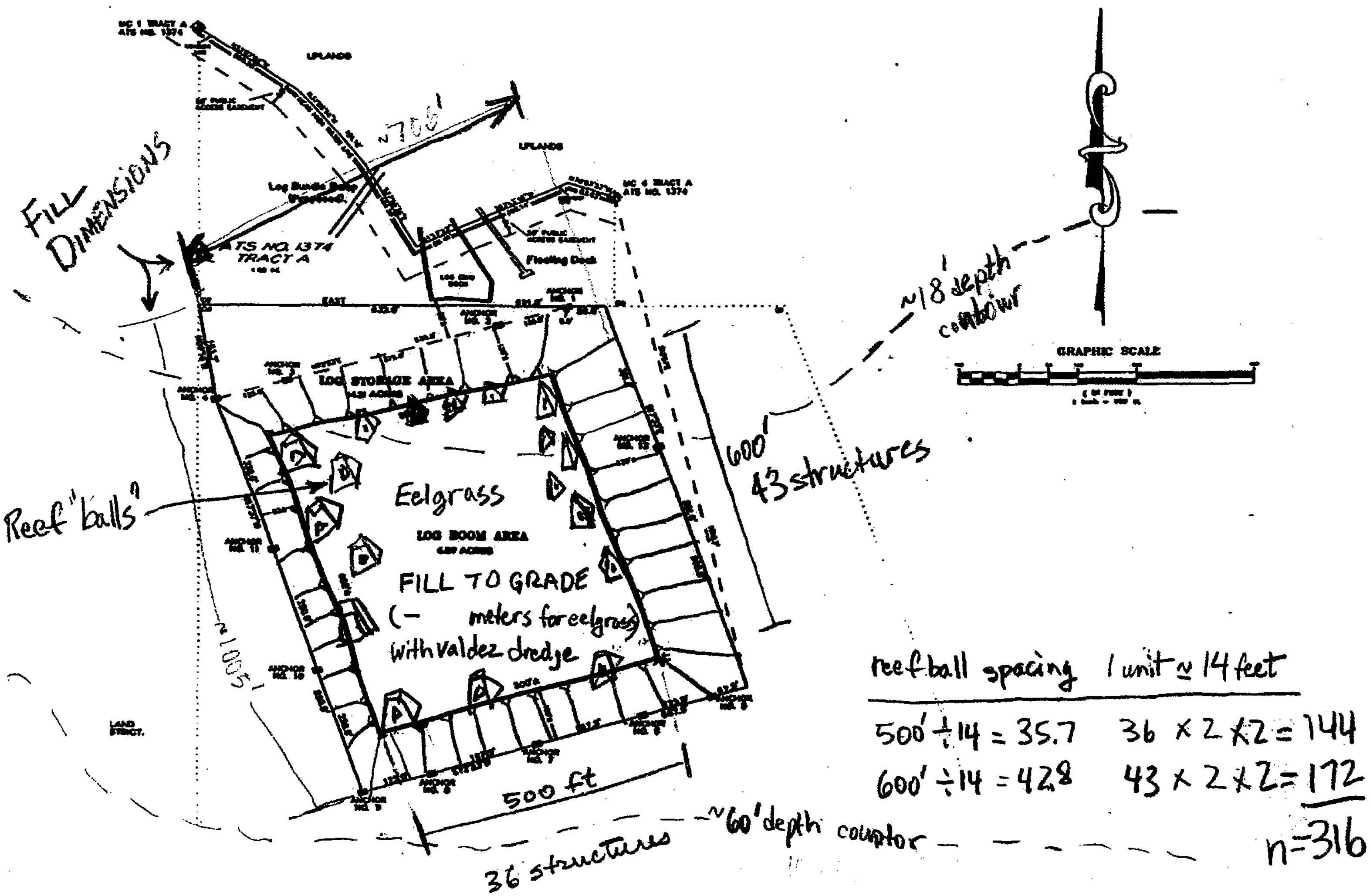
TIMBER DEBRIS CAPPING – TWO MOON BAY
VALDEZ HARBOR EXPANSION, VALDEZ, ALASKA

Figure 10

Figure 11


FILL DIMENSIONS
~700'
UPLANDS
Log Bundle Ramp
ATS NO. 1374
TRACT A
Floating Dock
LOG STORAGE AREA
~18' depth contour
GRAPHIC SCALE
600'
43 structures
Reef "balls"
Eelgrass
LOG BOOM AREA
FILL TO GRADE
(– meters for eelgrass)
with valdez dredge
~1005'
500 ft
36 structures
~60' depth countor
reef ball spacing 1 unit ≈ 14 feet
500' ÷ 14 = 35.7 36 × 2 × 2 = 144
600' ÷ 14 = 42.8 43 × 2 × 2 = 172
n = 316

spring, 2006. A monitoring study of those reef balls is currently ongoing. Because the Valdez Harbor expansion is not anticipated to occur until 2007 or later, some data will likely be available for evaluating the utility of reef balls as a mitigation tool (B. Lance, NMFS, pers. comm.).

Monitoring, the fourth phase of the restoration project, should include evaluation by Remotely Operated Vehicles (ROVs), SCUBA diving transects and videography. Bottom sampling should also be conducted in advance of, and throughout each stage of the Two Moon Bay restoration project.

Each component of this restoration project (e.g., capping bark debris, reef balls, eelgrass transplants) has been successfully used in other areas. However because this combination of restoration techniques has not been implemented in the south central Alaska habitats, this project can be considered an experimental approach. An adequate and carefully designed scientific evaluation should be conducted to determine whether and what tweaking of the restoration design is needed to make it more effective at Two Moon Bay and to document the project's value as an appropriate mitigation tool for a wide variety of future anticipated projects.

The Service recognizes that full implementation of the Two Moon Bay Restoration Project will depend on the availability of funds and staff resources. At the minimum, we recommend the ACOE adopt the appropriate portions of phases 1, 2, and 4 to cap between 6-8 acres of the debris field with between 1-3 meters of dredge spoil from the Valdez Harbor Expansion. Plans to conduct pre-restoration surveys and for continued monitoring and assessment throughout the project will need to be jointly developed and implemented with input from the Service and other stakeholders. These assessments should be considered an essential component of the mitigation plan and any FOSNI to be adopted for the project.

<u>Other compensatory mitigation sites</u> - Two other options which were "set aside" in the Mitigation Options Paper as not being timely may need to be reconsidered in the future if implementation of the harbor expansion does not occur within the current anticipated schedule (e.g., funding and construction ca FY2007-08). The Valdez City Council has not endorsed either of these options. Additional coordination with the ACOE will be necessary as both of these options focus on "out of kind" resources which might not qualify for inclusion into ACOE Civil Works Projects mitigation activities:

2. Limit development at Robe Lake through land swaps, transfers and zoning restrictions to provide protection of natural resources. (see "Options" document for details).

3. ***Set aside city lands on the western side of the Duck Flats as a Conservation Zone.*** The City of Valdez has indicated they may consider purchase of "Area 6" (20 acres on the west side of the Duck Flats as a "set aside" conservation zone. The City may consider constructing a "Potter's Marsh-like" interpretative boardwalk to provide educational opportunities to the public concerning the wildlife and habitat value of the Duck Flats region.

The Service concurs that either of these options could provide compensation for the proposed harbor. However because they involve "out-of-kind" habitats and conservation not restoration, a formulae or process is needed to relate the relative value of habitat lost to habitat "protected."

This relationship would need to be developed in cooperation with the Service and the ACOE and agreed upon before either of these options could be further explored as acceptable compensatory mitigation.

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Table 1. Specifications for 2006 revised alternatives, Valdez Harbor Expansion project. Data provided to the US Fish & Wildlife Service by the Army Corps of Engineers (email from Boyer to Seagars, March 27, 2006).

Project: Valdez Harbor Expansion
Description: Estimated areas and quantities for current alternatives
Prepared: MDP reviesd 27 MAR 2006

ALTERNATIVE ITEM	LENGTH		VOLUME		AREA*		ESTIMATED DISTURBED AREA							
							Above MHHW		Intertidal		Below MLLW		Total	
	M	FT	M^3	YD^3	hectares	acres	hectares	acres	hectares	acres	hectares	acres	hectares	acres
East Site NED Plan (186 boats)							**0.05**	**0.12**	**2.31**	**5.70**	**4.98**	**12.30**	**7.33**	**18.12**
South Breakwater	396.2	1300	49,600	64,877	1.21	2.99								
East Breakwater	183.2	601	28,500	37,278	0.62	1.53								
Stub Breakwater	29.1	95	1,100	1,439	0.04	0.10								
Dredging			175,600	229,685	5.99	14.80								
Upland Fill			25,400	33,223	0.70	1.73								
East Site Locally Prefered (244 boats)							**0.12**	**0.29**	**3.00**	**7.40**	**7.44**	**18.38**	**10.56**	**26.08**
South Breakwater	475.2	1559	79,400	103,855	1.80	4.45								
East Breakwater	229.2	752	40,600	53,105	1.00	2.47								
Stub Breakwater	29.1	95	1,500	1,962	0.06	0.15								
Dredging			202,700	265,132	7.39	18.25								
Upland Fill			75,600	98,885	1.93	4.77								
West Site Wave Barrier (228 boats)							**0.01**	**0.01**	**1.95**	**4.81**	**3.19**	**7.89**	**5.14**	**12.71**
Wave Barrier	451.2	1480												
West Breakwater	182.1	597	5,900	7,717	0.23	0.57								
Entr West Breakwater	91.9	302	8,700	11,380	0.26	0.64								
Entr East Breakwater	360.9	1184	14,600	19,097	0.42	1.04								
Dredging			154,500	202,086	4.92	12.15								
Two Moon Bay Disposal							**0.08**	**0.19**	**1.22**	**3.00**	**1.52**	**3.74**	**2.81**	**6.93**
Max Depth of Cover			97,000	126,876	0.90	2.22								
Slope Cover Fill			15,000	19,620	0.40	0.99								
Shallow Habitat Fill			93,300	122,036	1.98	4.89								

* The areas of individual plan items partially overlap one another