United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fish and Wildlife Office
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Lacey, Washington 98503

Colonel Michael McCormick, District Engineer
Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-2255

AUG 2 3 2006

Attention: Rustin Director, Project Manager

Dear Colonel McCormick:

Enclosed is the final Fish and Wildlife Coordination Act Report for the Shoalwater Reservation Coastal Erosion Project authorized by Section 545 of the Water Resources Development Act of 2000, as amended. This report is to aid your staff in completing the U.S. Army Corps of Engineers' (Corps) biological assessment and provides our comments and technical assistance for this project.

Our comments have been prepared under the authority of and according to the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended 16 U.S.C. 661, *et seq.*) and fulfills section 2(b) of this Act. We have based our comments and recommendations on documents prepared by the Corps, an on-site visit, conversations with resource agency personnel, and resource information available from our files and library. The recommendations included in the report are provided to assist you in meeting your obligation, under sections 7(a)(1) and 2(c) of the Act, to use your authorities to promote the conservation of listed species and their habitats.

We appreciate the direction the Corps has taken with this project and the coordination to select the least environmentally damaging action alternative. We look forward to continued coordination with you on future aspects of this project. For further information, please contact Karen Myers at (360)753-9098 or Tom McDowell at (360)753-9426.

Sincerely,

Pamela Kepp

for Ken S. Berg, Manager
Western Washington Fish and Wildlife Office

TAKE PRIDE® IN AMERICA

cc:
Shoalwater Bay Tribe (J. May, S. Spencer)
WDOE (G. Kaminsky)
WDFW (D. Molenaar, L. Ochoa, S. Pearson)
NMFS (D. Guy)

Enclosure

Assessment of the Shoalwater Reservation Coastal Erosion Project

Fish and Wildlife Coordination Act Report

Prepared for:

U.S. Army Corps of Engineers
Seattle District
Seattle, Washington 98124-3577

Prepared by:

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Western Washington Fish and Wildlife Office
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INTRODUCTION

This Fish and Wildlife Coordination Act Report (CAR) presents the conclusions of the U.S. Fish and Wildlife Service (Service) on the effects of the proposed U.S. Army Corps of Engineers' (Corps) Shoalwater Reservation Coastal Erosion Project (project), in Willapa Bay near Tokeland, Pacific County, Washington. The report is based on several draft and final documents (Morton et al. 2002, Corps 2004a, Corps 2004b, Hoffman and Sievers 2005, Corps 2005) provided by the Corps; discussions with staff from the Corps, U.S. Environmental Protection Agency, Washington State Department of Fish and Wildlife (WDFW), and Washington State Department of Ecology (WDOE); and input from Shoalwater Bay Tribal members. A site visit to the Shoalwater Bay project site occurred on July 15, 2003. This CAR is provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661, *et seq.*) and fulfills section 2(b) of this Act.

Project Location and Setting

The proposed project site is located on and immediately adjacent to the Shoalwater Bay Tribal reservation, on State Route (SR) 105, along the north shore of the mouth of Willapa Bay, in Pacific County, Washington (Figure 1). The proposed project site is approximately 28 miles north of the mouth of the Columbia River and 17 mi south of the Grays Harbor estuary. The reservation is comprised of approximately 1,034 acres, 700 of which are intertidal or subtidal. Tribal housing, a casino, and a Tribal center occupy an area on SR 105 next to the shoreline, adjacent to an embayment called North Cove.

North Cove, which contains salt marsh and tidal flat habitats, is protected from significant wave action by a series of barrier spits which extend southeast from Cape Shoalwater, the outermost northern extent of the mouth of Willapa Bay (Figure 2). During winter storm surges, incoming flows through the tidal channel within the barrier spits, referred to collectively as "Empire Spit" or "Graveyard Spit," expose the Tribal infrastructure to flooding. Significant erosion has occurred at Cape Shoalwater, Empire Spit, and in the intertidal areas that once supported shellfish (Ray 2002), on which the Shoalwater Bay Tribe has relied heavily both historically and in recent times. Until the mid-1950s, open water and tidal flats comprised the area between Cape Shoalwater and North Cove. Prior to the mid-1950s, Empire Spit was farther offshore, longer, and more contiguous than at the present. Aerial photographs from 1942, 1963, and 1999 indicate a progressive northward retreat of the Empire Spit by approximately half a kilometer, and a decrease in the size of the spit and of North Cove (Appendix A). Morton et al. (2002) suggested that Empire Spit is likely to continue to retreat across the marsh and tidal flats of North Cove, eventually merging with the Tokeland Peninsula. Empire Spit is currently breached in two places by tidal channels, with a third channel forming in the western part of the marsh. Empire Spit is assumed to protect the uplands from flooding during high wave events caused by storms.

The habitat in North Cove appears to be shifting from tidal flat to a high salt marsh, consisting of beachgrass (e.g., *Leymus mollis*), sedges (*Carex* sp.) and rushes (*Juncus* sp.), glasswort (*Salicornia* sp.) and other salt marsh succulents, as well as smooth cordgrass (*Spartina alterniflora*), an invasive, nonnative species. The existing Willapa Bay River channel in North Cove now occupies areas that appear to have once been extensive tidal flats, used historically by the Shoalwater Bay Tribe to grow and harvest shellfish, on which, along with subsistence fisheries, they relied heavily. A drainage ditch was constructed in the early 20th century to drain overland runoff and irrigation water from nearby cranberry bogs into Willapa Bay. A report by U.S. Geological Survey and the WDOE indicates that the ditch conveyed fine sediments into portions of North Cove, contributing to the expansion of the marsh and reducing the intertidal areas that were once habitat for clams (Morton et al. 2002).

Background and Recent History of the Project Area

Erosion, accretion, and the location of various features (e.g., river channels, sand islands, etc.) in Willapa Bay have varied throughout history, but the degree of influence of both nearby and distant human activities on this cycle is not yet known. The Corps has been studying the erosion problem in Cape Shoalwater and nearby Washaway Beach since 1955, and has determined that much of the past and ongoing erosion of the dune and shoreline has been caused by the northward migration of the main Willapa River channel entrance into Willapa Bay. The Corps has previously examined many different alternatives to potentially solve the erosion threat at Cape Shoalwater, including revetments, jetty construction, pile diking, groin placement, and dredging to encourage channel realignment. During previous investigations, the Corps concluded that no engineering solutions were economically justifiable and that funds would be better allocated toward purchasing threatened land in the path of erosion (Terich and Levenseller 1986). In 1967, the Corps projected shoreline retreat through 1994 and concluded that erosion would continue through the dunes and areas of alluvial deposits, but that it would slow "to the east, where uplands composed of more resistant terrace deposits are located."

Until recently, the Corps was doubtful whether an alternative existed that would meet all the stated goals of the legislation which supports this project. Achievement of all of these goals—cost-effectiveness of the project, availability of an "environmentally acceptable and technically feasible" alternative, and a project that would "improve the economic and social conditions of the Shoalwater Bay Tribe"—would be necessary for the project to move forward. Based on analysis of the most recent study conducted by the U.S. Geologic Survey and WDOE, the northward channel migration appears to have slowed, stopped, or locally reversed. This change in movement may allow for the use of alternatives that would provide effective protection from erosion for this stretch of shoreline, without the need for hard structures engineered to redirect the alignment of the channel in Willapa Bay (Corps 2004a).

Several projects have been implemented in response to shoreline erosion in the area in recent years. In 1998, the Washington State Department of Transportation constructed an underwater dike, groin, and beach nourishment project as an emergency action to prevent erosion of SR 105, which is the primary route for access to and from Tokeland and the reservation. By 2003, the Willapa Bay channel entrance had migrated north into the terminal end of the rock groin, affecting the integrity of the structure. As a result of this migration of the channel, the

submerged, terminal end of the groin has collapsed, flattening out at depths of 100 feet or more, indicating subtidal erosion of the structure (P. Hoffman, personal communication, 2003). Seavey (U.S. Fish and Wildlife Service, personal communication, 2003) reported that the sand (350,000 cubic yards) used as beach nourishment quickly eroded away, and that the groin also appears to be interrupting north to south sediment transport, and may be contributing to erosion of other barrier spits to the east.

In 2000, the Corps constructed a 1,700-foot-long revetment as an emergency action to protect the Tribal infrastructure and the road to Tokeland from flooding. This action was undertaken after a combined storm and high tide event in March 1999 that resulted in severe flooding of the reservation and nearby community. This 17-foot high riprap revetment continues to protect upland areas of the reservation; however, studies of existing site and erosion conditions suggest that this structure is not sufficient for the long-term protection of reservation lands from storm waves and other erosive forces (Corps 2004a).

Project Authority and Purpose

The project is authorized under Section 545 of the Water Resources Development Act of 2000 (Public Law 106-541), as amended. The purpose of this project is to provide coastal erosion protection for the reservation of the Shoalwater Bay Tribe on Willapa Bay in Pacific County, Washington. The project has been proposed by the Corps at the request of the Shoalwater Bay Tribe and would be constructed if the Corps is able to demonstrate that the project: 1) would be a cost-effective means of providing flood/erosion protection that is environmentally acceptable and technically feasible and 2) would improve the economic and social conditions of the Shoalwater Bay Tribe.

Project Description

The Corps (Federal sponsor) has proposed a two-part preferred alternative (Appendix B) to provide coastal erosion protection for the Shoalwater Bay Tribe (Corps 2005). The Corps would: 1) restore the sand dune which makes up a portion of Empire Spit directly waterward of the shoreline on reservation lands and 2) expand the existing riprap revetment to serve as a flood berm along the shoreline. Specific objectives of the project include:

- Protection of North Cove and Tribal lands—subtidal, intertidal, and upland—from erosion by reinforcing the Empire Spit that provides wave action protection to the cove.
- Protection of Tribal lands from flooding created by overtopping waves during storm and high tide events.

The Corps has considered a variety of alternatives to address or alleviate the effects of erosion in this area. These alternatives include: 1) a no action alternative, 2) hydraulic modifications to the entrance of Willapa Bay, 3) construction of a sea dike, 4) dune restoration, and 5) extension of the existing revetment ("flood berm"). The actions (dune restoration and flood berm extension) included in the implementation of the preferred alternative would require varying amounts of future maintenance, depending on the occurrence of high tide and storm events and the degree of

damage that may result from these events. The individual actions comprising the preferred alternative are further described below.

Restoration of Existing Dune

Approximately 600,000 cubic yards of sand would be placed to restore the dune (Figure 3). The sand would be dredged with a pipeline dredge from the adjacent entrance to Willapa Bay and Willapa River channel and placed on the crest of the existing dune (S. Babcock, Corps, personal communication, 2006a). This borrow site is located approximately 5,000 ft from the project area (Figure 4) (Babcock, Corps, personal communication 2005). Sand would be dredged from nearby areas that have been identified as accretion areas in the bay; borrow sites would be monitored by the Corps to ensure that dredging activities do not adversely impact the sand budget in the area (Corps, personal communication, 2006b). The restored dune would have a top elevation of +25 ft Mean Low Low Water (MLLW), and would be 12,500 ft long. The top of the dune would be 20 ft wide, with a side slope of 1 (vertical) to 5 (horizontal). After placement, the sand would be graded and planted with native dune vegetation to stabilize the restored dune.

The northward migration of the Willapa River channel is believed to have slowed or locally reversed; if this is the case, erosion of the dunes and shoreline as a result of the migration will likely subside. However, high waves and storm events would continue to contribute to erosion of the dune and possibly the shoreline of the cove, requiring future routine maintenance to replenish the eroded dune. The Corps estimates that the annual loss of sand from the restored dune, based on computations of sand loss from 2000 to 2002, would be approximately 50,000 cubic yards each year (R. Director, Corps, personal communication 2006). Maintenance actions, which include placement of additional sand and additional native vegetation plantings as needed, are expected to occur on an average of every 10 years, depending on the degree of deterioration of the dune (R. Director, Corps, personal communication 2006). The Corps estimates that approximately 500,000 cubic yards would be replaced every 10 years. The amount of sand needed for maintenance can be easily adjusted over time, if necessary, and the dune can be more easily realigned if a different configuration is deemed necessary.

Modification of Flood Berm

The existing 1,720-foot-long flood berm (Figure 5) would be extended 2,700 ft southward and 4,000 ft northward, with no change in height from the existing structure. The extensions would be of similar design as the existing berm, with the proposed 25,000 tons of graded rip rap and 15,000 tons of armor stone as core material for the extensions. The flood berm would be +17 ft MLLW, would be 16 ft wide at the top of the structure, and have a side slope of 1 (vertical) to 1.5 (horizontal). The northward extension would require the excavation of approximately 15,000 cubic yards of sand and soil for placement of riprap. Approximately 35,000 tons of graded riprap and 14,000 tons of core material would be used to extend the northward flood berm. The excavated sand would be placed and regraded over the riprap and core material. For the southward extension, excavation of approximately 10,000 cubic yards of sand along the existing shoreline would be necessary to place the riprap for the southward extension. This excavated sand, along with an additional 15,000 cubic yards of sand, would then be placed and re-graded over the riprap (25,000 tons) and core material (15,000 tons). Native vegetation would be

planted on the augmented flood berm extensions to promote stabilization of the sand on the structure.

Maintenance of the flood berm is expected be necessary in the future: 5,000 cubic yards of sand would likely be replaced every 25 years, as well as replacement of approximately 25 percent of the flood berm riprap every 25 years. Native vegetation would also be replaced as necessary.

The Corps has indicated that this project would require long-term maintenance to sustain the benefits provided by this alternative. However, the costs associated with this project—both financially and to the ecosystem—are expected to be minimal in comparison to the costs associated with the other alternatives considered in this analysis. The preferred alternative would afford a significant potential for adaptive management. Additionally, the increased protection for Tribal infrastructure from storm events provided by the flood berm would allow for greater flexibility for the dune maintenance timeline should the Corps encounter any difficulties with funding and/or equipment mobility.

FISH AND WILDLIFE RESOURCES

Willapa Bay is on the outer coast of Washington State between Grays Harbor to the north and the mouth of the Columbia River to the south. Willapa Bay is protected from the swells of the Pacific Ocean by the Long Beach Peninsula, a barrier spit approximately 20 mi long. The bay itself is relatively shallow, with extensive stretches of mudflat, shoals, islands, and salt marsh. Willapa Bay is the largest estuary in Washington and the third largest coastal estuary in the western United States (Proctor et al. 1980). The bay is largely undeveloped and is found within one of the most sparsely populated counties in the State. Land cover in the surrounding area is forested, pasture, and scattered residential.

Willapa Bay provides a number of important coastal habitats, including sand dunes, sand beaches, shoals, mudflats, grasslands, saltwater and freshwater marshes, and coniferous forest. Vast areas are shallow with habitats that support waterfowl, shorebirds, and raptors that forage on these birds. The estuary also provides important adult, migratory, and nursery habitats for recreationally and commercially important resources, including salmonids, shellfish, and forage fish that provide prey for other fish and wildlife.

Eelgrass (*Zostera marina*) beds, a Washington State critical habitat, are abundant in the northern portion of Willapa Bay (Hazen 1996 *in* USFWS 1997). Black brant (*Branta bernicla*) feed on eelgrass and often forage near Toke Point. The bay is a wintering ground for most of the Pacific flyway brant in the United States (Williamson 1996 in USFWS 1997). Eelgrass is used as a spawning substrate for Pacific herring (*Clupea pallasii*), an important forage fish for salmonids, marine mammals, and seabirds.

As of 1980, mudflats comprised as much as 55 percent of the estuary (Proctor et al. 1980); however, that amount has decreased due to the spread of smooth cordgrass, which accumulates sediments and transforms mudflats into higher elevation salt marsh. Nearly one third of Willapa Bay's 45,000 acres of tide flats are impacted by smooth cordgrass, one of the most significant

ecological problems in the bay. Imported as oyster packing material in 1894, smooth cordgrass has spread rapidly, from about 400 acres in 1982 to 15,000 acres in 2002 with a growth rate of 17 percent (WDOE 2003). While considered beneficial in its native range, the negative impacts to Washington ecosystems from cordgrass outweigh any potential benefits this invasive, nonnative species may provide. Clusters of smooth cordgrass plants increase deposition of sediments, thereby raising the elevation of the mudflats and converting gently sloping tidal flats to salt marsh meadows incised by tidal channels (Smith 1999). Impacts due to the smooth cordgrass invasion include displacement of native eelgrass, a nursery habitat for anadromous salmon and forage species; a reduction in available habitat for invertebrates, including shellfish; the loss of an estimated 16 to 20 percent of habitat for breeding and wintering birds; and the loss of rearing and foraging habitat for anadromous fish (WDOE 2003).

Other invasive plants, such as European beachgrass (*Ammophila arenaria*), are also creating problems in Willapa Bay and surrounding areas. Nonnative beachgrass was imported to this area in the 19th century in efforts to stabilize dunes. This invasive species has been very successful at colonizing native dune habitats, thereby changing the sand movement, plant communities, and animal habitats along Washington's southwest coast (WDOE 2003). Several Tribal members have voiced the concern that the extensive beachgrass cover in the dunes along the coast to the north of Willapa Bay has trapped sand that would have been transported south, thereby starving the northern part of Willapa Bay of sediment and contributing to erosion.

Intertidal mudflats in Willapa Bay provide habitat for a number of commercially-valuable species, including Dungeness crab (*Cancer magister*), English sole (*Parophrys vetulus*) and oysters (multiple species, see Table 1). Conflicts have arisen over the use of a carbamate pesticide (carbaryl) by the oyster industry to control populations of burrowing shrimp. The activities of this native invertebrate create bioturbation and destabilize sediments, reducing oyster survival and growth. Although carbaryl is intended to target burrowing shrimp, other species such as young-of-the-year and subadult Dungeness crab, English sole, and others may also be affected (Ray 2002). Carbaryl is also reported to affect larval razor clams (Hoffman, personal communication, 2003) and produce sub-lethal effects in coastal cutthroat trout (Davis, USFWS, personal communication, 2003).

Fish and Wildlife in Willapa Bay

Marine Mammals

Willapa Bay provides important habitats for marine mammals that frequent the region seasonally. Marine mammals found in or near the estuary include the northern (Stellar) sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*) Pacific harbor porpoise (*Phocoena phocoena*), and gray whale (*Eschrichtius robustus*). Although information on the use of the bay by most of these species is limited, it is reasonable that the three pinnepeds (northern sea lion, harbor seal, and California sea lion) might use the bay for haul-outs and/or rearing. Additionally, Willapa Bay and its sand islands are known to be pupping grounds and nursery areas for harbor seals and provides for 30 percent of the regional population of harbor seals that ranged between Netarts Bay, Oregon and Grays Harbor, Washington (Jefferies 1995 *in* USFWS 1997). Between 800 and 1,000 harbor seal pups are born

in Willapa Bay each year (USFWS 1997), and use the sand islands found in various places throughout the bay. Jeffries et al. (2000) report seasonal use of Willapa Bay by small numbers of California sea lions.

Information on the use of the bay by cetaceans is limited. The Pacific harbor porpoise may use the bay for resting or foraging. Gray whales may be present from March until July, resting or foraging in the bay during their annual migration north to their traditional summer feeding grounds.

Fish

The Willapa Bay estuary provides spawning, nursery, and rearing habitat for a variety of fish species (for common and scientific names of the species likely to be present in or near Willapa Bay, see Table 1 below), including salmonids, small forage fish, flatfish, sturgeon (and other fish (Proctor et al. 1980). Forage fish, such as surf smelt, Pacific sand lance, and Pacific herring, are important prey species for marine mammals, seabirds, salmonids, and other fish species found in Willapa Bay.

Willapa Bay supports hatchery and wild stocks of fall Chinook, chum, and coho salmon as well as steelhead (summer and winter) and cutthroat trout. Salmonids are highly valued and declining in Washington State, resulting in the proposal or listing of various populations under the Endangered Species Act. Washington State has imposed strict restrictions on the harvest of salmon and steelhead in an attempt to reverse the decline.

Table 1. Fish and shellfish expected or likely to be present in or near Willapa Bay.

Common Name	Scientific Name	Common Name	Scientific Name
Pacific tomcod	*Microgadus proximus*	Pacific razor clam	*Siliqua patula*
English sole	*Parophrys vetulus*	Native littleneck	*Protothaca staminea*
Starry flounder	*Platichthys stellatus*	Horse clam	*Tresus capex*
Lingcod	*Ophiodon elongates*	Soft-shell clam	*Mya arenaria*
White sturgeon	*Acipenser transmontanus*	Bent-nose clam	*Macoma nasuta*
Green sturgeon	*Acipenser medirostris*	Manila clam	*Tapes philippinarum*
Longfin smelt	*Spirinchus thaleichthys*	Pacific oyster	*Crassostrea gigas*
Surf smelt	*Hypomesus pretiosus*	Olympia oyster	*Ostrea lurida*
Northern anchovy	*Engraulis mordax*	Heart cockle	*Clinocardium nuttalli*
Shiner perch	*Cymatogaster aggregate*	Blue mussel	*Mytilus edulis*
Pacific herring	*Clupea pallasii*	Red rock crab	*Cancer productus*
Pacific sand lance	*Ammodytes hexapterus*	Dungeness crab	*Cancer magister*
American shad	*Alosa sapidissima*		
Staghorn sculpin	*Leptocottus armatus*		
Chinook salmon[1]	*Oncorhynchus tshawytscha*		
Coho salmon	*Oncorhynchus kisutch*		
Chum salmon	*Oncorhynchus keta*		
Steelhead trout	*Salmo gairdnerii*		
Cutthroat trout	*Salmo clarkia*		
Bull trout[1]	*Salvelinus confluentus*		

[1]Federally listed species (although Chinook listing is limited to certain stocks)

Most of the Willapa Bay anadromous fish stocks are considered healthy, with a few exceptions, such as the Fall River Chinook stock (WDFW 1992). Bull trout, which may forage in Willapa Bay, are listed as threatened throughout their range. Coastal cutthroat trout are a species of concern. The bay's health is crucial for all these salmonids, especially for juveniles during their out-migration or as they rear within the system. The Corps' finalized biological assessment for this proposed project should indicate how construction and maintenance activities would minimize impacts (e.g., turbidity, disturbance, displacement) to anadromous fish, especially during rearing and juvenile out-migration.

Shellfish

The Willapa Bay estuary is about 88,000 acres, approximately half of which is exposed at low tide, making the bay an ideal habitat for shallow water shellfish, such as oysters (Smith 1999) (for common and scientific names of the species likely to be present in or near Willapa Bay, see Table 1 above). Several bivalve species are harvested in Willapa Bay, including the Pacific razor clam, Pacific oyster, Olympia oyster, native littleneck, and heart cockle (Ray 2002). Other shellfish found in the area include the red rock crab and the commercially-important Dungeness crab; blue mussel; and Manila clam, horse clam, soft-shell clam, and bent-nose clam. Willapa Bay is an important nursery for Dungeness crab (Emmett et al. 1991; Proctor et al. 1980). Several of the shellfish species are nonnative (but commercially-harvested species), including the Pacific oyster, and the Manila and soft-shell clams.

Birds

The marshes, tidelands, and open waters of Willapa Bay provide important habitat for migratory birds of the Pacific Flyway. A list of migratory waterfowl and other water-associated birds that have been observed or are believed to use the area are listed below along with their common and scientific names below (Table 2). Anecdotal observations of water-associated birds (e.g., waders, shorebirds, waterfowl, etc.) of the salt marsh located south of the Shoalwater Bay Tribal Reservation include great blue herons, egrets (Ardeidae), yellowlegs, American bitterns, rails (Rallidae), and waterfowl (Kelley, Black Hills Audubon, personal communication, 2003). Although many passerines and other birds are also expected to be present in the area, the report will focus on water-associated birds, which are expected to be most affected by the project.

Willapa Bay is one of the most important sites for shorebirds on the west coast of North America, and is used during spring and fall migrations. Bird use information is unavailable for the project site; however, information is available for the greater Willapa Bay area. Buchanan and Evenson (*in* USFWS 1997) found that the Willapa Bay met the Western Shorebird Reserve Network's criteria used to designate internationally important shorebird sites, hosting between 100,000 and 500,000 birds per year with consistent, annual use (USFWS 2002). The Willapa River[1] and the Bear River[2] estuaries support the highest counts of shorebirds in the Willapa Bay as a whole. Willapa Bay is particularly important to wintering dunlins and supports 15.5 percent of the Pacific Flyway population of that species (Buchanan and Evenson 1997).

[1] The Willapa River estuary is located approximately 9 mi east of the project area.
[2] The Bear River estuary is located at the southeast corner of Willapa Bay.

The tide flats around Tokeland (west of the project area) are considered a primary census site for shorebirds (Buchanan and Evenson 1997) and one of coastal Washington's "birding hot spots." The flats are well known for long-legged shorebirds such as willets, godwits, and curlews. Brown pelicans may also be observed using the sandy spits off shore along with other shorebirds and gulls (Morse 2001).

The need for shorebirds to migrate, the tendency for some species or individuals to aggregate, and their dependence on wetlands have placed many shorebird species at risk, including the western snowy plover, listed as threatened under the Endangered Species Act. Populations of many shorebird species are in decline, most likely because of factors such as human disturbance and habitat loss (Fernandez 2004) (e.g., from coastal development and draining of wetlands). Stopover sites such as Willapa Bay are extremely important to these species, and are used for critical resting and foraging during migration. Stop-over sites are typically limited in size and distribution, and the limited resources at these habitats may result in "migratory bottlenecks" that may limit successful migration, reproduction or even survival (Drut and Buchanan 2000). For these reasons, negative impacts to migratory birds and their habitat from the proposed project should be avoided.

Table 2. Water-associated bird species expected or likely to be present in or near Willapa Bay. (Proctor et al. 1980, Parametrix 1997, Morse 2001)

Common Name	Scientific Name	Common Name	Scientific Name
Tundra swan	*Cygnus columbianus*	Red-throated loon	*Gavia stellata*
Trumpeter swan	*Cygnus buccinator*	Western grebe	*Aechmophorus occidentalis*
Greater white-fronted goose	*Anser albifrons*	Red-necked grebe	*Podiceps grisegena*
Snow goose	*Anser caerulescens*	Double-crested cormorant	*Phalacrocorax auritus*
Canada goose	*Branta canadensis*	Brandts cormorant	*Phalacrocorax penicillatus*
Black brant	*Branta bernicla*	Pelagic cormorant	*Phalacrocorax pelagicus*
Mallard	*Anas platyrhynchos*	Marbled murrelet[1]	*Brachyramphus marmoratus*
Gadwall	*Anas strepera*	Bald eagle[1]	*Haliaeetus leucocephalus*
American widgeon	*Anas americana*	Brown pelican[1]	*Pelecanus occidentalis*
Green-winged teal	*Anas crecca*	Great blue heron	*Ardea herodias*
Pintail	*Anas acuta*	American bittern	*Botaurus lentiginosus*
Northern shoveler	*Anas clypeata*	Dunlin	*Calidris alpine*
Greater scaup	*Aythya marila*	Sanderling	*Calidris alba*
Ruddy duck	*Oxyura jamaicensis*	Black turnstone	*Arenaria melanocephala*
Common goldeneye	*Bucephala clangula*	Ruddy turnstone	*Arenaria interpres*
Bufflehead	*Bucephala albeola*	Red knot	*Calidris canutus*
Canvasback	*Aythya valisineria*	Willet	*Catoptrophrus semipalmatus*
White-winged scoter	*Melanitta fusca*	Killdeer	*Charadrius vociferous*
Surf scoter	*Melanitta perspicillata*	Northern phalarope	*Phalaropus lobatus*
Common merganser	*Mergus merganser*	Whimbril	*Numenius phaeopus*
Red-breasted merganser	*Mergus serrator*	Greater yellowlegs	*Tringa melanoleuca*
Glaucous-winged gull	*Larus glaucescens*	Lesser yellowlegs	*Tringa flavipes*
Western gull	*Larus occidentalis*	Spotted sandpiper	*Actitis macularia*
Heermans gull	*Larus heermanni*	Least sandpiper	*Calidris minutilla*
Herring gull	*Larus argentatus*	Western sandpiper	*Calidris mauri*
California gull	*Larus californicus*	Long-billed dowitcher	*Limnodromus scolopaceus*
Ring-billed gull	*Larus delawarensis*	Short-billed dowitcher	*Limnodromus griseus*
Mew gull	*Larus canus*	American golden plover	*Pluvialis dominica*
Bonapartes gull	*Larus philadelphia*	Black-bellied plover	*Pluvialis squatarola*

Thayers gull	*Larus thayeri*	Snowy plover[1]	*Charadrius alexandrinus*
Caspian tern	*Sterna caspiai*	Semipalmated plover	*Charadrius semipalmatus*
Caseins auklet	*Ptychoramphus aleuticus*	Bar-tailed godwit	*Limosa lapponica*
Pigeon guillemot	*Cepphus columba*	Marbled godwit	*Limosa fedoa*
Common murre	*Uria aalge*	Long-billed curlew	*Numenius americanus*
Common loon	*Gavia immer*	Wandering tattler	*Heteroscelus incanus*

[1]Federally listed species

Federally Listed Species

Several species listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), are known to or may occur within the vicinity of the proposed project: the western snowy plover (*Charadrius alexandrinus nivosus*), marbled murrelet (*Brachyramphus marmoratus*), bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis*), bull trout, orca (*Orcinus orca*), and Chinook salmon. Consultation on federally listed species should be initiated with both the Service and the National Marine Fisheries Service (NMFS) in accordance with section 7(a)(2) of the Act. In addition to consideration of the species discussed below, we recommend that the Corps acquire an updated list of federally listed threatened and endangered species found in the project county from the Service's Western Washington Fish and Wildlife Office website (http://www.fws.gov/westwafwo/cta/index.html) to ensure that your obligations under section 7 of the Act are fulfilled. The Corps should also contact the NMFS at (360)753-9530 to request a list of species under their jurisdiction and to determine if evaluation of effects to essential fish habitat (EFH) is necessary. The species listed below are under the jurisdiction of the Service unless noted otherwise.

Western snowy plover

Western snowy plover are found in Willapa Bay. Their preferred coastal nesting habitat includes sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths. The encroachment of nonnative European beachgrass, introduced in the late 1800s for dune stabilization, has altered habitat and created cover for predators and has become a significant obstacle for successful western snowy plover reproduction. Human disturbance is also a key factor in the ongoing decline of breeding sites and populations of western snowy plover.

Two western snowy plover nests were found on Empire Spit[3] in summer surveys in 2006 (S. Pearson, WDFW, personal communication, 2006), each containing eggs. While nests have not been previously reported in this area, it is unknown whether 1) nesting has occurred but was not observed or reported, or 2) if the nesting activity in this area is a new occurrence.

There are two important breeding areas in Washington State, down from five locations documented from historic records (USDOI 1995). Leadbetter Point is located approximately 5 mi south-southwest from the project site, and south of the entrance channel to Willapa Bay The outer coast at Midway Beach approximately 5 mi northwest of the project site also provides nesting habitat for western snowy plovers. It is unlikely that dredging or altering sediment and hydraulic processes in the project area may affect existing nesting habitat for this species at

[3] The site was identified as "Graveyard Spit" in the cited personal communication.

Leadbetter Point and Midway Beach as the amount of sand dredged during implementation (600,000 cubic yards) and maintenance (250,000 cubic yards /5-year-period) of the proposed dune is not expected to significantly alter the sediment budget for Willapa Bay (Babcock, personal communication, 2006a; Babcock, personal communication, 2006c). Regarding Empire Spit, the project may enhance western snowy plover habitat by providing and maintaining suitable, unvegetated nesting and foraging areas for this species in the project area waterward of the dune.

Marbled murrelet

The marbled murrelet is a small alcid that forages on invertebrates and small schooling fishes, such as sand lance, anchovy, herring, and smelt, along relatively shallow inland marine and coastal areas of Washington (Burkett 1995). Nesting occurs in older forests, with birds traveling between nests and foraging habitat, which may be a significant distance from a nest. Suitable nesting habitat exists within the Willapa Bay watershed (Thompson 1999).

Murrelets have been observed in some coastal areas of the Pacific Northwest aligning themselves on or near the boundaries of rip-current plumes at river mouths and harbor entrances, presumably for foraging (Speich and Wahl 1995) or staging. Marbled murrelets have been observed in Cape Shoalwater and greater Willapa Bay (Thompson 1995; Varoujean and Williams 1995) indicating that summer foraging may occur in the vicinity of the site during the summer. Impacts to marbled murrelet foraging in Willapa Bay, particularly with respect to disturbance during the nesting and fledging period (April 1 through September 15), and negative impacts to their prey species should be avoided or minimized.

Bald eagle

Bald eagles nest and winter in the Willapa Bay area. Nests are generally constructed in uneven-aged tree stands with a large-tree component, and are found near water bodies with an adequate food supply. Wintering eagles use tall perch trees near feeding areas. Areas with high waterfowl concentrations and anadromous fish are important for foraging eagles. In some areas bald eagles have become accustomed to high levels of human activity. However, bald eagles are often particularly susceptible to disturbance throughout the nesting season (January 1 to August 15) or while foraging during the wintering period (October 31 to March 15). Disturbance impacts to nesting and wintering bald eagles should be avoided during these critical life history stages, as should adverse impacts to their prey species.

Brown pelican

The number of brown pelicans using Willapa Bay has fluctuated over time, likely due to food availability. Large numbers were observed in the 1800s, followed by decades with no reported sightings until the 1970s. Within approximately 15 years, thousands of pelicans began migrating into Washington, and Willapa Bay and southern Washington represented an important area for non-breeding brown pelicans (Jaques 1994). Estuary sandbars, which limit predation and disturbance, are the most important roost habitats for brown pelicans in Washington. Pelicans have been observed in large numbers in recent history on some of the sand bars in Willapa Bay,

including Sand Island. They have also been observed occasionally at Empire Spit[4], near the project site (Morse 2001). Important forage species include northern anchovy, Pacific sardine (*Sardinops sagax*), and Pacific mackerel (*Scomber japonicus*). Impacts to brown pelicans, especially through elimination of or a decrease in the amount of isolated sandbar habitat available for roosting through modification of the bay's hydrology, should be avoided or minimized.

Bull trout

The first documented sighting of a bull trout in Willapa Bay occurred in February 2002, when a WDFW fish technician captured a single bull trout in the Willapa River. Bull trout most likely use the Willapa River system for foraging, although their level of use is currently unknown. Bull trout consume a variety of prey species, with small individuals targeting invertebrates, but becoming piscivorous as they mature. This project should be assessed for potential impacts to bull trout, particularly for impacts to their forage species.

Chinook salmon

Chinook salmon are believed to use Willapa Bay as both a migratory corridor and as a foraging and rearing area. Both juvenile and adult salmonids such as Chinook salmon require nearshore marine areas that are free of migratory obstructions and high predation rates and provide good water quality and quantity as well as adequate forage and cover (e.g., submerged/overhanging vegetation) (S. Anderson, NMFS, personal communication, 2006). These conditions are necessary for juvenile rearing and to sustain adult physiological transitions between salt water and fresh water for Chinook salmon, as well as other salmonids, such as chum and coho.

Several stocks of Chinook salmon are listed by NMFS under the Act. However, Chinook salmon in Willapa Bay would likely be considered part of the Washington Coast evolutionarily significant unit (ESU). According to their website[5] (accessed March 22, 2006), the Washington Coast ESU listing is not warranted. The Corps should contact NMFS to determine whether this information is still valid and/or if another ESU should be evaluated for this project.

Orca

Several stocks (or populations) of orcas (killer whales) are found in the coastal and/or inland waters of the Pacific Northwest. The stocks that are most likely to be found in coastal waters near the project area for at least a portion of their life history (e.g., during seasonal migrations) include the Eastern North Pacific Southern Resident stock, the Eastern North Pacific Transient stock, and the Eastern North Pacific Offshore stock (Carretta et al. 2005). However, orcas are expected to remain outside of Willapa Bay and are not expected to be found in the project area. The Southern Resident orca distinct population segment is currently listed by NMFS under the Act. The Corps should contact NMFS to determine whether effects to orcas should be evaluated in the Biological Assessment.

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[4] The site was identified as "Graveyard Spit" in the cited article.

[5] www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Chinook/

Future with the Project

If the preferred alternative is implemented, storm waves which overtop and erode the existing dunes would be inhibited, eliminating the resultant sand deposition and transformation of the remaining tidal flats in North Cove into high marsh. The suppression of this transformation allows for future habitat enhancement in the cove, including but not limited to the removal of invasive nonnative species (i.e., smooth cordgrass). Fish and wildlife species that depend on the existing tidal flats in the cove would retain the use of the habitat in the interim.

Although a large portion of the shoreline would be altered through the flood berm enlargement and modification, the armored shoreline would be softened through the placement of sand and stabilizing vegetation. Although this sand and vegetation would likely be replaced or augmented periodically as necessary, it would likely provide better habitat structure than the riprap structure alone.

The combination of the restored dune (Empire Spit) and the augmented flood berm actions would provide a dual benefit for the Corps and the Shoalwater Bay Tribe: 1) Tribal infrastructure and the shoreline would be protected from flooding and the erosive effects of tidal currents and storm waves from typical winter storm events, and 2) the flood berm would allow for longer periods of time between future maintenance and nourishment of the dune. Although the Corps has estimated that dune maintenance would likely be necessary at 10-year intervals, the augmented flood berm would allow for a degree of flexibility due to financial costs or unforeseen circumstances (such as severe damage to the dunes from a storm), minimizing interim erosion to the shoreline and Tribal property.

Future without the Project

Although there are indications that the northward migration of the main channel into Willapa Bay and the associated erosion evident in the area may be slowing or has halted (Corps 2004), flooding and erosion is still expected to continue to impact the project area during future storm waves and tidal currents. In the absence of the project, North Cove is expected to continue its transformation from historic tidal flats to a high salt marsh through erosion of the existing dune materials into the cove during storm events that overtop the spit. Fish and wildlife species that are dependent upon current habitat conditions would likely continue to be impacted by existing and future eroding conditions. Additionally, although the existing flood berm protects the shoreline structures along 1,720 ft of the Reservation shoreline, shoreline areas within and adjacent to the Reservation that are not sheltered by the flood berm may experience significant flooding during severe storm events (Corps 2004a).

DISCUSSION

Development of Alternatives

Several alternatives have been considered during the development phase of the project proposal. The need for shoreline and dune erosion control was evaluated, as was the effectiveness of using

a number of hard and soft structures. Other alternatives considered, but not incorporated in the most recent list of proposed alternatives, included no action, hydraulic modifications (e.g., training dikes/flow diversion structures), and a sea dike.

Analysis of the "no action" alternative indicated that the eroded barrier dune would provide decreasing wave protection for the cove and shoreline infrastructure, resulting in more frequent flooding of the Shoalwater Bay Tribe Reservation and adjoining lands. Hydraulic modification would consist of one of several designs regarding the placement of underwater rock structures to redirect currents and sediment flow in and near the project area. The impacts from these designs would be less predictable than the preferred alternative, and have the potential to result in significant impacts to fish and wildlife and their habitats through unpredictable system-wide alterations. Proposed structures ranged from 2,300 to 4,300 ft long, and involved the placement of over a million tons of rock. A third alternative was the construction of a 12,500-foot rock sea dike along the barrier spit (Empire Spit) and across the mouths of the tidal channels using substantial amounts of armor stone (135,000 tons), quarry spalls (110,000 tons), and under-layer stone (60,000 tons). Placement of the sea dike would also include the excavation of approximately 100,000 cubic yards of substrate, the construction and removal of a temporary off-loading pier, and placement and removal of approximately 10,000 tons of quarry spalls for a temporary access road. The use of a sea dike (or other hard structures) in this area may also have unpredictable impacts, and adaptive management techniques would likely be difficult or cost-prohibitive if the original placement or design was later found to be inadequate (Babcock 2006c).

Potential Impacts of the Preferred Alternative

The effects of implementation of the project on fish and wildlife species would be dependent on which alternative is chosen. If the preferred alternative is indeed chosen, the proposed project would likely result in impacts to fish and wildlife resources, but fewer and less significant impacts than those expected from the use of other alternatives that use more substantial hard structures (e.g., groin, dike, etc.) in the bay.

Impacts from the restoration of the existing dune include both direct and indirect effects from procurement (i.e., dredging) and placement of sand. Future dredging and sand placement would also be necessary during maintenance activities, and would result in similar impacts each time additional material is required. Expected effects of dredging include the potential entrainment of crabs, shellfish, forage fish and other aquatic species. The placement of the sand would also result in impacts, particularly the smothering and burial of sessile or slow-moving aquatic organisms in the water column and at or beneath the surface of the substrate. Impacts from dredging and placement of sand are expected to be minor. Colonization of the disturbed areas is expected to be relatively rapid because the sites can be easily accessed by nearby individuals. However, to minimize disturbance or mortality from dredging and sand placement to fish and wildlife, dredging and placement activities should be avoided critical life history stages.

Additionally, if some of the tidal channels within North Cove are obstructed as a result of the dune restoration as proposed, the current amount of access potential for foraging juvenile salmonids may be reduced; however, the cove will still be connected to Willapa Bay through the

tidal channel to the east, and will continue to provide access to juvenile salmonids and other fish species.

Modification of the flood berm would also result in impacts to fish and wildlife species. Because the flood berm modification is expected to increase the length of the existing flood berm, impacts to natural shoreline areas through the installation of riprap and other materials are anticipated. Placement of riprap will be above Mean Higher High Water (MHHW) (R. Director, Corps, personal communication, 2006). The Corps plans to place sand on the riprap to soften the structure, and include plantings of suitable native vegetation on both the flood berm and restored dune. These plantings should help to stabilize both features and encourage more rapid natural colonization of native vegetation.

The impacts from these project components are expected to be significantly less than potential impacts from installation of other hard structures such as groins, dikes, and other placement of rock/rip rap as hydraulic modifications in the bay. The extent of impacts of such structures to the geomorphic and sediment transport processes of the bay would be unpredictable at best, potentially resulting in a number of effects. These effects may include: 1) the erosion of roosting and nesting sites of listed bird species, and pupping and resting sites for harbor seals; 2) erosion of mudflats, eelgrass beds, and marshes important for shellfish, foraging shorebirds, waterfowl, salmonids, and foraging and/or spawning forage fish; and 3) transfer of erosive energy down-drift of the site, compounding shoreline erosion. This additional erosion could generate additional proposed shoreline armoring projects (with associated losses of nearshore and shoreline habitat) in areas that already have high rates of shoreline armoring.

The impacts of the proposed project to upland areas adjacent to the project site were also considered; however, due to the nature of these areas (e.g., Tribal residential/infrastructure, road right-of-way, other residential, etc.), the impacts to these areas from the proposed project are expected to be relatively minor. For example, although the armoring of additional shoreline may result in a decreased ability of the uplands to contribute to the sediment supply of the bay, the existence of the highway corridor along this shoreline currently serves as a barrier to this process.

CONCLUSIONS

The Corps has determined that the use of soft structures (i.e., the restoration of the dune) in combination with the extension of the existing flood berm would likely be sufficient to achieve the goals of the project. The Corps has attempted to minimize impacts to Willapa Bay through the incorporation of certain measures in the project design, specifically: 1) the use of soft materials (i.e., sand) instead of hard structures in the bay, 2) native vegetation plantings for dune stabilization, and 3) the placement and maintenance of sand and plantings on the existing flood berm and its extension. If the Corps proceeds with project implementation, we recommend that the Corps select their preferred alternative with the proposed measures to minimize impacts to habitat and species.

We support the goals of the proposed restoration project in regard to the protection of Tribal lands and resources, and give our support on the presented components of the preferred alternative, pending the satisfactory inclusion of appropriate conservation measures to minimize impacts to fish and wildlife and their habitats during the construction.

RECOMMENDATIONS

We are providing the following recommendations to further minimize impacts of the project to the species and habitat present in the Shoalwater Bay/Willapa Bay project area. These recommendations are based on discussions with agency (Federal and State) and Tribal staff, review of literature provided by the Corps and other organizations (see References), and a site visit.

1. We recommend work windows for listed species (including salmonids and bald eagles), spawning forage fish, and other species be incorporated into the project's construction schedule and future maintenance operations to minimize impacts to listed species, their prey, and their habitats during sensitive portions of their life cycle. Please coordinate with the Service, NMFS, and WDFW to finalize the appropriate work window for this project prior to the initiation of section 7 consultation.

2. We recommend the Corps evaluate effects of the project to nesting and foraging marbled murrelets. Although the Corps has noted the proximity of nesting marbled murrelets in the Environmental Assessment (Hoffman and Sievers 2005), we recommend potential impacts to foraging marbled murrelets and their prey also be considered in the final Biological Assessment, particularly during the marbled murrelet nesting and fledging period. We recommend that any construction and maintenance activities that may result in disturbance to foraging marbled murrelets during their nesting and fledging period (April 1 to September 15) not occur until 2 hours after sunrise and cease 2 hours before sunset.

3. We recommend that the Corps continue to coordinate with the Service and with WDFW to retain suitable unvegetated areas on the spit as nesting areas for western snowy plovers. The planting plan should clearly indicate the location of these areas and future actions should maintain these areas in an unvegetated condition. Flexibility in future maintenance of such areas is likely to be necessary, pending results of future western snowy plover surveys. We also recommend that all future dune maintenance activities be preceded by surveys for nesting western snowy plovers by a qualified biologist (in coordination with WDFW and the Service) to avoid disturbance of nesting western snowy plovers. It is hoped that a site management plan can be developed that meets both the objectives of the Shoalwater Bay Tribe and maintain nesting habitat for snowy plovers.

4. We recommend staging, fueling, and wash-out areas be located on an impervious surface, with no runoff allowed to reach surface water, wetlands, or groundwater.

The Corps has not yet identified or defined all potential staging, refueling, and equipment cleaning areas for this project. We recommend that the Corps incorporate measures to ensure that no pollutants, including chemicals, fuels, or other contaminants, are allowed to enter the water at the project site or any other site.

5. We recommend the Corps identify potential local opportunities for compensatory mitigation through restoration or enhancement actions. Although the Corps plans to soften the riprap flood berm structure with the placement of sand and planting of stabilizing vegetation, the length of shoreline that would be impacted by the action is nonetheless considerable and maintenance activities are expected to be necessary to sustain these conditions. These impacts should be mitigated. Potential restoration or enhancement opportunities may include, but are not limited to, the removal of nonnative invasive species from the cove (e.g. smooth cordgrass, beach grasses, etc.) or other similar actions to improve habitat conditions for species that use the area and would potentially be impacted by the proposed project.

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FIGURES

Figure 1. Location of proposed Shoalwater Reservation Coastal Erosion Project in Willapa Bay, Pacific County, Washington.

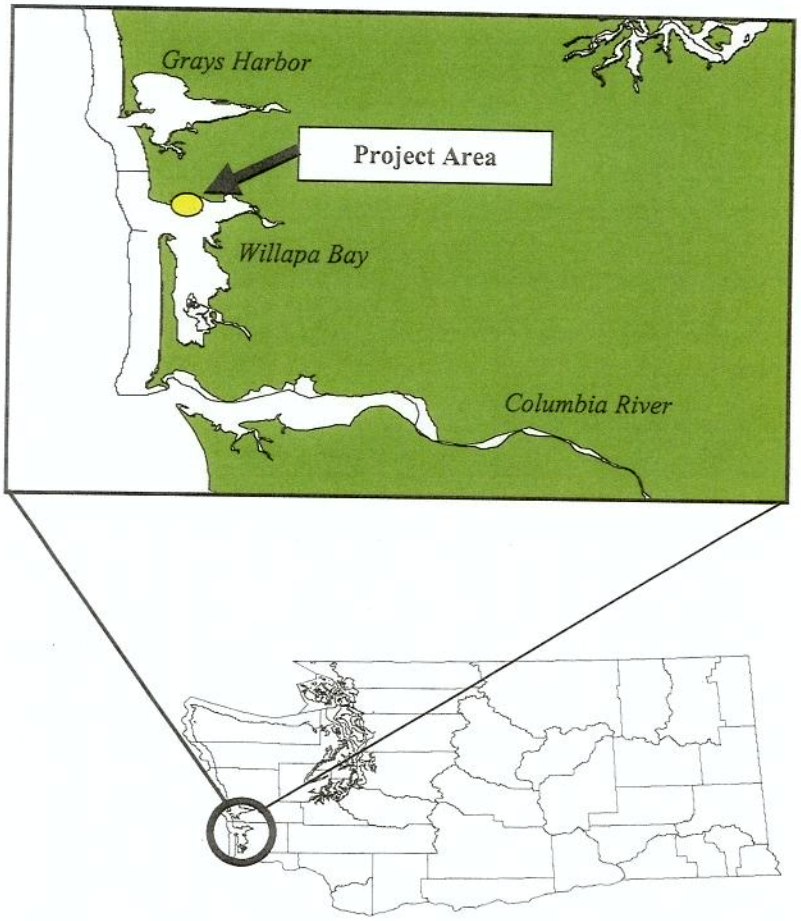


Figure 2. Barrier spits extending southeast from Cape Shoalwater (not shown), in Willapa Bay, Pacific County, Washington. (Photo courtesy U.S. Army Corps of Engineers). Arrows indicate channels into North Cove. The main channel (dotted line) now occupies areas that appear to have once been extensive tidal flats.

Figure 3. View of Willapa Bay and North Cove, showing location of protective sand dunes (Empire Spit). (Aerial photo courtesy of Washington State Department of Ecology). Dotted line indicates main channel. Note main breach in the protective dune.

Figure 4. Location of borrow site for the proposed project. (Drawing courtesy of the U.S. Army Corps of Engineers.)

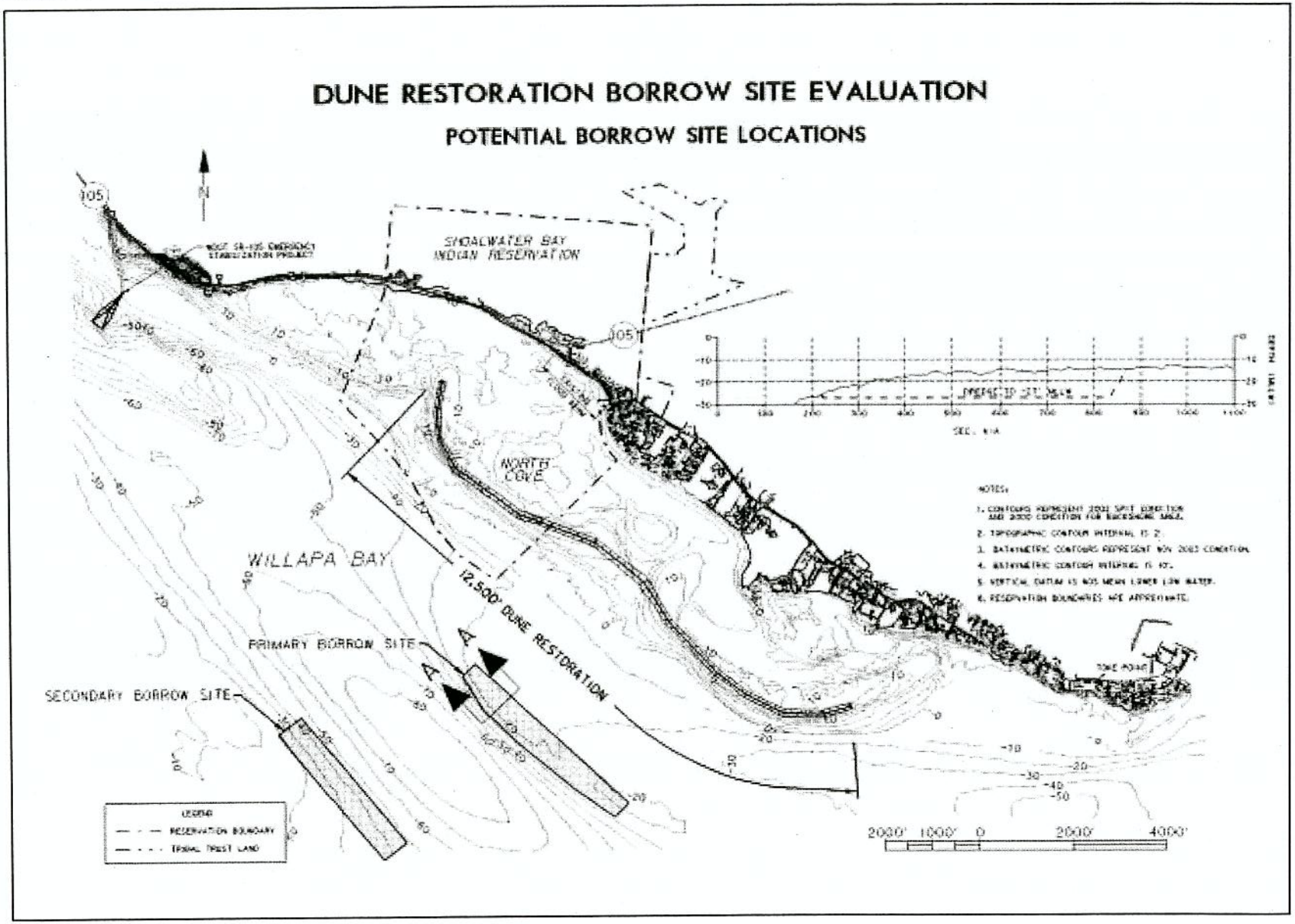
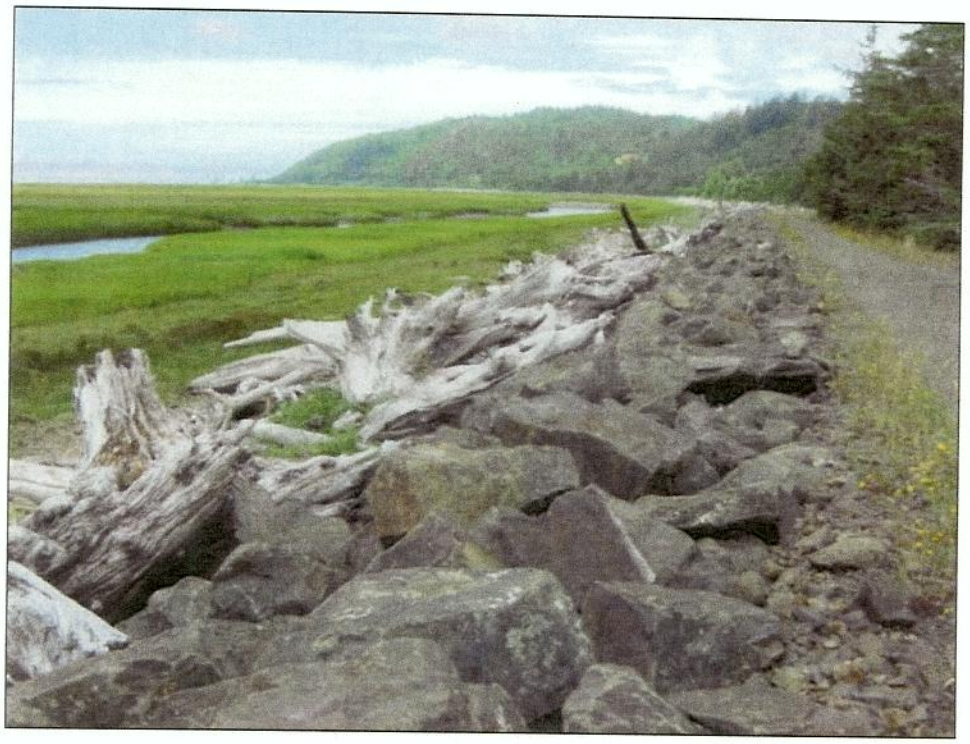
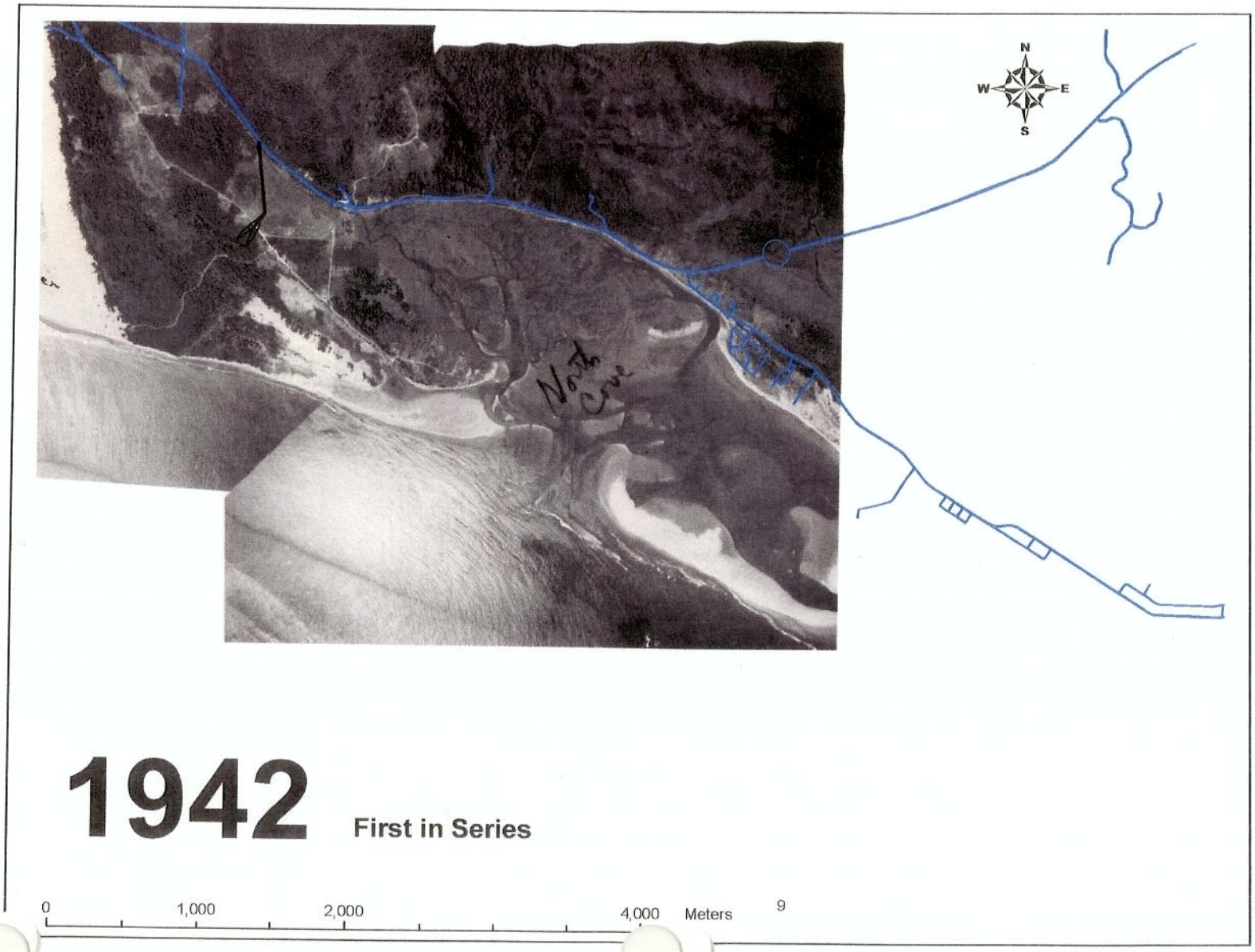


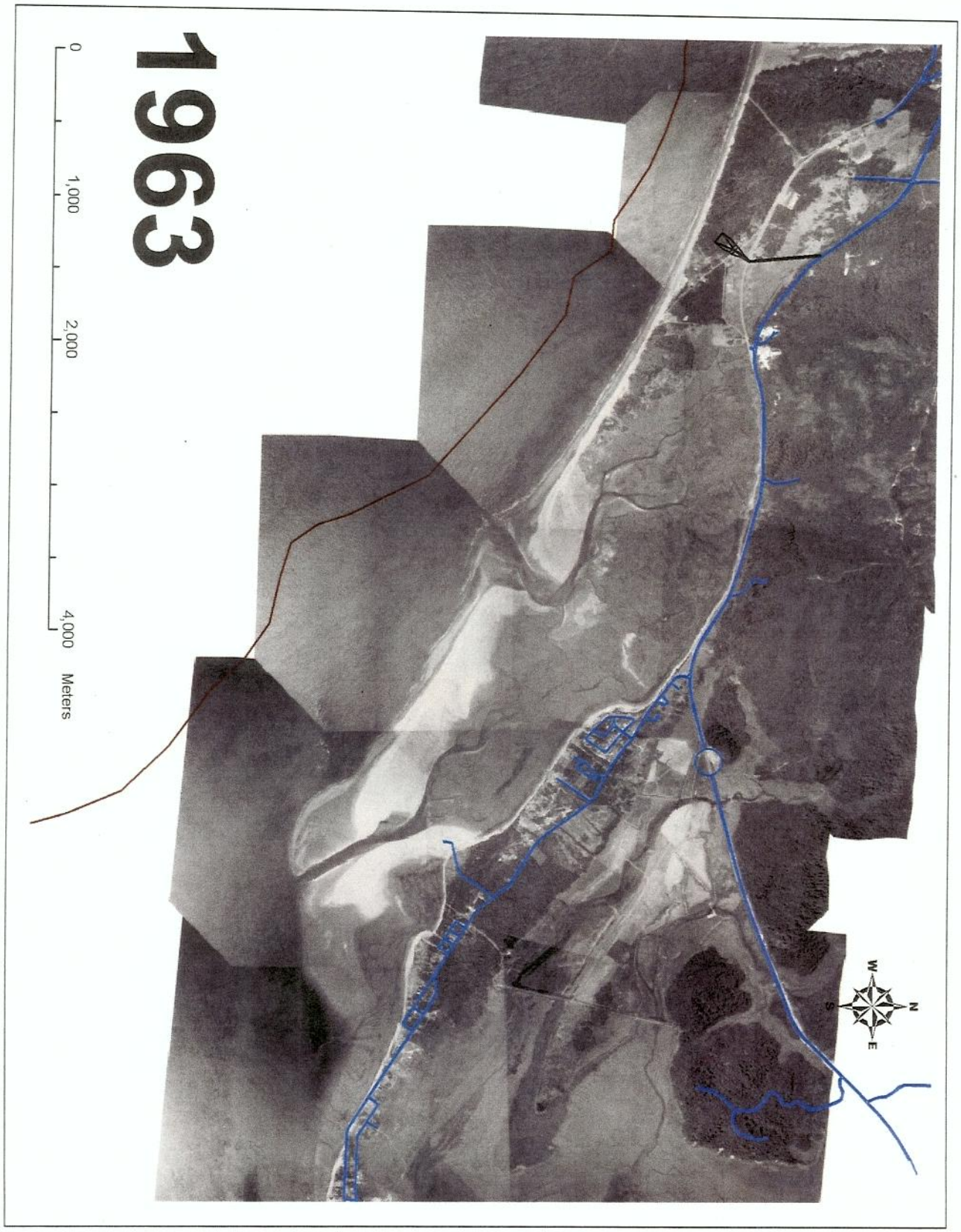
Figure 5. Section of revetment along the Shoalwater Bay Tribal Reservation shoreline, looking west. (Photo by L. Jones).



APPENDICES

Appendix A. Aerial photographs from previous years indicating the northward retreat and decrease in size of the barrier spit (Empire spit). (Photos courtesy of the U.S. Army Corps of Engineers.)

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Appendix B. Preferred alternative for the Shoalwater Bay Coastal Erosion Project proposed by the U.S. Army Corps of Engineers (Hoffman and Sievers 2005).