

SECTION 905(b) ANALYSIS

GENERAL INVESTIGATION RECONNAISSANCE STUDY

Puget Sound Nearshore, Washington



**US Army Corps
of Engineers®**
Seattle District

EXPEDITED RECONNAISSANCE STUDY

SECTION 905(b) (WRDA 86) Analysis

PUGET SOUND NEARSHORE MARINE HABITAT RESTORATION STUDY

1. STUDY AUTHORITY: The Puget Sound Nearshore Restoration Project was initiated as a Corps of Engineers Civil, Title 1 General Investigation study under Public Law 106-60 (29 September 1999). This authority states:

The following appropriations shall be expended under the direction of the Secretary of the Army and the supervision of the Chief of Engineers for authorized civil functions of the Department of Army pertaining to rivers and harbors, flood control, beach erosion, and related purposes.

General Investigation funds are used for the collection and study of basic information pertaining to rivers and harbors, flood control, shore protection and related projects, restudy of authorized projects, miscellaneous investigations, and, when authorized by laws, surveys and detailed studies and plans and specifications of projects prior to construction.

2. STUDY PURPOSE: This report is a preliminary analysis to determine if there is a federal (Corps) interest in pursuing a feasibility study related to ecosystem restoration in the nearshore environments of central Puget Sound. Once restoration opportunities have been identified, the Corps will work with local governments to determine which measures and/or projects warrant further study effort in the feasibility phase. For those potential projects, a Project Management Plan (PMP) will be developed to conduct further feasibility studies, and a Feasibility Cost Sharing Agreement (FCSA) will be coordinated with the current local sponsors: King County, and City of Burien. The primary area of consideration is to address environmental restoration projects in the nearshore environment of central Puget Sound. This analysis is in accordance with the guidelines of Section 905(b) of the Water Resources Development Act (WRDA) of 1986.

1. LOCATION OF STUDY, NON-FEDERAL SPONSOR AND CONGRESSIONAL DISTRICTS

- a) The study area is located in the nearshore environment of central Puget Sound in Washington State (Figure 1). Possible restoration sites include:
 1. Shilshole Bay at the mouth of the Hiram Chittenden Locks within the City of Seattle in King County;
 2. Seahurst Park in the City of Burien in King County;
 3. Dumas Bay in the City of Federal Way in King County;

4. The nearshore coastline of Kitsap County;
 5. The nearshore coastline of King County, north of the City of Seattle; and
 6. A series of programmatic projects including but not limited to: restoration of estuaries, creation of wetlands, rehabilitation of public abutments, softening of beach fronts along private properties, and utilization of slide material for use as source material into the Puget Sound nearshore.
- b) The current non-Federal sponsors for the feasibility phase of the study are King County, and the City of Burien. In addition, both Kitsap and Island County and the City of Seattle have expressed interest in the GI study, and also may participate as local sponsors at a later date.
 - c) The study area lies within the 1st, 6th, 7th, and 9th Congressional Districts.
2. **DISCUSSION OF PRIOR STUDIES AND EXISTING WATER RESOURCE PROJECTS:** The only previous studies done in the proposed project areas have been associated with the Lake Washington Ship Canal and the Hiram A. Chittenden Locks.
- a. *The Lake Washington Ship Canal.* This project was completed in 1916. The authorized project purpose is navigation. The 8-mile long Lake Washington Ship Canal links Puget Sound with fresh waters of Salmon Bay, Lake Union, and Lake Washington. The Hiram A. Chittenden Locks provide the navigable connection between salt and fresh waters and controls the elevation of the Lake Washington drainage basin to Puget Sound. Fish passage was provided to mitigate for the loss of a stream to the project. The fish ladder and locks enable adult anadromous fish passage from salt to fresh water. A movable saltwater barrier, located in the large lock, reduces saltwater intrusion into Lake Washington during lock operations. The saltwater drain located near the upstream end of the large lock, returns much of the saltwater to Puget Sound via the original spillway outlet located adjacent to the small lock and through the fish ladder as attraction flows.
 - b. *The Lake Washington Basin Restoration Study.* This current feasibility study is evaluating two water-related issues in the greater Lake Washington Basin, which includes Lake Sammamish, Lake Washington, and the Cedar River. These issues are: improved salmonid migration and survival at the Hiram A. Chittenden Locks through water conservation and the modification of facilities, and the creation of specific habitat improvements throughout the basin for fish and wildlife. The listing of Puget Sound chinook and Puget Sound bull trout as threatened species has strengthened the need for specific habitat projects in the basin.
 - c. *The Green Duwamish River Ecosystem Restoration Project.* The final feasibility report recommended 45 site specific and programmatic restoration

sites in the Green Duwamish River Basin. The recommended sites were selected to address several limiting factors within the Green/Duwamish River basin. The sites vary from stream restoration projects high up in the basin to habitat restoration in Elliot Bay at the bottom end of the river system. WRDA 2000 authorized \$115 million for implementation of this project over a 10-year timeframe.

5. PLAN FORMULATION:

- (a) Identified Problems:** The proposed study would evaluate degradation and loss of estuarine and nearshore habitat necessary to the support critical fish and wildlife populations in the central Puget Sound environment.

Historic and current development along the Puget Sound shoreline has resulted in a significant loss in estuarine and nearshore habitats. The Washington State Department of Natural Resources estimates that almost 80% of the original eastern nearshore habitat of Puget Sound's central basin (King, Pierce, and Snohomish counties) has been modified through the construction of bulkheads and docks, filling of intertidal habitat, and removal of shoreline vegetation. Changes in physical structure have resulted in losses which include loss of shade, reduction in leaf fall, which limits terrestrial food sources and nutrient inputs; lowering of the beach profile; coarsening of beach sediment; narrowing of the beach; loss of area through dredging and filling; and the alteration of groundwater flows. The direct link between physical conditions and habitat, and habitat and biological resources have resulted in significant impacts to critical fish and wildlife resources, including habitat that supports all species of salmonids. Remnant habitat patches have now become critical support features to remaining fish and wildlife populations, including two threatened salmonid species (chinook salmon and bull trout).

There are several factors that effect the character of the nearshore and its related habitat functions. Factors include the extent of armoring, structures within the nearshore environment, sources of sediments, the extent of past modifications, and littoral drift patterns. The needs and projects within the Puget Sound nearshore specifically relate to shoreline process restoration or rehabilitation. The project would focus on the following types or needs:

- Restoration of historic shoreline processes;
- Beach nourishment;
- Removal of armoring or structure setbacks;
- Alternative 'processes friendly' erosion protection measures; and
- Sustainable measures.

Review of past restoration projects clearly demonstrates the benefits of creating and/or restoring functioning estuarine habitat to the nearshore environment. This investigation would identify restoration projects intended to maximize estuarine and nearshore functions.

Existing Conditions.

Existing studies have documented a 73 percent decline in the area of Puget Sound covered by intertidal salt marshes. Nearly all of this loss is associated with modifications of river deltas within major urban areas. Direct loss to nearshore environments outside of major river deltas has not been as well documented. Additionally, the Washington State Department of Natural Resources estimates that one-third of Puget Sound's shoreline – approximately 800 miles – has been modified by human development. Central Puget Sound, with the basin's highest past and present population, has the highest level of shoreline modification overall (52 percent) and the highest percentage of shoreline with intertidal modifications (45 percent). Construction activities, dredging and filling, shoreline armoring and other invasive human activities have reduced significant areas of available fish and wildlife habitat. Specifically, the effects of shoreline armoring are readily apparent on the physical structure of Puget Sound's beaches. Recent studies have shown the following potential effects of armoring:

- i. Habitat structure and/or loss can be modified by the erosion of fine sediments from beaches (change from hardshell clam habitat to one dominated by surface dwelling seaweed, kelp, and barnacles);
- ii. Surf smelt, sand lance, herring, and rock sole spawning areas can be lost due to the removal of fine sediments and woody debris from the intertidal zone;
- iii. Hard armoring structures usually provide poorer habitat for prey resources of many benthic-feeding fish, including juvenile salmon;
- iv. Armoring typically results in a net loss of intertidal habitat that supports a wide diversity of fish and wildlife species;
- v. Armoring results in the loss of shoreline vegetation that provides a critical food source to both fish and wildlife species (both insects and detritus). Shoreline vegetation also provides shade and a source of large woody debris; and shoreline armoring may exacerbate erosion and/or deposition in other areas of the beach.

A study of marine life for the Protect Marine Life Workgroup of the Puget Sound/Georgia Basin International Task Force identified 13 species or groups of organisms whose regional populations have declined substantially in recent years. These include six species of fish (Pacific herring, Pacific cod, Pacific hake, walleye pollock, lingcod, and three species of demersal rockfish), three seabirds (marbled murrelet, common murre and tufted puffin), unclassified marine invertebrates, Olympia oysters, and harbor porpoises. Habitat for spawning, rearing, and sustaining other life cycles processes was identified as a major limiting factor in population declines of these species. Restoring, enhancing, and/or creating suitable habitats in Puget Sound will be critical for

the halt and possible reversal of these population trends. In addition, two salmonid species (Puget Sound chinook and bull trout) have been listed as threatened under the Endangered Species Act. The National Marine Fisheries Services subsequently listed all estuarine habitats as critical to the support of chinook salmon.

Expected Future Conditions.

(1) Future Without Project Conditions. The human population density continues to grow at an astounding rate in the Puget Sound basin with shoreline properties going for premium prices. As these properties are developed, increasing pressure will be brought to bear on already stressed nearshore processes and habitats. Demand for habitat protection and habitat and process restoration will also continue to increase, especially due to the recent listings of two threatened salmonid species (chinook and bull trout) and other species likely to be listed in the future (coho and steelhead). Numerous wildlife species (including migratory birds) are also dependent upon nearshore habitats. The state, county governments, local municipalities and Native American tribes will continue to explore ways to protect or acquire critical habitats, and to control land use through planning regulation and public education. However, without the implementation of projects to restore estuarine and nearshore habitat and processes, Puget Sound will experience a steady decline of ecosystem health, the threatened and endangered species that rely upon the nearshore will become increasingly stressed, and possibly more species will be listed. Without Corps participation, restoration opportunities will be passed over or not completed, which will be to the detriment of natural resources unique to this area.

(2) With Project Conditions. The recommended plan barely scratches the surface of available projects and restoration projects that would contribute significantly to restoring the functions of the nearshore ecosystem. However, the sites and programmatic measures initially proposed have the potential to significantly improve fish and wildlife habitat, improve the aesthetics of existing shorelines for greater public appreciation, provide suitable ‘environmentally friendly’ erosion protection measures, and increase the function and access of existing nearshore habitats throughout the Puget Sound. The expected benefits associated with the recommended plan include improvements to critical migratory routes for anadromous fish, significant improvements to feeding, refugia, and osmoregulatory habitat for anadromous fish, improvements to wildlife habitats and corridors, restoration of nearshore processes, and greater public appreciation (education) of the value of nearshore habitats. It is anticipated, during PMP development, that other local entities will want to participate in a larger study, and many more restoration projects will be identified that will significantly contribute to the efforts to restore Puget Sound.

(b) ALTERNATIVE PLANS: In addition to the No Action alternative, several restoration opportunities (alternatives) will be considered in the feasibility study. During feasibility, we anticipate that the alternative project types will be evaluated along with actions specific to a given location. In coordination with State and Federal fish and wildlife agencies, King County, Kitsap County, and the Cities of Federal Way and Burien, the District has determined numerous types of restoration projects and potential project locations which would provide significant benefits to fish and wildlife and address the

ecosystem and process needs as outlined above. To date, six possible restoration sites were identified during the reconnaissance phase. It is assumed that all six and possibly more would be recommended for implementation in feasibility. Figure 1 indicates the location of the project sites. The types of restoration projects that will be investigated during feasibility include:

No Action Alternative: The no action alternative will not meet the need of restoring nearshore habitat and processes within central Puget Sound.

Bank Rehabilitation Alternatives. These projects would include the removal or modification of existing shoreline armoring structures such as the rock-cribs at Seahurst Park (City of Burien) or the large, angular riprap at Dumas Bay (City of Federal Way). The projects would increase the available area of shallow intertidal migration corridors for fish (through setbacks and/or removal), increase the amount of marine riparian vegetation along the shoreline, create additional feeding and refugia habitat for many species of fish and wildlife, and create shoreline wildlife migration corridors. Benefits would include restoration and improvement of fish and wildlife habitat, and the restoration of fish and wildlife migration corridors.

Estuarine/Nearshore Habitat Restoration Alternatives. These projects would include the expansion or increased utilization of existing habitat in the nearshore environment. Potential project locations have been identified in the sub- and intertidal environments of the numerous intertidal areas located within the study area. These projects include: Removal of a sea dike in Kitsap County, and construction of a setback levee to allow tidal inundation of approximately 35 acres of previous intertidal salmonid habitat; and removal of intertidal fill and an old boat ramp within Puget Sound, restoration of approximately 20 acres of intertidal wetland and enhancement of 10 acres of adjacent monotypical wetland. Further study will clarify specific locations and the activities necessary to augment existing habitat. These projects would increase available estuarine and nearshore habitats that support numerous fish and wildlife species. Support functions would include feeding and refugia, and osmoregulation. Benefits would include restoration of fish and wildlife habitat. Harper estuary/Pt. No Pt Wetland project.

Beach Nourishment Alternatives. These project would include opportunities to add sediments to sediment starved beaches where the source has been isolated from the beach (King County). Potential projects include various locations along the railroad grade from Seattle north along the King County shoreline. These projects would deliver sediments to existing beaches where erosion has resulted in dramatic changes from historic conditions due to human activities. Benefits would include restoration of beach profiles that are supportive of fish and wildlife, restoration of littoral processes that support eelgrass beds and bank protection.

(b) PRELIMINARY EVALUATION OF ALTERNATIVES: Based on studies to date, it is apparent that the alternatives would result in net environmental benefits through ecosystem restoration. Of particular importance is that all of the alternatives would provide increased habitat diversity necessary for threatened and endangered species such as Puget Sound chinook and bull trout. The PMP will be based on refinement and analysis of the identified alternatives. Based on the limited evaluations to date, it appears that the alternatives would be technically feasible, environmentally sound, and could be justified for implementation.

6. FEDERAL INTEREST: The preliminary assessment indicates that measures exist that are economically justified, environmentally acceptable, supported by local sponsors, and consistent with Army policies, cost, and benefits. Since ecosystem restoration is a high priority in the Puget Sound region and the primary goal of this project, there is a strong federal interest in conducting the feasibility study.

7. PRELIMINARY FINANCIAL ANALYSIS: The following entities have expressed interest in being local sponsors (Enclosure 2):

- (a)** The Cities of Burien has been identified as the local sponsor for the Bank Rehabilitation projects. The City of Federal Way also may participate as a local sponsor for Bank Rehabilitation within Dumas Bay.
- (b)** Kitsap and Island County's have been identified as a potential local sponsors for the Estuarine/Nearshore Habitat Restoration projects.
- (c)** King County has been identified as the local sponsor on Beach Nourishment projects.

8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS:

- Expected benefits will accrue to more than one species and extend over a long period of time (i.e., 50 years or more);
- The proposed work will be compatible with other ongoing efforts by Federal, State, and local agencies;
- Public health, safety and well being will be protected;
- The project will be designed to mimic the natural processes of Puget Sound as much as possible to minimize the amount of maintenance required;
- The proposed work will provide critical habitat as identified above;
- The proposed work will enhance habitat for threatened or endangered species that occur within central Puget Sound;
- Real estate is reasonably available and is cost effective;

- The proposed project will have positive net benefits to existing, degraded ecosystem;
 - The non-Federal sponsor is willing and able to operate and maintain the site.
- 9. FEASIBILITY PHASE MILESTONES:** The feasibility study schedule is highly dependent upon the negotiation of the PMP with the local sponsor. As the PMP is developed, the scheduled will be revised and refined.

**Table 1
Feasibility Phase Milestones**

Milestone	Description	Target Dates
054	Submit draft PMP	April 2001
100	Execute FCSA	August 2001
105	Initiate Feasibility Study	September 2001
111	PMP In-Progress Review	December 2001
112	Without Project Conditions Complete	April 2002
113	Preliminary Design Complete	June 2002
114	Plan Selection	September 2002
124	Feasibility Design Complete	December 2002
145	AFB	December2002
165	Public Review Complete	February 2003
170	Feas. Report w/NEPA Complete	April 2003
290	MSC Public Notice	June 2003
330	PED Agreement Executed	August 2003
340	President Sign Authorization	WRDA 2004
350	Chief's Report to ASA(CW)	September 2003

10. FEASIBILITY PHASE COST ESTIMATE: This estimate is a preliminary estimate of feasibility costs based on the alternatives, delineating the estimated costs for studies of the Corps and potential local sponsor. This estimate will be modified pending the formulation and negotiation of the PMP.

**Table 2
Preliminary Cost Estimates**

<i>MAJOR WORK ITEMS</i>	<i>STUDY COST</i>
COST SHARING FOR FEASIBILITY STUDY	
TOTAL STUDY COSTS	\$ 1,057,000
50 % FEDERAL SHARE (Note: This is only funding estimates, local sponsor cash will increase these figures)	
Public Involvement	\$ 75,500
Environmental Studies	\$ 265,500
Economic Studies	\$ 10,000
Project Management	\$ 22,500
Engineering	\$ 51,500
Real Estate Studies	\$ 22,500
Model Studies	\$ 17,500
Review Contingency	\$ 63,500
TOTAL FEDERAL SHARE	\$ 528,500
50% SPONSOR SHARE	
Public Involvement	\$ 75,500
Environmental Studies	\$ 265,500
Economic Studies	NA
Project Management	\$ 22,500
Engineering	\$ 51,500
Real Estate Studies	NA
Model Studies	NA
Review Contingency	NA
TOTAL IN-KIND SERVICES	\$ 264,250
CASH FUNDS	\$ 264,250
TOTAL SPONSOR SHARE	\$ 528,500

11. RECOMMENDATIONS: On the basis of the above findings, ecosystem restoration in the central Puget Sound basin warrants federal participation in a cost-shared feasibility study. Such projects are in the federal interest, are in accord with Administration policy and budgetary priorities, and are strongly supported by the local sponsors. The preliminary cost estimate is \$1,057,000. This estimate will be revised as the PMP is developed. The feasibility study is currently scheduled for completion in September 2003.

I recommend this 905(b) analysis be certified as being in accordance with current policy and that a feasibility study should be conducted.

12. POTENTIAL ISSUES EFFECTING INITIATION OF FEASIBILITY PHASE: None identified.

13. VIEWS OF OTHER RESOUCE AGENCIES: The Federal and State resource agencies are in favor of nearshore restoration efforts within Puget Sound. Nearshore habitat areas have been determined to be critical for the continued survival of threatened and endangered fish species, which form a link in the food chain for other species, also listed as threatened or endangered. Recovery of estuarine and nearshore habitat is

imperative for the recovery of these threatened or endangered species. Therefore, it is anticipated that resource agencies will review restoration in this area in a very favorable light.

14. PROJECT AREA MAP: A map of the region and study area is attached as Figure 1.

Date _____

Signature _____

Ralph H. Graves
Colonel, Corps of Engineers
District Engineer

Insert Figure 1 – Project map

Insert Enclosures –Letters of Intent