FINAL HABITAT RESTORATION DOCUMENTATION REPORT BELLINGHAM BAY DEMONSTRATION PILOT PROJECT

1.0 INTRODUCTION AND BACKGROUND

Contaminated marine sediments in urban areas of Puget Sound, including Bellingham Bay, can pose a threat to both marine and public health. Cleanup of contaminated sediments has proven to be a difficult task, complicated by high costs, limited disposal site options, concerns about environmental liability, source control issues, habitat alterations, and regulatory and land owner constraints. To address the need for sediment cleanup and overcome some of the existing roadblocks to expedited opportunities, a group of five federal and state agencies in Washington formed the Cooperative Sediment Management Program (CSMP) in May 1994 and signed an Intergovernmental Agreement. The agencies that signed the CSMP Intergovernmental Agreement included:

- Washington State Department of Ecology (Ecology);
- Washington State Department of Natural Resources (DNR);
- U.S. Environmental Protection Agency, Region 10 (EPA);
- U.S. Army Corps of Engineers (Corps); and
- Puget Sound Water Quality Action Team (PSWQAT).

The Washington State Department of Transportation (WSDOT) later joined the CSMP signatory agencies, in part as a response to the Sediment Cleanup Strategy Workgroup report to the CSMP agencies. In developing the agencies' response to the workgroup, the CSMP signatories and WSDOT decided to focus on a pilot demonstration project in a selected embayment with the goal of overcoming roadblocks to expedited cleanup actions at that location. Further, the CSMP agencies and WSDOT expect to revise the Intergovernmental Agreement in the future to bring two additional cooperating state agencies, WSDOT and the Washington Department of Fish and Wildlife (WDFW), into the CSMP.

The cooperating agencies proposed to help fund a Demonstration Pilot Project (Pilot) to develop sediment cleanup and disposal, habitat restoration/protection, and source control priorities in an urban embayment of Puget Sound by creating a partnership with local governments and businesses. The key goals of the Pilot were to control sources of contamination, expedite cleanup of high priority sediment sites, test various incentives for cleanup, and create new and flexible methods for achieving cleanup. Ecology set aside a grant available to local governments under the Model Toxics Control Act (MTCA) to help fund the Pilot.

In June 1996, Bellingham Bay was selected as the location for a CSMP Demonstration Pilot Project. Bellingham Bay was selected in part due to the responsiveness of a local group that had already initiated collaborative efforts. The local group included:

- Port of Bellingham,
- City of Bellingham,
- Whatcom County Health Department, and
- Georgia-Pacific, West, Inc.

In September 1996, the Bellingham Bay Work Group (BBWG) was established to initiate the Pilot. The BBWG "Pilot Team" included the six sponsoring state and federal agencies, the four local proponents, two additional agencies: U.S. Fish and Wildlife Service (USFWS), and WDFW, and representatives of the Lummi Nation and Nooksack Tribe.

1.1 OBJECTIVES OF THE DEMONSTRATION PILOT PROJECT

The Pilot Team developed environmental, process, partnering, and policy objectives specific to the Pilot which were intended to ensure achievement of the overall mission statement of the Pilot:

> *"To use a new cooperative approach to expedite source control, sediment cleanup and associated habitat restoration in Bellingham Bay."*

1.1.1 ENVIRONMENTAL OBJECTIVES

- Implement a thoughtful planning approach for integrated opportunities within Bellingham Bay, including source control, sediment cleanup, and preservation and restoration of aquatic resources;
- Prioritize and take early opportunity on contaminated sediment sites which pose a threat to public health and the environment in the bay, including sediment areas within or next to the Whatcom and I & J Waterways, Cornwall Avenue Landfill, and Harris Avenue Shipyard; and
- Design and permit a multi-user disposal site for contaminated sediments associated with identified priority problem areas.

1.1.2 PROCESS OBJECTIVES

- Build a comprehensive record of existing environmental and land use information to support planning efforts in Bellingham Bay;
- Develop and utilize a coordinated regulatory process to provide more streamlined and predictable permitting, design, and implementation of priority projects;
- Consider a reasonable range of alternatives for sediment remediation that are protective, cost-effective, and practicable within an urban embayment;
- Maintain coordination with other sources of emerging information regarding sediment remediation and habitat preservation and restoration [e.g., since the Pilot Team developed these objectives in 1997 potential listings of some salmonids as threatened or endangered have elevated the importance of Endangered Species Act (ESA) compliance]; and
- Provide for effective integration of environmental remediation with economic development, including cleanup and redevelopment of contaminated property, coordination of project timeline to achieve multiple objectives, and maintaining flexibility for individual landowners. [Please note: the Habitat Subcommittee advocates the management of aquatic habitat in Bellingham Bay in general as a component of the infrastructure].

1.1.3 PARTNERING OBJECTIVES

- Develop a framework for sediment remediation among cooperative partners, that is environmentally protective, cost-effective and practicable within the urbanized portion of Bellingham Bay;
- Maintain an effective working relationship among project participants;
- Identify and coordinate public and private opportunities for project participation and funding, including a framework for project cost-sharing;
- Provide for cooperative resolution of liability for historical environmental problems associated with contaminated marine sediments with less litigation, less administrative redundancy and less project delay; and
- Document elements of the Pilot that may be transferable to other locations.

1.1.4 POLICY OBJECTIVE

- Have the Pilot contribute to the understanding and resolution of existing policy conflicts that have presented such a collaborative and coordinated effort in the past.

1.2 INTEGRATION OF HABITAT RESTORATION/PROTECTION EVALUATION WITH OTHER PROJECT ELEMENTS

The Pilot has four fundamental project elements, including:

- Sediment cleanup and source control;
- Sediment disposal site identification;
- Habitat restoration/protection; and
- Aquatic land use.

Each project element is currently being addressed either by the entire Pilot Team (in the case of disposal site identification) or through subcommittees. The Pilot Team and/or subcommittee recommendations for source control and sediment cleanup, sediment disposal site identification, habitat restoration/protection, and aquatic land use will be described in documentation reports that have been or are being prepared. The recommendations will also be integrated together into a Comprehensive Strategy for the bay. The Comprehensive Strategy will provide a long-term guide for planning future activities in the bay, and will identify near-term alternatives that integrate the highest priority action from each of the elements. This integration of project elements will occur on a subarea basis, which will separate the bay into enough geographic resolution such that a strategy for each subarea can be clearly articulated.

Both the Comprehensive Strategy and the near-term alternatives, which represent the integration of priority recommendations for each project element, will be further analyzed in a State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS). A generalized flow chart depicting this process is presented in Figure 1. At least one near-term alternative will be implemented as part of the Pilot.

The relationship of the habitat element to other Pilot elements is discussed further in Section 6.0.

1.3 PURPOSE AND ORGANIZATION OF THE DOCUMENTATION REPORT

The purpose of this documentation report is to describe and document the process used by the Habitat Subcommittee to identify and evaluate all potential habitat restoration/protection opportunities in Bellingham Bay, and prioritize the opportunities. This documentation report presents and/or describes:

- The process used by and thoughts of the Habitat Subcommittee to first define an overall broad habitat vision for the bay and continuing efforts to refine the vision through more focused goals and objectives and specific habitat restoration/protection opportunities;

- The seven Pilot goals and corresponding evaluation criteria scoring guidelines developed by the Pilot Team;

- The Habitat Subcommittee's modifications to the evaluation criteria scoring guidelines to make them applicable to habitat;

- Assumptions, rationale, and results of applying Goal 3 to a range of habitat opportunities to develop an initial list of high priority habitat opportunities;

- Candidate habitat restoration/protection opportunities (including figures showing the location of the opportunity); and

- The relationship of habitat restoration/protection opportunities to other identified programs/projects being implemented upstream and in proximity to Bellingham Bay; and

- The relationship of habitat restoration/protection opportunities to and between other project elements such as land use, disposal siting, and sediment clean up and source control.

A flow chart depicting the process used by the Pilot Team to identify and screen habitat opportunities is presented in Figure 2.

Figure 1

Figure 2

2.0 HABITAT VISION, GOALS, AND OBJECTIVES

The Habitat Subcommittee is comprised of the following Pilot Team members:

Brain Williams – WDFW;
Dale Griggs – Nooksack Tribe;
Mike Cochrane – Lummi Nation;
Barry Wenger – Ecology;
Paul Wagner – WSDOT;
Tim Romanski – USFWS (up until late 1997);
Bill Graeber – DNR;
Rachel Friedman-Thomas – NMFS (was with Ecology up until fall 1998);
Glenn Grette – PI Engineering; and
Tracey McKenzie – PI Engineering.

These individuals are on this subcommittee because of their local experience with habitat and resource issues in Bellingham Bay and/or their expertise on specific aquatic resources and habitat restoration/protection. Their expertise and historic and current knowledge of resources and habitats in Bellingham Bay along with existing data sources (e.g., historic shoreline maps, historic and current reports on utilization of the shoreline by salmonids, eelgrass beds, and other available resource and habitat data) were used to develop a broad-based habitat vision for Bellingham Bay.

2.1 HABITAT VISION

The habitat vision for the Bellingham Bay Pilot Project is:

"To maximize Bellingham Bay habitat productivity to the extent possible."

The Habitat Subcommittee decided that an overall vision for habitat restoration/protection in Bellingham Bay was necessary to guide the development of habitat restoration/protection objectives and to integrate the various view points of the resource agencies and tribal entities that serve on the subcommittee. The most important consideration in developing the habitat vision was to determine how visionary it will be. Essential questions considered and discussed by the subcommittee include:

- What do you as a resource manager/user want to see for habitat in Bellingham Bay?;
- What is your overall objective for habitat restoration/protection within Bellingham Bay?;
- What are the geographic constraints for habitat restoration/protection given the Pilot's objectives and mission statement?;
- To what extent is it practical to consider that the bay should be restored to conditions that were present in the 1800's?;
- To what extent will existing land use constraints be incorporated into the vision?;
- Will the restoration focus be on those sites that are apparently available?; or, will the vision encompass the potential offered by the entire land base without the constraints of current land use?. For example, if a viable industrial facility is located on land that could be used to restore a particularly valuable habitat function, should the vision include elimination of that use to implement the habitat vision?

The subcommittee decided that the most limiting approach for defining a habitat vision for Bellingham Bay would be to apply current zoning and shoreline designations to each land parcel and conclude that all parcels in the inner bay (upland and adjacent aquatic lands) are unavailable because they fall within zoning or shoreline designations that reserve them for high level economic uses. With this approach no restoration opportunities would exist within the developed portions of Bellingham Bay. Presumably only opportunities in the portions of the bay approved for with low intensity uses would be available for a habitat restoration/protection action.

Members of the Habitat Subcommittee have advocated management of aquatic habitat in the inner bay and Bellingham Bay in general as a component of the infrastructure. Such an approach puts habitat functions on equal footing with all other land uses even in those areas designated for high intensity land uses. The ecological basis of this approach is that for many habitat functions location is as important as it is for economic uses. From the perspective of habitat function, location determines whether target species use a particular habitat and whether the proper physical and biological processes exist, or can be restored at the site, to support a desired range of functions through time. Based on this ecological perspective, the subcommittee encourages a re-examination of all shorelines and bedlands from the perspective of optimizing their uses (both economic and ecological). For some portions of the Bellingham Bay shoreline the ecological uses would be the primary focus and conversion to these uses would be advocated in the long term, while on other portions of the shoreline a balance between ecological and economic considerations would be the focus in an effort to restore the habitat continuum upon which a variety of resources depend. DNR has developed draft management principals for the management of state-owned aquatic lands. Though DNR's draft management principals were not fully embraced by the Habitat Subcommittee, they are provided in Appendix A.

Thus, the Habitat Subcommittee has proceeded along a path that recognizes existing land use but identifies opportunities for habitat actions in areas that may be available for habitat use even though they are currently used or zoned for high intensity or other public uses. The subcommittee identified particular focus areas (e.g., Squalicum Creek estuary) that if the opportunity were to arise, exceptional ecological benefits may be realized by converting it from an economic use. The Habitat Subcommittee's work presumes that the City's shoreline designations and DNR harbor areas may be either reexamined, adjusted, or conditioned so that habitat uses may occur in some of these areas. The Habitat Subcommittee also acknowledges shoreline planning as it is currently practiced pursuant to the Shoreline Management Act (SMA) and the Growth Management Act (GMA), both of which contain development and certain types of shoreline activities to specific portions of the shoreline and recognize that these high intensity use area can also accommodate public access and aquatic and shoreline habitat.

The Habitat Subcommittee recognizes that as part of the Pilot the Land Use Subcommittee has overlapping responsibilities with regard to upland and shoreline land use. Further, the subcommittee examined the entire bay and recognized that much of the Nooksack River delta continues to provide high value and functions. The development focus on the inner bay over the last 50+ years has seriously affected the habitat quality of the inner bay, including Little Squalicum, Squalicum, Whatcom, and Padden Creek estuaries, where important habitats and habitat functions have been lost to historic dredging, filling, and shoreline modifications and which consequently provide the greatest opportunity for habitat restoration. Although historic information from the early 1900s to about the 1960s indicates that heavy industrial uses (e.g., ship yards, oil docks, canneries, log storage) (Mark Larsen, RETEC, personal communication) occurred in more than just the inner bay, more current uses since the 1960s have been concentrated in the inner bay leaving the delta of the Nooksack River in a relatively natural state and relatively undisturbed unique habitat areas and functions around Portage Island and Chuckanut Bay that warrant preservation. Overall, the habitat in Bellingham Bay is not in the same degraded state as other highly developed bays in Washington (e.g., Elliott Bay, Commencement Bay), and critical baywide function has not been impaired to the same level.

The Habitat Subcommittee also recognized that the Pilot's habitat opportunities may overlap with and/or compliment habitat programs or projects being planned or implemented upstream of Bellingham Bay (see Section 5.0). It is important to consider the habitat opportunities identified through the Pilot project in concert with these other efforts to help determine how habitat restoration and protection opportunities can be accomplished in a way that provides for habitat across an ecological continuum.

In addition to the larger scale questions and discussions that guided the development of the Pilot's habitat vision, the subcommittee based the vision for the Pilot on the following ecological and restoration principles:

- Landscape Ecology
- Habitat Connectivity and Migration Corridors
- Distribution of Target Species
- Historic Habitat Conditions

These are discussed individually below.

2.1.1 LANDSCAPE ECOLOGY

Aquatic habitats do not occur in isolation, the types and levels of functions that they provide depend on the physical and biological processes that occur around them and the sequence of habitats needed by target species (see below). Therefore, from the perspective of the individuals of a species, aquatic habitat occurs as a continuum rather than a discrete geographic location. Each portion of the continuum may provide a mix of unique or general ecological functions depending upon its characteristics and location. Because of the interrelationships and physical connections of aquatic habitats it is wise to consider habitat on a landscape scale within the context of the habitat continuum whereby location, physical processes, and biological processes can be incorporated into long-term planning.

Habitat location is important because of its influence on the ecological functions provided by a habitat. Some functions are essentially location dependent due to the occurrence of a unique set of characteristics. An example of a location dependent function is the physiological transition that juvenile salmonids make while adapting from freshwater to salt water. Typically this function is considered to occur close to the mouth of the "home stream". Therefore, the mouths of streams that support runs of salmon provide an opportunity for enhancing a function that may not be transferable to a different location.

Location also determines the sustainability of a habitat. Habitat sustainability is of particular interest with reference to habitat restoration and preservation actions. The persistence and functions provided by a habitat may be dependent upon a physical process that provides sediments, detritus, or low salinity water over an appropriate time scale. Evaluation of sustainability within a landscape perspective entails integration of physical processes such as sediment transport and site characteristics such as exposure to wave action to assess whether a proposed habitat restoration/protection may yield a transitory or long-term feature of the landscape. For example, attempting to build a mudflat on a cobble beach is fruitless unless the restoration action is protected from scour and has a source of sediments.

In a similar fashion biological processes may shape or influence the sustainability of a restoration action. For example, colonization of a mudflat by ghost shrimp may limit the potential for successful colonization by eelgrass, due to disturbance of the roots.

The physical processes at a location are also important in determining the types and means of energy processing at the site. The ultimate energy sources for the aquatic environment are upland vegetation and detritus, in-stream vegetation, marine vegetation, and phytoplankton. The primary productivity from these sources is processed either at the site that production occurs (e.g., within an eelgrass bed) or is transported as detritus to another site (e.g., a mudflat) where processing occurs. Therefore, in the most basic case a habitat is either a net exporter or net consumer of primary productivity. Further, transport linkages can cross the freshwater/salt water boundary as detritus is exported from a stream to the bay. Alternatively, an important reverse route of energy flow is the return of adult salmon to their natal streams. The carcasses of the spawners provide a source of energy and nutrients that moves counter to the typical down-gradient flow of other sources.

Based on these relationships, it is important to consider the role of particular habitat type in a specific location. Will the habitat be a net exporter or consumer of primary productivity? If the habitat is planned as a net consumer, will the physical processes transport enough detritus to the site for processing so that important functions can occur there? These types of questions are the basis for evaluating specific restoration locations and actions.

2.1.2 HABITAT CONNECTIVITY AND MIGRATION CORRIDORS

This concept is more local than the habitat continuum and pertains to whether target species have access to habitat of suitable quality. A number of shoreline characteristics can either hinder migration or reduce habitat use. For many aquatic species such as juvenile salmonids, the water itself always provides a migration corridor. However, the quality of the habitat function (e.g., feeding opportunities) is determined by the characteristics of the shoreline. For example, steep armored shorelines that are covered by piers provide relatively low quality habitat but migration still occurs along them. Therefore, the Habitat Subcommittee considered means to improve the quality of existing degraded corridors and preserve functions on higher quality corridors as a means to improve the level of function

realized by organisms migrating along the shoreline.

2.1.3 DISTRIBUTION OF TARGET SPECIES

The locations for restoration and preservation actions were considered with regard to the known distribution of the target species. This is a means to ensure that a restoration or preservation action will provide the target functions. For example, Whatcom Creek is known to support natural-spawned runs of salmon and hatchery-supplemented runs of salmon. Based on the abundance of this target species, restoration opportunities near the mouth of the creek were considered to offer important opportunities as were the mouths of the other small watersheds draining into Bellingham Bay that are known to support salmonids.

2.1.4 HISTORIC HABITAT CONDITIONS

Historic habitat conditions can be an important template for assisting habitat restoration and protection planning. Essentially, understanding the types of habitat that have been lost and created over time and the potential effects on habitat function offers insight into potential limiting factors for target populations or biological communities.

The Habitat Subcommittee examined the pre-development conditions of Bellingham Bay and determined that for the bay in general the acreage of intertidal and shallow subtidal habitat had increased due to deposition of sediments at the Nooksack River delta. Increases in the area of coverage of eelgrass beds may also have occurred. Also, a qualitative comparison of historic harbor leases to current day harbor leases indicates that historically, there was more water borne commerce, navigation, and industrial uses than occurs today in Bellingham Bay (Mark Larsen, RETEC, personal communication).

In contrast to the bay-wide habitat trends, habitat changes in the inner bay have been characterized by a loss of aquatic habitat in all elevation zones due to filling associated with development. Substantial loss of eelgrass beds has also occurred. Overall, the major habitat changes in Bellingham Bay have occurred in the inner Bay where several small estuaries exist.

Based on the historic habitat conditions and the types of changes that have occurred, the Habitat Subcommittee has focused its restoration planning activities on the inner bay with a focus on the estuaries at the creek mouths and eelgrass beds.

2.2 TARGET SPECIES

The Habitat Subcommittee identified the following target species with the acknowledgement that if habitat preservation and restoration opportunities are directed towards the needs of the target species, the preservation and restoration would also benefit the needs of other aquatic resources (e.g., epibenthic zooplankton, benthic infauna).

- All salmonid species including Cutthroat trout and Steelhead;
- Dolly Varden;
- Bull Trout (thought to occur in the Nooksack River);
- Sand lance and surf smelt;
- Pacific herring;
- Ling cod;
- Flatfish (e.g., English sole);
- Pandalid shrimp;
- Dungeness crab; and
- Hardshell clams.

2.3 BAYWIDE HABITAT OBJECTIVES

Given the Pilot vision and the range of species that habitat restoration and preservation efforts should strive to benefit, the Habitat Subcommittee identified habitat restoration/protection objectives that could occur to achieve the overall habitat vision. These objectives were meant to be broad and do not include quantifiable standards to measure

whether the objective is met. The subcommittee relied on individual's knowledge and expertise on resources and habitats in the bay, historic and current day information, and best professional judgement to identify the broad range of habitat restoration/protection objectives. They include:

- Containing or removing shoreline landfills;
- Maximizing shoreline riparian vegetation;
- To the extent possible, achieving a net gain in in-water habitat, saltmarsh, and marine buffer;
- Providing habitat connectivity;
- Restoring the viable estuaries known to support a variety of species including Squalicum Creek, Whatcom Creek, Padden Creek, and Little Squalicum Creek;
- Removing remnant in-water structures (some affect habitat function and may be a source of contaminants to sediments);
- Removing historic shoreline fills;
- Removing or replacing creosote treated timber piles (a habitat and source control issue);
- Identifying opportunities for restoration that would not necessarily be associated with compensatory mitigation;
- Restore historical eelgrass (*Zostera marina*) beds;
- Modify substrates;
- Create shallow water habitat by modifying elevations; and
- Establishing habitat reserve areas (in discussing this concept, the Habitat Subcommittee acknowledged that any sites identified for protection or as a reserve would not preclude tribal access to or utilization of resources within the designated areas). Protection or reserve areas were defined as areas where there is habitat difficult to replace (e.g., *Z. marina* beds) and/or that support multiple species and/or multiple life history stages for a variety of species.

Once the Pilot's habitat vision and objectives were defined, the next step was to identify locations within the bay where those objectives could be met. Using an aerial photograph of the Pilot study area, specific locations were identified where the broad range of habitat objectives could be met (Table 1). These descriptions were prepared using existing maps and aerial photographs, a site visit to some areas conducted by some members of the Habitat Subcommittee, and input from the Habitat Subcommittee. Figure 3 shows the location of habitat opportunities within the Pilot project area. The description of the habitat opportunities include:

- the number of the opportunity which corresponds to the location shown on Figure 3;
- the estimated area of habitat that would be realized;
- the name of the habitat restoration/protection opportunity; and
- an overall description of what could occur at the site (see Table 1).

In identifying specific locations, the Habitat Subcommittee did not consider whether the area was already being used for industrial purposes, commerce and navigation, etc. within the bay. In addition, the subcommittee acknowledges that some restoration opportunities may be implemented as a component of sediment remediation. The subcommittee decided that total abandonment of federally authorized navigation channels within the bay for the purposes of habitat may not be realistic, but habitat opportunities are not precluded from occurring within federally authorized navigation channels. The habitat restoration/preservation locations include:

1. Cement Co. Dock
2. Mt. Baker Plywood West
3. Mt. Baker Plywood Northwest
4. Mt. Baker Plywood South
5. Squalicum Creek. Waterway A
6. Squalicum Creek. Waterway B
7. Bellingham Cold Storage
8. Squalicum Harbor Breakwater
9. Squalicum Marina
10. Port-Hilton Harbor
11. G-P ASB East
12. G-P ASB South

13. G-P ASB
14. Sash & Door
15. Citizens Dock
16. Lower Whatcom Creek
17. Head of Whatcom Waterway
18. G-P Log Pond
19. Port Log Raft
20. Cornwall Landfill
21. Boulevard Park
22. Taylor Street Dock and Associated Structures
23. Padden Creek North Shoreline
24. Padden Creek North - In-Water
25. Padden Creek Upland
26. Post Point Upland
27. Post Point Shoreline
28. Post Point South
29. Chuckanut Spit
30. Chuckanut Breach
31. Post Point to Chuckanut Preservation
32. Portage Island Preservation Area
33. Lummi Peninsula
34. Nooksack Delta Preservation Area
35. Nooksack Delta East
36. East Shore Padden Creek

2.4 REFINED BAYWIDE HABITAT RESTORATION/PROTECTION OBJECTIVES

As the subcommittee identified specific locations where habitat restoration/protection/reserve opportunities could occur, they also worked on refining the overall habitat restoration/protection objectives into more focused, quantifiable habitat restoration/protection objectives. The more focused objectives are listed below.

- Provide clean sediments to support functions and species. Sediment quality is an important component of the aquatic environment and poor sediment quality may limit the biotic communities existing or anticipated to develop. Estuarine habitats have been a direct depository of contaminants, and sinks for contaminants transported to the site from upland areas and other areas of the estuary. Certain contaminants are known to accumulate in the tissues of certain organisms and may affect biological processes. Providing habitat in areas where contaminated sediments are cleaned up or capped with clean sediments can provide habitat that can support biological diversity and is beneficial to feeding, physiological, and reproductive functions.

- Restore the 200+ acres of historical native eelgrass bed that was formerly located in inner Bellingham Bay to the extent possible. The eelgrass beds in this area have been substantially reduced over time as a result of shoreline modifications and historical dredging and filling activities. The inner Bellingham Bay eelgrass beds would be restored to support a variety of species, species life history stages, and functions, likely to have been supported by the former eelgrass meadow provided that physical processes needed to sustain eelgrass meadows can occur.

- Restore/enhance degraded estuaries of Whatcom, Squalicum, Padden, and Little Squalicum Creeks to support salmonids, salmonid prey, and functions such as refuge, feeding, and rearing. Restoration and enhancement of these areas would help salmonid recovery efforts in the Bellingham Bay watersheds, including the proposed listing of Puget Sound Chinook. Many salmonid species rear for periods of days to several months in a connected system of mudflats, marshes, and eelgrass, and ecosystem sub-components of creek deltas as a part of their smoltification from freshwater streams to open ocean. Most of these critical refuge, feeding, and rearing habitat areas have been removed or modified over time in the four creek deltas as a result of historical dredging and filling activities and shoreline modifications. Restoration of these estuarine delta areas will be coordinated with related restoration and recovery opportunities being considered within the watersheds.

- Restore/enhance/protect viable habitat that provides connective corridors between estuary and open water habitats and between other habitats in the open water environment. Connective corridors form important migration/movement routes between habitats for many species. Corridors for movement from spawning/larval grounds to restored habitats are critical. Narrow strips of marsh, channels from mud flats to deeper water, bands of eelgrass, and even ditches represent corridors for species in estuarine environments in the Pacific Northwest (Shreffler and Thom 1993). For example, corridors are very important for out-migrating salmonids between the stream mouths and estuarine habitat. Connective corridors may also function as habitat for other species. Connective corridors also help to assure exchange of species, materials, and energy. A few large habitats connected by many smaller habitats may be a good combination for maintaining and enhancing the overall system. Preservation, restoration, and/or enhancement of habitat may not be as beneficial to species, species diversity, and energy transfer if connective corridors are not present or can not be provided.

- Restore, protect, and enhance natural habitat forming processes that create and maintain habitat. Physical sediment and oceanographic processes (e.g., longshore transport) processes create and/or maintain habitats that support functions for some species. For example, physical processes that result in the movement of sands to expose gravels may provide potential habitat for surf smelt spawning.

- Net gain in aquatic area and function. This objective is based on the concept of providing high quality habitat to ensure healthy, naturally produced aquatic species.

- Preserve existing viable habitat that tends to either concentrate sensitive life history stages and/or supports large numbers of species of concern. Certain species appear to concentrate in certain locations within Bellingham Bay. Physical and biological factors such as currents, elevation, and habitat structures result in relatively large numbers of certain species either seasonally or year round, and may influence life history stages of certain species. Preservation of these habitats through recommendations of types of uses that should or should not be allowed can help to maintain this existing viable habitat.

- Maximize habitat restoration/protection opportunities (including marine buffer) with remediation and/or shoreline projects. The implementation of habitat restoration opportunities may not be achievable in the absence of some type of shoreline or sediment remediation project. A thoughtful process of identifying habitat restoration/protection opportunities can result in the integration of habitat restoration/protection opportunities in a way that yields maximum habitat benefits in the inner Bellingham Bay area, which has lost about 300+ acres of aquatic land due to historic dredging and filling activities.

- Restore lost habitat attributes by removing shoreline fills, shoreline landfills, removing remnant structures, and removing/replacing treated timber structures. A historical analysis of nearshore and intertidal habitat in the Bay indicates that historic filling and shoreline development has resulted in the loss of 300+ acres of aquatic land in inner Bellingham Bay. These historic nearshore and intertidal habitats had physical (e.g., substrate type, elevation, slope, sediment quality, habitat edges) and biological (e.g., eelgrass, emergent marsh, marine/riparian buffer) attributes that supported a variety of fauna (e.g., epibenthos, benthic infauna, zooplankton, macrofauna, sedentary and mobile fish). Some of these attributes can be restored through removing historic shoreline fills/landfills, remnant structures, treated timber piles, and through recontouring the shoreline.

These more quantifiable objectives will be part of the Comprehensive Strategy (see Section 1.2) and will be refined and applied to specific subareas identified in the Comprehensive Strategy. Refining these objectives may be based on the type of habitat management desired for a subarea, the degree of physical alteration/ongoing efforts in the subarea and surrounding watershed, etc. For example if physical and biological information indicate that certain areas tend to concentrate sensitive life history stages, or significant numbers of multiple species, and these areas are important to set aside as preservation areas, recommendations will be made for the types of activities that are/are not warranted within that area. Another example is if historical habitat use patterns and distribution of a species of concern (e.g., Chinook salmon) indicates that an area historically provided habitat (e.g., Whatcom Creek estuary and nearshore areas west and southeast of Whatcom Waterway), but physical alterations have degraded this historical ecosystem, recommendations will be made to restore lost habitat attributes, structure, and function.

Lastly, these more focused, quantifiable objectives will be refined even further during the development and evaluation of near-term alternatives. For example, if a near-term alternative is identified in inner Bellingham Bay where there historically was eelgrass, the long-term objective of restoring 200+ acres of eelgrass could be refined so that the measurable standard of the near-term objective is to restore no less than 40 acres of eelgrass in that particular area.

Table 1. Habitat opportunity descriptions.

Refer to Figure 3 for the location of the opportunity.

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description
1	38,000 ft^2 (0.87)	Cement Co. Dock	The cement company dock is a relatively wooden structure near Little Squalicum Creek. It extends through intertidal and shallow subtidal water. The primary action would be removal of the treated wooden piles (probably cut below the mudline) to remove creosote from the aquatic environment and restore substrates.
2	30,000 ft^2 (0.68)	Mt. Baker Plywood West	The beach area west of Mt. Baker Plywood consists of large boulders and rocks. Opportunities at this site include either removing the large boulders and rocks to expose underlying sediments and supplement with finer mixed coarse gravel and sand, or placing finer mixed coarse gravel and sand over the large boulders and rocks to fill interstices.
3	30,000 ft^2 (0.68)	Mt. Baker Plywood Northwest	A portion of the shoreline appears to be fill. The fill could be removed and the area graded to support marine buffer, possibly salt marsh and sand/mud flat.
4	120,000 ft^2 (2.75)	Mt. Baker Plywood - South	The fill could be removed and the site graded to provide habitat suitable for sand/mudflat and salt marsh habitat with a marine buffer fringe.
5	20,000 ft^2 (0.45)	Squalicum Crk. Waterway - A	This action would involve the removal of treated wooden piles, a pier, log rafting structures, and log rafts.
6	200,000 ft^2 (4.6)	Squalicum Crk. Waterway – B	The elevations in this portion of the creek estuary could be raised to provide intertidal and shallow water habitat such as eelgrass, kelp or salt marsh and associated functions. Shoreline buffer could also be established.
7	50,000 ft^2 (1.1)	Bellingham Cold Storage	The fill could be removed and the site graded to provide estuary habitat suitable for marine buffer, saltmarsh and/or intertidal mud/sandflat.
8	640,000 ft^2 (14.7)	Squalicum Harbor Breakwater	Elevations off portions of the breakwater could be raised from about -18 ft MLLW to provide gently sloping intertidal and shallow subtidal habitat and functions. Side slopes on the seaward edge of the breakwater could be modified to incorporate finer grained material to provide intertidal/shallow water functions.

Table 1. Habitat restoration/protection opportunity descriptions (cont.)

No.	Habitat Area to be Gained in ft^2 (acres)	Name	Description
9	70,000 ft^2 (1.6)	Squalicum Marina	The substrates along the marina margins could be modified to incorporate finer grained material to provide intertidal/shallow water functions.
10	160,000 ft^2 (3.6) (area available outside of existing eelgrass bed)	Port-Hilton Harbor	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and/or site elevations could me modified to meet the elevations of the existing eelgrass bed. Allow for natural eelgrass colonization or do limited eelgrass transplanting.
11	280,000 ft^2 (6.4)	G-P ASB – East	Shallow water habitat could be established by raising the elevation next to the ASB. Marine buffer fringe habitat could be established at high elevations and the site could support either marsh plants or eelgrass at lower elevations.
12	960,000 ft^2 (22)	G-P ASB – South	Elevations could be raised or modified to expand the existing eelgrass bed on the west side of the ASB. About 200, 000 CY would be required to create habitat at elevations suitable for eelgrass.
13	1,430,000 ft^2 (33)	GP – ASB	This action would consist of removing the ASB from the water and establishing intertidal and shallow subtidal habitat, and marine buffer and/or eelgrass.
14	30,000 ft^2 (0.68)	Sash & Door	This action would involve removing fill from the Sash and Door site and establishing estuarine riparian buffer, marsh, and mudflat banks.
15	18,000 ft^2 (0.41)	Citizens Dock	The action would involve removing the existing wooden dock structure and derelict floats, etc. in the vicinity.
16	<10,000 ft^2 (<0.23)	Lower Whatcom Creek	The action would involve removing wooden structures, derelict floats, etc. in the vicinity.
17	60,000 ft^2 (1.4)	Head of Whatcom Waterway	The concept would be to modify elevations and substrates in the head of the waterway to establish estuarine riparian buffer, mudflat benches, and marsh. Perhaps introduce rootwads or other structure to the head of the waterway.
18	270,000 ft^2 (6.2)	G-P Log Pond	The concept would be to modify the shoreline elevations to provide a gently sloping or terraced slope from the top of the bank to the pierhead line in the Whatcom Waterway. Remove and debris, treated wooded structures. Establish marine buffer fringe, mudflat banks and/or saltmarsh.

Table 1. Habitat restoration/protection opportunity descriptions (cont.)

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description
19	1,080,000 ft^2 (24.8)	Port Log Raft	Remove wood/bark debris, and sunken logs. Modify the shoreline edge and modify elevations to support intertidal and shallow subtidal habitat (sloped or terraced bench). The site may provide an opportunity to provide substrates suitable for macroalgae attachment establish and/or an eelgrass bed.
20	350,000 ft^2 (8)	Cornwall Landfill - Shoreline/Upland/in-water	Remove garbage from the in-water portion of the landfill. Cut back bank along shoreline and remove garbage. Re-grade upland to intercept an appropriate shallow water elevation. Establish intertidal habitat, marine buffer fringe, possibly a saltmarsh, and potentially expand the sparse eelgrass patches (0.25 acre) just offshore of the seaward extent of the garbage.
21	45,000 ft^2 (1.03) (1st action) 360,000 ft^2 (8.3) (2nd action)	Boulevard Park	Two actions could occur along the shoreline and offshore from about 600 to 800 ft north of Boulevard Park to the south end of the Park. The first action is shoreline substrate modification. Substrates consist of riprap and large rock and concrete debris. These substrates could possibly be removed and replaced with coarser grain sand and gravel to provide surf smelt and sand lance spawning areas. Alternatively, finer grained substrates could be placed in the interstices to provide some epibenthic habitat. The second action would occur offshore and consist of potentially restoring eelgrass or providing substrates to support kelp.
22	18,000 ft^2 (0.41)	Taylor Street Dock and Associated Structures	Remove the treated wooden structure and associated pilings and pier structures to remove creosote from the aquatic environment. Either allow eelgrass to naturally recolonize or conduct eelgrass transplant.
23	8,000 ft^2 (0.18)	Padden Creek - North Shoreline	Remove shoreline fill and create mudflat and/or saltmarsh.
24	1,500 ft^2 (0.03)	Padden Creek - North - In-Water	Remove treated wooden pier to remove creosote from the environment. This may provide an opportunity for existing eelgrass beds to expand. Remove a small filled area that protrudes waterward of the OHW line at the landward end of the pier structure.
25	120,000 ft^2 (2.75)	Padden Creek – Upland	Remove fill and establish connection to Padden Creek. Excavate fill to create tidally influenced brackish marsh. Provide habitat buffer.

Table 1. Habitat restoration/protection opportunity descriptions (cont.)

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description
26	80,000 ft^2 (1.8)	Post Point – Upland	Excavate upland next to a small open water embayment containing eelgrass. Grade excavated area to provide saltmarsh and mudflat bench.
27	900 ft^2 (0.02)	Post Point – Shoreline	Modify existing structure under railroad crossing to open it up and replace existing concrete debris that has been used to armor the shoreline with rock.
28	900 ft^2 (0.02)	Post Point – South	Modify existing structure under railroad crossing to open it up.
29	900 ft^2 (0.02)	Chuckanut Spit	There is apparently a closed culvert under the rail trestle. The action would involve either opening the culvert or replacing the culvert with a new culvert that was bigger and more open.
30	7,500 ft^2 (0.17)	Chuckanut Breach	There is one rail trestle allowing exchange between Bellingham Bay and the embayment in the north end of Chuckanut Bay. The action would consist of either installing a large open culvert under the rail line or building another trestle along the eastern end of the rail bed.
31	21,200,000 ft^2 (486)	Post Point to Chuckanut Protection	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
32	75,000,000 ft^2 (1,722)	Portage Island Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
33	900,000 ft^2 (20)	Lummi Peninsula	Portions of the shoreline along this area are armored with rip rap and large boulders. The action that could be implemented here would consist of restoring upper intertidal substrates to coarse sand and gravel suitable to support surf smelt and sand lance spawning habitat. (the Lummi Nation, Corps, and County are proposing to armor the entire beach for road protection. Mitigation for maintaining surf smelt spawning habitat and functions lost from the revetment will be required by WDFW. This opportunity may not be a viable option for the Pilot).

Table 1. Habitat restoration/protection opportunity descriptions (cont.)

No.	Habitat Area to be Gained in ft^2 (acres)[1]	Name	Description
34	140,000,000 ft^2 (3,214)	Nooksack Delta Protection Area	Set this area aside as a preservation area because habitats within the area are difficult to replace, the area provides multiple functions (as documented through maps showing use of the area by multiple resources), and it is thought to represent a unique habitat in Bellingham Bay.
35	170,000 ft^2 (3.9)	Nooksack Delta - East	Decaying wood deposits have apparently blanketed much of the higher intertidal area. The action would be to remove the wood deposits and if necessary import appropriately sized gravel to support surf smelt and sand lance spawning habitat.
36		East Shore Padden Creek	Remove fill, asphalt, and rock along the east shore and modify elevations to provide estuarine riparian buffer, mudflat benches, and marsh.

ASB = aerated stabilization basin
[1] Areas are approximate

3.0 BELLINGHAM BAY WORK GROUP GOALS AND EVALUATION CRITERIA

The evaluation and identification of priority habitat restoration/protection sites and activities to be integrated into the Comprehensive Strategy and the near-term alternatives to be analyzed in the forthcoming SEPA EIS was performed using a consistent application of the Pilot Team goals. The development of baywide goals, evaluation criteria and scoring guidelines for this application is discussed below.

3.1 DEVELOPMENT OF BELLINGHAM BAY WORK GROUP GOALS

The overall environmental, process, partnering, and policy objectives of the Pilot are summarized above in Section 1.1. Beginning in August 1997, the Pilot Team started a process of further refining these objectives into Baywide goals that reflect the collective interests and desired outcomes of the Pilot. The Pilot goals were initially developed as simple statements (the bullet items listed below under "goal descriptors") of desired outcomes that can be applied to the development of the Comprehensive Strategy, the near term alternatives, and to all of the Pilot's project elements (i.e., source control, sediment cleanup sites, sediment disposal, habitat restoration/protection, and aquatic land use). The statements were also designed to represent key regulatory and policy issues and concerns of individual Pilot Team members. These statements were then consolidated, reviewed, and refined into logical goal groupings as follows and agreed to at the October 28, 1997 Pilot Team meeting.

3.1.1 GOAL 1: HUMAN HEALTH AND SAFETY

Goal Descriptors:

- protect human health;
- human safety;
- protect drinking water supplies;
- reduce contaminant sources;
- control point and non-point sources;
- minimize chemical releases and maintain integrity;
- clean up contaminated sediments posing human health risks; and
- protect sediment/water quality.

3.1.2 GOAL 2: ECOLOGICAL HEALTH

Goal Descriptors:

- enhance or maintain aquatic organism health;
- reduce contaminant sources;
- control point and non-point sources;
- minimize chemical releases and maintain integrity;
- clean up contaminated sediments posing ecological risks; and
- protect sediment/water quality.

3.1.3 GOAL 3: PROTECT AND RESTORE ECOSYSTEMS

Goal Descriptors:

- environmental preservation/minimize environmental harm;
- maintain/protect physical integrity of habitats including shoreline erosion/accretion and other attributes such as sediment transport and detrital and nutrient transport and storage;
- habitat improvement;
- avoid/minimize loss of in-water habitats and compensatory mitigation;
- protect/restore aquatic life and resources;

- maintain/enhance ecosystem diversity, productivity, and stability, and biological function; and
- restore threatened and endangered species.

3.1.4 GOAL 4: SOCIAL AND CULTURAL USES

Goal Descriptors:
- protect spiritual use and location;
- protect/enhance ceremonial and subsistence resource use;
- ensure compatibility with community goals and property uses; and
- enhance recreation, aesthetic values, and public use and access.

3.1.5 GOAL 5: RESOURCE MANAGEMENT

Goal Descriptors:
- utilize renewable resources;
- use dredge material beneficially;
- protect and develop water supplies; and
- conserve resources such as reuse of water, sediments, and soil.

3.1.6 GOAL 6: FASTER, BETTER, CHEAPER

Goal Descriptors:
- technical feasibility;
- implementabilty;
- timely completion;
- cost effectiveness;
- integrate multiple land-use (including public uses) and environmental objectives; and
- efficient use of existing built-environment.

3.1.7 GOAL 7: ECONOMIC VITALITY

Goal Descriptor:
- encourage water dependent commerce;
- allow only water dependent discharges;
- maintain/enhance navigation;
- protect tribal access to and uses of treaty resources;
- minimize treaty fishing losses;
- develop marine transportation facilities;
- maintain/enhance commercial property use/property redevelopment; and
- enhance economic vitality.

The relative priority of each of the goals was assessed by the Pilot Team as part of goal development. On a baywide basis (i.e., with all four project elements combined), the first three goals (Human Health and Safety, Ecological Health, and Protect and Restore Ecosystems) ranked higher than the remaining four goals. Moreover, given the stated overall objective of the Pilot to achieve sediment cleanup and source control, and habitat restoration/protection in Bellingham Bay, the first three goals approximate “threshold criteria” which must be met.

3.2 GOAL EVALUATION AND CRITERIA DEVELOPMENT

Subsequent to the development of agreed-upon Pilot goals as described above, these goals were transformed from a habitat perspective into evaluation criteria scoring guidelines that were used to evaluate and prioritize habitat

restoration/protection opportunities described in the Draft Habitat Restoration Documentation Report (PI Engineering and Anchor Environmental 1998).
The Habitat Subcommittee decided that from an ecological perspective Goal 3: Protect and Restore Ecosystems was the most important goal for evaluating potential habitat restoration/protection opportunities in Bellingham Bay. Thus, only Goal 3 was utilized to prioritize habitat restoration/protection sites, as described in Section 4.0. Results of additional prioritization of the habitat restoration/protection opportunities using the remaining six goals was presented in the Draft Habitat Restoration Document Report (PI Engineering and Anchor Environmental 1998). However, after the subcommittees review of the draft report and further discussion, the Habitat Subcommittee decided that application of the remaining goals may limit options or constrain opportunities to consider habitat because they conflict with existing and potential land uses too early in the development of the Comprehensive Strategy. However, the subcommittee determined that the application of the remaining six goals in the Draft Report was useful and valid in identifying issues that require further discussion on the relative trade-offs of various ecological and economic management options as part of development of the Comprehensive Strategy and near term alternatives. Thus, in this Final Draft Report the evaluation criteria scoring guidelines for all seven Pilot goals are included for continuity; however, only the application of Goal 3 is included in the Final Draft Report in Section 4.0.

Goals were transformed into evaluation criteria scoring guidelines in two sequential steps. First, a narrative description of each goal was prepared that defined or discussed the goal in the context of habitat restoration/protection. Second, scoring criteria were developed that defined how a habitat restoration/protection opportunity would score into high, medium, and low categories (this scoring system also allowed for intermediate scores of medium-high or medium-low if a given opportunity fell between the established high, medium, or low scoring categories). In developing the scoring criteria, an attempt was made to incorporate key regulatory and policy issues expressed by individual Pilot Team and Habitat Subcommittee members. Definitions of the high, medium, and low scoring criteria were intended to be somewhat general yet specific enough to distinguish between opportunities. It was during the application of the evaluation criteria scoring guidelines to habitat opportunities, and describing the rationale for rating each opportunity, where terms are specifically defined. The scoring procedure is described in more detail in Section 4.0.

Thus, the Habitat Subcommittee reviewed, refined from a habitat perspective, and approved the evaluation criteria scoring guidelines for all seven Pilot goals in February, 1998. The resultant criteria and guidelines are summarized below.

3.2.1 GOAL 1: HUMAN HEALTH AND SAFETY

Goal Evaluation Description: The primary human health and safety issues associated with a habitat opportunity are potential affects to water quality and exposure pathways from implementing a habitat restoration/protection opportunity, and whether the habitat opportunity would affect drinking water supply and sources of contamination to Bellingham Bay.

Evaluation Criteria Scoring Guidelines: The following definitions were used to score habitat opportunities based on their impact on health and safety:

High - A habitat opportunity will be scored high if:
- the habitat opportunity would isolate or contain sources of contamination to sediments;
- the potential for reintroduction of contaminants is eliminated or occurs over a short time and is temporary;
- it has the potential to improve water quality;
- it does not adversely or permanently affect drinking water supply;
- it eliminates bioaccumulation of contamination in human exposure pathways;
- it eliminates direct human contact.

Medium - A habitat opportunity will be scored medium if:
- a habitat opportunity would control sources of contamination to the sediments or water;
- the potential for reintroduction of contaminants occurs over moderate period of time;
- it neither worsens nor improves water quality;
- it temporarily affects drinking water supply;

- it neither worsens nor improves bioaccumulation of contamination in human exposure;
- it neither increases nor decreases direct human contact.

Low – A habitat opportunity will be scored low if:
- uncontrolled sources to water or sediments are not controlled;
- the reintroduction of contamination could occur over the long-term;
- adversely impacts water quality;
- it permanently affects drinking water;
- it worsens or does not eliminate bioaccumulation in human exposure pathways;
- it worsens direct human contact.

3.2.2 GOAL 2: ECOLOGICAL HEALTH

Goal Evaluation Description: The extent to which a habitat opportunity can control sources of contamination to Bellingham Bay can depend on whether the habitat opportunity will isolate contaminated sediments, control existing sources of contamination to the Bay or be compatible with source control measures, whether sources exist that could contaminate the surface of the habitat restoration opportunity, and whether the habitat opportunity has the potential to control the reintroduction of contaminants into the aquatic environment.

Evaluation Criteria Scoring Guidelines: The following definitions were used to score habitat opportunities:

High - A habitat opportunity will be scored high if:
- the habitat would isolate or contain sources of contamination to sediments;
- the potential for reintroduction of contaminants is eliminated or occurs over a short time and is temporary;
- it eliminates bioaccumulation of contamination in aquatic biota exposure pathways;
- it eliminates direct aquatic biota contact .

Medium - A habitat opportunity will be scored medium if:
- a habitat opportunity would control sources of contamination to sediments or the water;
- the potential for reintroduction of contaminants occurs over a moderate period of time;
- it neither worsens or improves bioaccumulation of contamination in aquatic biota exposure pathways;
- in neither increases nor decreases direct aquatic biota contact.

Low – A habitat opportunity will be scored low if:
- uncontrolled sources to water or sediments are not controlled;
- the reintroduction of contamination could occur over the long-term;
- it worsens nor does not eliminate bioaccumulation in aquatic biota exposure pathways;
- it does not eliminate direct aquatic biota contact.

3.2.3 GOAL 3: PROTECT AND RESTORE ECOSYSTEMS

Goal Evaluation Description: There are several ecosystem and habitat issues associated with a habitat opportunity. In general, the issues can be grouped into the following categories: physical considerations, ecosystem function, diversity, stability and productivity; mitigation sequencing; and ecosystem preservation and improvement. Aquatic ecosystems may be positively or negatively affected by a habitat restoration opportunity. Existing habitats may be replaced with new habitat or permanently alter or convert habitat. A habitat opportunity may affect habitat types, area, and functions provided, and may present constraints or opportunities for incorporating opportunities and/or improving or destroying ecosystem integrity. A habitat opportunity may also alter physical processes such as shoreline accretion or erosion and/or bathymetry.

Evaluation Criteria Scoring Guidelines:

High - A habitat opportunity will be scored high if:
- it is located in a significantly degraded habitat area or non-habitat area in Bellingham Bay;

- the restoration time is relatively fast;
- it provides significant opportunity to improve ecosystem function by providing several functions for a variety of species and/or results in a net increase of in-water habitat;
- permanent preservation of the site occurs;
- the opportunity does not permanently disrupt or is supported by hydrologic transport and deposition processes;
- it directly benefits threatened or endangered species;
- the probability of success is high based on previously demonstrated restoration techniques;
- the opportunity provides habitat connectivity to contiguous habitats;
- the opportunity would restore/replace limited habitat;
- the opportunity creates habitat functions that are sustained through natural process rather than ongoing manipulations;
- the opportunity represents in-kind replacement of habitat types and functions affected through disposal siting;
- the opportunity can be implemented in advance of any disposal site impacts.

Medium - A habitat opportunity will be scored medium if:
- it requires conversion of relatively moderate functioning habitat to a different habitat type or occurs in other estuarine/marine waters of Bellingham Bay;
- restoration occurs over a moderate time frame;
- it provides a few functions but does not necessarily result in a net area increase of in-water habitat;
- limited protection of the site occurs;
- the opportunity results in limited disruption of hydrologic transport and deposition processes;
- it neither worsens nor improves threatened or endangered species;
- the probability of success is moderate based on previously demonstrated mitigation techniques;
- the opportunity provides some habitat connectivity;
- the opportunity neither worsens nor improves limited habitat;
- the opportunity creates habitat functions that require some ongoing manipulation;
- the opportunity provides for some in-kind replacement;
- the opportunity can be implemented concurrently with any disposal site impacts.

Low - A habitat opportunity will be scored low if:
- it requires conversion of relatively high functioning habitat that is difficult to replace to a different habitat type, or occurs outside of the estuary/marine waters of Bellingham Bay (e.g., non-tidally influenced freshwater areas in the drainage's to Bellingham Bay);
- the restoration time is relatively long;
- it provides only one function for one species or does not result in a net increase of in-water habitat;
- the site can not be permanently protected;
- the opportunity does permanently disrupt hydrologic transport and deposition processes;
- it does not benefit threatened or endangered species;
- the probability of success is questionable based on previously demonstrated mitigation techniques;
- the opportunity provides limited habitat connectivity;
- the opportunity does not restore or replace limited habitat;
- the opportunity requires ongoing manipulations;
- the opportunity does not provide for in-kind replacement;
- the opportunity can not be implemented in advance of or concurrent with any disposal site impacts.

3.2.4 GOAL 4: SOCIAL AND CULTURAL USES

Goal Evaluation Description: The primary social and cultural issues associated with a habitat opportunity are social uses and tribal cultural uses. A habitat opportunity could affect both tribal and non-tribal uses. These uses may be replaced, created, or provided in areas not previously available. These uses may be permanently destroyed or adversely altered through the conversion of social and cultural use areas into areas no longer suitable for social or cultural use. Lastly, a habitat opportunity could influence existing and proposed future property/land use and compatibility with goals for aesthetics, property use, and/or public and recreational use.

Evaluation Criteria Scoring Guidelines: The scoring guidelines are as follows:

High - A habitat opportunity will be scored high if:
- it is located in an area that does not permanently adversely affect social and cultural uses;
- it can provide resource opportunities for subsistence, ceremonial, or recreational resource uses, or improves aesthetics;
- it is located in an area compatible with local land use/shoreline goals;
- it avoids or does not permanently affect shoreline public use/access.

Medium - A habitat opportunity will be scored medium if:
- it is located in an area that temporarily adversely affects social and cultural uses and/or requires some changes in property use;
- it does not worsen nor improve resource opportunities for subsistence, recreational, or ceremonial resource uses and aesthetics;
- it is located in an area that is somewhat compatible with local land use/shoreline goals;
- it temporarily affects shoreline public use/access.

Low - A habitat opportunity will be scored low if:
- it is not located in an area that permanently adversely affects social and cultural uses;
- it does not provide any resource opportunities for subsistence, recreational, or ceremonial resource uses;
- it is located in an area that requires major changes to local land use/shoreline goals;
- it permanently affects shoreline public use/access.

3.2.5 GOAL 5: RESOURCE MANAGEMENT

Goal Evaluation Description: This goal is associated with whether a habitat opportunity is located in an area that maximizes uses of or conserves renewable resources such as water, reuse/beneficial use of dredged material, and existing infrastructure.

Evaluation Criteria Scoring Guidelines:

High - A habitat opportunity will be scored high if:
- it can maximize the use of or conservation of renewable resources, including dredged sediments;
- is located in an area with existing infrastructure that does not require any improvements.

Medium - A habitat opportunity will be scored medium if:
- it can use or conserve some renewable resources;
- is located in an area that requires some improvements to infrastructure.

Low - A habitat opportunity will be scored low if;
- it can not use or conserve renewable resources;
- requires new infrastructure.

3.2.6 GOAL 6: FASTER, BETTER, CHEAPER

Goal Evaluation Description: The primary issues associated with this goal are the implementabilty, cost, and timely completion of constructing a habitat restoration opportunity; ability to integrate environmental objectives/opportunities; and availability of the site. A habitat opportunity can provide opportunities to achieve multiple objectives/opportunities, which may result in economies of scale and timely completion. Some habitat opportunities may be implemented at relatively low cost in a relatively short time frame. Other habitat opportunities may require significant financial resources and a long period of time before they are completed. Some sites may be available and others may be available in the near future while other site locations may not be available for the foreseeable future.

Evaluation Criteria Scoring Guidelines: The scoring guidelines are as follows:

High - A habitat opportunity will be scored high if:
- it can achieve many multiple environmental objectives/opportunities;
- if the site is available;
- the site requires limited operations and maintenance;
- if the opportunity is capable of being done at relatively low cost (e.g., cost per unit function, cost per acre).

Medium - A habitat opportunity will be scored medium if:
- it can achieve some multiple environmental objectives/opportunities;
- if the site is reasonably available;
- the site requires some operations and maintenance;
- if the opportunity is capable of being done at relatively moderate cost (e.g., cost per unit function, cost per acre).

Low - A habitat opportunity will be scored low if:
- it does not achieve multiple environmental objectives/opportunities;
- if the site is not available;
- the site requires significant operations and maintenance;
- if the opportunity is capable of being done at relatively high cost (e.g., cost per unit function, cost per acre).

3.2.7 GOAL 7: ECONOMIC VITALITY

Goal Evaluation Description: The primary economic issues associated with this goal are whether the habitat opportunity affects water dependent uses, navigation, and economics of treaty resources. The location of a habitat opportunity may impair water dependent uses by affecting access to the shoreline or navigation channels. A habitat opportunity could either reduce access to, use of, or economics of tribal/non-tribal resources or potentially improve access to, use of, or economics of tribal/ non-tribal resources.

Evaluation Criteria Scoring Guidelines: The scoring guidelines are as follows:

High - A habitat opportunity will be scored high if:
- it does not significantly adversely or permanently affect property redevelopment, and/or navigation, access to tribal/ non-tribal resources and/or tribal economy.

Medium - A habitat opportunity will be scored medium if, on balance:
- it neither worsens nor improves water dependent/related and/or, or access, use, and economics of tribal/ non-tribal resources.

Low - A habitat opportunity will be scored low if:
- it permanently destroys water dependent uses and/or navigation, or eliminates or permanently destroys access to, use of, and economics of tribal/ non-tribal resources.

4.0 EVALUATION OF HABITAT OPPORTUNITIES

Using the habitat site evaluation criteria scoring guidelines described in Section 3.0 the list of all potential habitat opportunities was scored to determine which sites were of highest priority to achieve Goal 3. Only Goal 3 (Protect/Restore Ecosystems) was used in this initial priority assessment because the Habitat Subcommittee decided it was the most important goal for evaluating the range of potential habitat opportunities [even though on a baywide basis (i.e., with all four project elements combined) the first three goals ranked higher than the remaining four goals].

The scoring guidelines and assumptions used to evaluate all potential habitat opportunities relative to Goal 3 are presented below, followed by a presentation of the results of the initial scoring to identify higher priority habitat sites and opportunities. A summary of the evaluation criteria is presented in Table 2.

4.1 EVALUATION CRITERIA SCORING GUIDELINES AND ASSUMPTIONS – GOAL 3: PROTECT/RESTORE ECOSYSTEMS

These evaluation criteria scoring guidelines were separated into twelve distinct criteria to facilitate the prioritization of habitat sites as follows (see Table 2).

Note: the subcommittee noted that any opportunity that is implemented will have to have a strong monitoring component with an appropriate time scale and as detailed plans are developed, the potential for introduction of exotic species needs to be considered.

4.1.1 CRITERION 3A: QUALITY OF EXISTING HABITAT

This criterion assessed whether a habitat opportunity would be located in a degraded or non-habitat area, moderately functioning, or high quality functioning habitat. Degraded habitat could include areas where human alteration has converted aquatic habitat to upland (e.g., fill areas) or areas where estuarine functions have been impacted through dredging or shoreline structures. Moderately functioning habitat include areas where there has been some habitat alteration such as the placement of structures without major modifications to elevations or substrates. High functioning habitat includes areas where multiple resources or habitats occur, such as:

- Mud/sandflat habitat (e.g., next to the Nooksack Delta);
- Sand/mudflat habitat with fringe saltmarsh;
- Hardshell clam resource areas (e.g., Governor's Island);
- Surf smelt/sand lance spawn areas; and,
- Relatively large eelgrass beds.

Information used to apply this criterion came from Pilot Team Habitat Subcommittee member's personal knowledge of particular areas and existing habitat and resource data used in the Data Compilation and Analysis Report.

4.1.2 CRITERION 3B: RESTORATION TIME FRAME

Restoration time frame was defined as the amount of time needed for the site to be restored. The time required for a site to be restored depends on the goal. For example, based on previous monitoring of other Puget Sound restoration sites, benthic communities at aquatic sites may be restored within one or two years, while restoration of eelgrass could take five to ten years. Those sites expected to be restored relatively quickly (i.e., within one to about 5 years) received a higher score than sites that could take longer to restore. Information used to evaluate restoration time frame included general working knowledge of past and recent saltmarsh and marine buffer restoration actions associated with development projects in Commencement Bay (Glenn Grette, personal communication), the results of an analysis of eelgrass transplant restoration projects in Puget Sound (Thom 1990; Thom personal communication), and recent eelgrass work at Washington State Ferry terminal facilities (WSDOT 1997).

4.1.3 CRITERION 3C: OPPORTUNITY TO IMPROVE ECOSYSTEM FUNCTION

With respect to additional restoration or enhancement opportunities, an opportunity could potentially be designed o or expanded to provide for a variety of habitats that support several ecosystem functions for a variety of species. Opportunities identified very near or within the inner Bay estuaries tended to score higher because of the potential opportunity to restore or enhance several functions within the bay's estuaries that have been significantly modified over many years. Information used to score this criterion included best professional judgment, historical shoreline and resource information presented in the Data Compilation and Analysis Report, and the physical proximity of the restoration opportunity to adjacent land.

4.1.4 CRITERION 3D: SITE PROTECTION

The scoring of this criterion considered whether there was an opportunity to permanently protect the habitat site after the identified opportunity is implemented. The determination of whether a site could be permanently protected or provided additional opportunity for enhancement depends to some extent on site ownership and how the site would be restored, respectively. The willingness of each site's owner to provide permanent protection was not determined for the scoring.

4.1.5 CRITERION 3E: SEDIMENT DEPOSITION/TRANSPORT PROCESSES

This criterion considered whether a habitat opportunity would affect or be supported by sediment accretion or erosion, bathymetry, and/or hydrologic transport process that are important in maintaining physical characteristics of habitats. Assumptions about the physical processes (e.g., energy regimes, and currents) were made relative to the location of a habitat restoration opportunity. Information used to score this criterion included data presented in the Data Compilation and Analysis Report and best professional judgement.

4.1.6 CRITERION 3F: THREATENED AND ENDANGERED SPECIES

This criterion evaluated the extent to which a habitat opportunity could benefit threatened or endangered species. For example, habitat opportunities that provide an increase in in-water intertidal benches and marine buffer particularly in estuaries with salmon bearing creeks tended to score higher than opportunities that involved the removal of remnant structures. Information used to score this criterion included data presented in the Data Compilation and Analysis Report, and existing information on the importance of nearshore habitats as migration corridors or refugia for juvenile salmon.

4.1.7 CRITERION 3G: PROBABILITY OF SUCCESS

This criterion relates to the probability of success of a habitat opportunity based on demonstrated mitigation and restoration techniques used primarily in the marine and estuarine environment. Information used to score this criterion included information on salt marsh, elevation modification, and marine buffer restoration projects in Commencement Bay (Glenn Grette, personal communication), salt marsh restoration in Port Gardner Bay (Port of Everett, personal communication), and more recent research on eelgrass requirements and transplant work in Puget Sound (WSDOT 1997).

4.1.8 CRITERION 3H: HABITAT CONNECTIVITY

This criterion was defined as the extent to which a habitat opportunity provided habitat connectivity to other habitat areas. For example a habitat restoration opportunity at the mouth of an estuary could provide habitat connectivity to downstream nearshore and deeper open water habitat, adjacent nearshore habitat parallel to the shoreline, or to upstream habitat. Information used to score this criterion included data presented in the Data Compilation and Analysis Report and maps showing the habitat opportunity relative to other habitats.

4.1.9 CRITERION 3I: RESTORE/REPLACE LIMITED HABITAT

This criterion related to whether a habitat opportunity would replace or restore limited habitat. Limited habitat includes habitats that historically were present in Bellingham Bay but have been lost through alterations over many years. Examples of limited habitat in Bellingham Bay include intertidal mud/sandflat habitat, saltmarsh habitat and eelgrass beds. Information used to apply this criterion came from Pilot Team Habitat Subcommittee member's personal knowledge of particular areas and existing habitat data used in the Data Compilation and Analysis Report.

4.1.10 CRITERION 3J: SUSTAINABILITY OF HABITAT FUNCTIONS

This criterion evaluated the sustainability of an opportunity once implemented. For example, certain opportunities such as removing remnant structures would require no operation and maintenance (O&M) Removing fill to re-establish saltmarsh requires some ongoing O&M until the saltmarsh is self-sustaining. This criterion is addressed a second time under Goal 6. Based on the Pilot Team's review and comments on the draft Habitat Documentation Report, this criterion may be deleted from Goal 3 and considered only once under Goal 6.

4.1.11 CRITERION 3K: TYPE OF HABITAT REPLACEMENT

This criterion relates primarily to regulatory requirements or guidelines for habitat replacement. Typically natural resource regulatory agencies prefer habitat restoration projects that replace habitat and functions that are going to be impacted by a development activity. Since in-water disposal of contaminated sediments is a very possible scenario in Bellingham Bay, this criterion was included to assess whether a habitat restoration opportunity could achieve in-kind replacement for impacts that may occur if in-water sediment disposal occurs.

4.1.12 CRITERION 3L: TIMING OF IMPLEMENTATION

This criterion relates primarily to timing of implementation of a habitat opportunity relative to in-water sediment disposal. It was used to assess whether a habitat opportunity could be implemented in advance of, concurrent with, or after an in-water disposal action. This criterion assumes that if in-water disposal occurs, it will be in 2000 or 2001.

4.2 RESULTS OF INITIAL HABITAT OPPORTUNITY SCORING

A detailed presentation of the rationale used in the site-by-site scoring is provided in Table 3. A summary of the overall results of the habitat opportunity scoring is in Table 4 and a summary of habitat opportunities in order of priority is shown in Table 5.

For the scoring using Goal 3, the total numeric score for each opportunity was calculated using the following system:

- High = 5
- Medium/High = 4
- Medium = 3
- Medium/Low = 2
- Low = 1

The total score for each potential habitat opportunity was calculated as the arithmetic sum of the individual criterion scores for Goal 3. As appropriate, apparent breakpoints in the habitat restoration opportunity scores were used to help distinguish between relatively high and lower scoring opportunities relative to Goal 3.

The total scores ranged from a low of 26 to a high of 57. Break points appear to occur in the following order:

- 26 - 27 – lower priority opportunities;
- 38 - 43 – medium priority opportunities; and

- 46 - 57 – high priority opportunities.

A total of 19 opportunities scored high, 14 scored medium, and three scored low. The high priority opportunities based on this analysis are summarized in Tables 4 and 5.

Based on the distribution of scores for each criterion in this analysis, the following appear to differentiate the most between habitat opportunities:

- 3c – Opportunity to Improve Ecosystem Function;
- 3d – Site Protection
- 3h – Habitat Connectivity;
- 3i – Restore/Replace Limited Habitat; and
- 3k – Type of Habitat Replacement

Habitat opportunities that have good potential to improve ecosystem function, can be permanently protected, provide habitat connectivity or an opportunity for habitat across an ecological continuum, restore or replace limited habitat, and provide an opportunity for in-kind replacement of habitat that may be affected if contaminated sediments are disposed of in the aquatic environment tended to score higher than other opportunities because scores for these criterion were between medium and high. Criterion 3e – Sediment Deposition/Transport Process appears to be the criterion that least discriminates among habitat opportunities.

Table 2. Goal 3 - Summary of criteria.

GOAL 3: PROTECT/RESTORE ECOSYSTEMS

Criterion 3a: Quality of Existing Habitat
Criterion 3b: Restoration Time Frame
Criterion 3c: Opportunity to Improve Ecosystem Function
Criterion 3d: Site Protection
Criterion 3e: Sediment Deposition/Transport Processes
Criterion 3f: Threatened and Endangered Species
Criterion 3g: Probability of Success
Criterion 3h: Habitat Connectivity
Criterion 3i: Restore/Replace Limited Habitat
Criterion 3j: Sustainability of Habitat Functions
Criterion 3k:Type of Habitat Replacement
Criterion 3l: Timing of Implementation

Table 3. Site by site application of the initial scoring guidelines from Goal 3.

Table 4. Summary of habitat opportunities using Goal 3.

Table 5. Summary of habitat priorities using Goal 3.

5.0 RELATIONSHIP OF HABITAT OPPORTUNITIES TO UPSTREAM PROJECTS AND INVASIVE SPECIES

5.1 RELATIONSHIP TO UPSTREAM PROJECTS

As discussed in Section 2.1, the habitat vision strives to integrate with programs and projects being implemented upstream of Bellingham Bay. Details are not available for all of these other programs and projects. Below is a summary of available information for these other programs and projects.

The Lummi Nation is initiating the Nooksack Estuary Recovery Project. The goal of this project is to improve habitat for Nooksack River salmon stocks by increasing the size of the Lummi River and Nooksack River estuaries and improving access for fish to migration corridors. Specific goals include:

- restoring fish access and use to the Lummi and Nooksack rivers by increasing rearing/transition habitat, increasing adult migration/transition habitat and improving fish management efforts;
- restoring and maintaining wetlands and estuarine habitats by providing a larger fish nursery area, improving water quality for finfish and shellfish, and maintaining/enhancing other wetland functions;
- improving flood control for Marietta;
- optimizing current and future land use and zoning;
- promoting economic development.

The Lummi Nation is beginning a two-year effort to develop an EIS for this project. The entire project is expected to be complete in approximately six to seven years.

The Whatcom County Public Works Department implemented the Nooksack River Fish Habitat Improvement and Erosion Control at the Davis-Riverberry and Van Dellen Sites Project. The major goal of the project was to control bank erosion for two to three years until a more comprehensive erosion treatment is implemented by the Corps. The project was constructed in summer 1997, and incorporated stone and stone/dolo barbs rather than traditional riprap treatment to remedy bank erosion along two stretches of the Nooksack River. Monitoring was initiated in spring 1998 and includes the collection of as-built and other baseline information, monitoring of barb configuration, bank erosion, sediment deposition, installed woody debris, high flow hydraulics, fish habitat and utilization, and vegetation. Monitoring results are currently unavailable.

Other programs being implemented or planned in the Nooksack River include a thermal study, a salmon out-migration study, the development of a fecal coliform model to look at fecal sources to Portage Bay and ambient monitoring in Portage Bay, and the City of Ferndale's enlargement/expansion of the levee system along the Nooksack River to alleviate seasonal flooding along Slater Road.

The Nooksack Salmon Enhancement Association (NSEA) is involved with several habitat projects in creeks that drain into Bellingham Bay. NSEA is involved with two riparian revegetation projects on Silver Creek about 1.75 miles upstream from Bellingham Bay. Silver Creek empties into Bellingham Bay about one half mile east of the Nooksack River. Another project on the creek is the installment of a livestock barrier about 1.75 miles upstream. Approximately three miles upstream (just upstream of Interstate 5) is an in-channel sediment reduction project and riparian planting project along Sunset Avenue. There are several other riparian planting projects about four miles upstream above Northwest Drive. A fish barrier removal project is planned for summer 1998 in Bear Creek (a drainage to Silver Creek) about 4.2 miles from the mouth of Silver Creek, which will allow fish to access several miles of upstream habitat. Overall, a total of about 25 miles of restoration work has occurred along the rivers and steams that are part of the Nooksack River watershed.

One of the more intensive and integrated efforts to resolve water conflict issues in the Nooksack Watershed is being lead by the Nooksack Watershed Task Force (convened by Ecology) through the Nooksack Watershed Initiative. The

initiative is a geographically focused effort to promote the long term sustainability of water-related resources in the Nooksack Watershed ecosystem. Relying on the experience and expertise of people representing agriculture, environmental groups, industry, business, land developers, fishers, water purveyors, recreational users, salmon enhancement groups, and government, the Task Force endeavors to meets its adopted goals:

1. Identify issues influencing the health of the Nooksack River Watershed.
2. Develop a common data base and maintain a constantly revolving information system.
3. Set priorities and begin interim actions.
4. Educate themselves, decision makers, and the public.
5. Develop solutions for repairing resources in the watershed.
6. Make necessary policy recommendations.

As part of this effort, the Task Force has developed 26 interim recommendations related to water quantity (e.g., local water rights, basin-wide water budget), water quality (e.g., monitoring, protection, enforcement, developing farm plans, program for septic systems), stormwater control, stream stewardship, a basin-wide integrated fish management program, habitat restoration, and emergency planning for hazardous materials and spill response. Ecology as one of the lead agencies for the Pilot Project and Nooksack Watershed Initiative, is encouraged to provide a direct link between the two programs and help coordinate efforts in the watershed with habitat restoration efforts in Bellingham Bay to ensure that mutually desirable ecosystem-wide objectives are met.

Projects on Padden Creek include retrofitting a fish ladder under Chuckanut Drive (about 0.5mile upstream of the bay), riparian planting, in-stream work downstream of the west border of Fairhaven Park (about 0.65 mile upstream of the bay), retrofitting a fish ladder on the east side of Fairhaven Park (about 1.2 miles upstream of the bay), and realignment of a culvert immediately above the fish ladder.

NSEA has one project on Chuckanut Creek. It involves a landslide stabilization project in Arroyo Park (about 0.5 mile upstream of the bay). The landslide has been stabilized temporarily and further action may be necessary.

There are two projects in Squalicum Creek. One project which was completed in 1997 involved riparian revegetation efforts on easements just upstream of the “Guide Meridian” (about two miles upstream). The second project, planned for summer 1998, is the removal of a fish passage barrier and riparian vegetation planing upstream at Woburn.

NSEA completed a revegetation project at the mouth of Whatcom Creek. Installation of a fish ladder at Woburn is planned for summer 1998. Riparian planting at the confluence of Lincoln Creek and Whatcom Creek, installation of a fish ladder on Whatcom Creek above Lincoln Creek, and excavation of side channels on Whatcom Creek are planned activities for summer 1999. In addition, the Bellingham Bay Rotary Club plans to build a 60-foot-long concrete fish ladder in Whatcom Creek. The fish ladder will be 4.5 feet high, 4.5 feet wide, and have fir timbers for stop logs.

5.2 RELATIONSHIP TO INVASIVE SPECIES

Invasive species are a threat to the sustainability of native resources and habitats. DNR in coordination with the University of Washington and the San Francisco Estuary Institute conducted a rapid assessment survey of invasive species in Puget Sound in 1998 (Cohen et al. 1998). The team sampled Squalicum Harbor, Bellingham Bay and found one non-indigenous species present in a few colonies: the Urochordate *Botrylloides violaceus*. This species is a member of the fouling community and is often present on marina floats and boat hulls. This species native range is Japan and was first recorded in Puget Sound in 1977. The possible mechanism of introduction is with shipments of Japanese oysters and/or in ship fouling or boring. Although the rapid assessment survey identified only one species in a portion of Bellingham Bay, there continues to be growing concern about the effects of invasive species on ecosystems and native species diversity, and the need to understand and control the mechanisms of introduction (e.g., shipment with Atlantic or Japanese oysters, in ship fouling or boring, in ship ballast water or seawater systems, in solid ballast, or planted).

The issues associated with invasive species has resulted in the White House issuing an Executive Order (EO) (Office of Press Secretary 1999) to each federal agency whose actions may affect the status of invasive species. The EO requires federal agencies to :

- identify actions that may affect the status of invasive species;
- prevent their introduction;
- control and monitor their populations;
- restore native species and habitats that have been affected by invasive species;
- conduct research;
- promote education, and
- not authorize, fund, or carry out any activity likely to cause or promote the introduction or spread of invasive species.

Although the Sediment Site and Source Control Documentation Report (Anchor Environmental 1999) addresses invasive species as a source control issue, from a habitat and resource perspective, there should be a concerted effort between local, state, Port, and federal agencies to prevent the further proliferation of invasive species in Bellingham Bay.

6.0 RELATIONSHIP OF HABITAT OPPORTUNITIES TO OTHER PILOT ELEMENTS

As discussed in Section 1.0, the Pilot will develop a Comprehensive Strategy that integrates habitat restoration opportunities with the other project elements. The Comprehensive Strategy incorporates a complete inventory for each project element by sub-area within the bay; opportunities and conflicts between project elements; resolution of conflicts and ways to maximize complimentary opportunities between project elements; specific recommended sub-area strategies within the bay; and an overall Comprehensive Strategy for Bellingham Bay. The Comprehensive Strategy also includes near-term project alternatives that are priority action items from each of the elements, integrated together into near-term actions. The sections below discuss the relationship of habitat restoration opportunities to other identified ongoing habitat projects or projects that are occurring or are planned to occur upstream of Bellingham Bay and to other Pilot elements including sediment cleanup and source control, sediment disposal, and aquatic land use. Both the Comprehensive Strategy and near-term project alternatives developed by the Pilot will be further evaluated in an EIS, and provided for public review and comment.

6.1 RELATIONSHIP TO SEDIMENT CLEANUP AND SOURCE CONTROL

Having clean sediments and controlling sources of contamination to the bay are key factors that affect the quality of habitat, habitat productivity, and function in the bay. Certain methods of cleaning up sediments provide opportunities to incorporate habitat features. For example, sediments that are remediated by capping contaminated sediments (i.e., placing a thin or thick layer of clean sediment over contaminated sediment) may provide an opportunity restore eelgrass beds or provide a clean substrate that can support organisms that are food resources of fish. Alternatively, a habitat restoration opportunity may not be viable if it is located in an area where sediments are not cleaned up or where there will be an on-going source of contamination to the bay.

6.2 RELATIONSHIP TO SEDIMENT DISPOSAL

Aquatic or terrestrial habitat types, area, and functions could be positively or negatively affected by disposal site construction. Existing habitat and functions may be permanently altered, replaced with a different type of habitat, or be removed or eliminated. Alternatively some habitat restoration opportunities that require modifying elevations from deeper subtidal to shallow subtidal and intertidal elevations may be achieved more easily by being incorporated into a disposal opportunity. In addition, sediment disposal may present opportunities or constraints for incorporating habitat mitigation requirements in the event that a disposal site impacts existing habitats. For example, if a nearshore fill were constructed at the existing G-P log pond to contain sources of contamination to sediments and provide disposal capacity for some other contaminated sediment approximately five acres of intertidal and shallow subtidal habitat would be converted to upland. To compensate for this loss of in-water habitat, the Habitat Subcommittee considered the following preliminary mitigation requirements:

- Provide area to area replacement to the extent practicable, with a minimum 1/3 acre replacement for every acre lost; and
- Provide four acres of enhancement for every acre lost that cannot be replaced. (The regulatory agencies and Tribes participating in the Pilot may consider reducing the enhancement replacement ratio to 2:1 if intertidal estuary habitat can be provided in the Squalicum Creek estuary).

6.3 RELATIONSHIP TO AQUATIC LAND USE

There are a variety of aquatic land uses being considered as part of the Pilot. They include: Shoreline Master Program (SMP) designations and allowable uses within those SMPs, DNR harbor area designations, planned projects, potential uses of the shoreline and aquatic environment, and land use opportunities that are part of longer term planning frameworks. Planned projects, potential uses, and planning framework opportunities include new or expanded public access trails and/or parks, marina expansion, expansion of existing industrial sites, reconfiguration

of shoreline features to maximize uses, and dredging. Similar to the other project elements, the Aquatic Land Use Subcommittee has decided that Goal 4 – Social and Cultural Uses and Goal 7 – Economic Vitality are the two most important goals affecting aquatic land uses. This subcommittee is in the process of evaluating land uses according to existing conditions and potential improvements, and identifying priorities for guiding future land use changes in the bay. The habitat restoration opportunities tend to overlap with many of the existing and potential aquatic land uses. In some instances, habitat restoration and land use may directly conflict with each other and in other instances there may be an opportunity to achieve habitat restoration in a way that is compatible with land uses.

A site-by-site summary of potential overlaps between all the habitat restoration opportunities, sediment cleanup and source control, sediment disposal, and aquatic land use is presented in Sections 6.4 through 6.39 below. The information presented below represents an initial effort to identify overlaps between the habitat restoration opportunities and the other project elements. During the fall and winter of 1998, the Pilot Team used the information presented in this and other documentation reports prepared for the other project elements to formulate the Comprehensive Strategy.

6.4 HABITAT OPPORTUNITY 1 – CEMENT COMPANY DOCK

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites. However, it does compliment source control opportunities for removing creosote, a potential source of contamination to sediments.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity does not appear to overlap with the existing Little Squalicum Park or plans to expand this park area, or a potential trail connection between Little Squalicum and Squalicum creeks. Future use of the site by the property owner is currently unknown. The restoration opportunity appears to be consistent with the SMP Public designation. A portion of the dock occurs within a harbor area.

6.5 HABITAT OPPORTUNITY 2 – MT. BAKER PLYWOOD WEST

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity does not appear to overlap with any identified near-term aquatic land use such as potential trail access from the shoreline in front of the Plywood plant to Roeder Avenue or a shoreline trail connecting Squalicum Creek and Little Squalicum Creek. Potential future land uses that may overlap with this restoration opportunity include a marina west of Mt. Baker Plywood. The potential readjustment of the DNR inner and outer harbor lines, may overlap with this habitat restoration opportunity. This restoration opportunity is located in the SMP Maritime use designation.

6.6 HABITAT OPPORTUNITY 3 – MT. BAKER PLYWOOD NORTHWEST

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity conflicts with existing property uses and with the potential expansion of Mt. Baker Plywood. No other aquatic land uses have been specifically identified for this area. This habitat restoration opportunity does not appear to overlap with the potential trail access from the shoreline in front of the Plywood plant to Roeder Avenue. Potential future land uses include a marina west of Mt. Baker Plywood. Readjustment of the DNR inner and outer harbor lines may overlap with this habitat restoration opportunity. This restoration opportunity is located in the SMP Maritime use designation.

6.7 HABITAT OPPORTUNITY 4 – MT. BAKER PLYWOOD SOUTH

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not have any overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity conflicts with existing industrial uses and with potential property development. It is located within a harbor area and the SMP Maritime use designation.

6.8 HABITAT OPPORTUNITY 5 – SQUALICUM CREEK WATERWAY A

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites. However, it does compliment source control opportunities for removing creosote, a potential source of contamination to sediments.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity does conflict with existing industrial uses. It also appears to overlap with a potential proposal by Bellingham Cold Storage to restore the existing dock to add a third berth at their existing facility. It is located next to a federal navigation channel within a harbor area and is within the SMP Maritime use designation.

6.9 HABITAT OPPORTUNITY 6 – SQUALICUM CREEK WATERWAY B

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not overlap with potential in-water disposal options.

Aquatic Land Use – This opportunity conflicts with existing industrial uses and may overlap with a proposal by Bellingham Cold Storage to restore the existing dock to add a third berth at their existing facility. This restoration opportunity is located next to a federal navigation channel within a harbor area and is within the SMP Maritime use designation.

6.10 HABITAT OPPORTUNITY 7 – BELLINGHAM COLD STORAGE

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – This opportunity does conflict with existing property uses and Bellingham Cold Storage's potential proposal to redevelop the existing upland. It is located next to a federal navigation channel within a harbor area and is within the SMP Maritime use designation.

6.11 HABITAT OPPORTUNITY 8 – SQUALICUM HARBOR BREAKWATER

Sediment Cleanup and Source Control – This opportunity does not overlap with known or potential sediment clean up sites or source control actions.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – Near term overlap with aquatic land uses is not likely. However, this habitat restoration opportunity could overlap with a potential future land use, identified at a planning framework concept, for marina expansion for fish vessel moorage. It is located within a harbor area and is within the SMP Maritime and Maritime Multi-use use designations.

6.12 HABITAT OPPORTUNITY 9 – SQUALICUM MARINA

Sediment Cleanup and Source Control – Although a small "hot spot" of 5,000 to 15,000 cubic yards has been identified in the location of the boat lift, the contamination is very localized. This habitat restoration opportunity could be implemented in a way that would not overlap with this sediment site.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal locations.

Aquatic Land Use – This opportunity may overlap with a planning framework level concept for marina expansion to accommodate either commercial or recreational boating needs. It is located inshore of the inner harbor line within the SMP Maritime Multi-use designation.

6.13 HABITAT OPPORTUNITY 10 – PORT-HILTON HARBOR

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site.

Sediment Disposal – This opportunity also overlaps with potential in-water sediment disposal or remedial opportunities including thin layer capping and a confined aquatic disposal (CAD) site.

Aquatic Land Use – This opportunity should not affect existing uses but could overlap with future potential uses that might include dry stack storage or other commercial/industrial expansion west of the ASB. Other currently unidentified uses that involve filling, dredging, and berthing may be encumbered as a result of implementing this habitat restoration opportunity. This restoration opportunity is located next to an existing eelgrass bed and federal navigation channel inshore of the inner harbor line within the SMP Maritime use designation.

6.14 HABITAT OPPORTUNITY 11 – G-P ASB EAST

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site.

Sediment Disposal – This opportunity also overlaps with potential in-water sediment disposal or remedial opportunities including capping. Capping would be compatible with this habitat restoration opportunity.

Aquatic Land Use – This opportunity appears to overlap with potential future commercial/industrial expansion and a potential public access beach. It is located next to a federal navigation channel inshore of the inner harbor line in the SMP Maritime use designation.

6.15 HABITAT OPPORTUNITY 12 – G-P ASB SOUTH

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site.

Sediment Disposal – This opportunity also overlaps with potential in-water sediment disposal or remedial opportunities including capping and CAD options. Both of these disposal options are compatible with the habitat restoration opportunity.

Aquatic Land Use – This habitat restoration opportunity is located between the inner and outer harbor line between two federal navigation channels within the SMP Maritime use designation. It would overlap with potential future development of berthing areas and terminals

6.16 HABITAT OPPORTUNITY 13 – G-P ASB

Sediment Cleanup and Source Control – This site is an existing facility and has not been identified as a known or potential sediment cleanup site or source control action.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal options.

Aquatic Land Use – The Pilot's Aquatic Land use Subcommittee has not identified any lands uses at this specific site. It is an existing facility integral to G-P's operation. If expansion of the ASB facility is required in the future,

expansion would occur on the upland (north) side of the existing facility. There are no plans to reduce the size of the facility, relocate it, or eliminate it in the near-term and the foreseeable future.

6.17 HABITAT OPPORTUNITY 14 – SASH & DOOR

Sediment Cleanup and Source Control – This site is an existing facility also referred to as the Holly Street landfill. The presence of soil and groundwater contamination has been confirmed on the site.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal locations.

Aquatic Land Use – Although the site is an existing industrial use, the City is considering purchasing the site to convert it to a design and reutilization project. Plans are not formalized at this time but may include converting asphalt storage into public parking, improving the B Street waterfront from Holly Street to the fish hatchery with pedestrian walkways, picnic areas, and fishing access docks, including the reuse of piles that supported the historical wooden plank road at the north end of B Street. Other ideas include restoring buildings that were originally developed on the property between 1888 and 1904 and reusing these buildings for retail, entertainment, arts, historic purposes, and a fish and farmers market. Thus, there is some overlap with aquatic land use.

6.18 HABITAT OPPORTUNITY 15 – CITIZENS DOCK

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal sites. It does overlap with potential remedial options, which include full or partial dredging of this area.

Aquatic Land Use – This opportunity overlaps with Whatcom Waterfront Master Plan Guidelines (Hough Beck & Baird 1997) which encompass the entire waterfront area next to Whatcom Creek and the Whatcom Creek Waterfront Action Program (Beckwith Consulting Group (1996). A retrofit of Citizens Dock is planned. An appropriate use and the extent of the retrofit will be resolved for the historic dock structure by the Regional Urban Design Assistance Team (R/UDAT), the City of Bellingham Parks and recreation Department, the Old Town Business Association, Whatcom County Museum of History and Art, Whatcom County Maritime Heritage Society, Nooksack Salmon Enhancement Association, and the Port of Bellingham. An option may include changing the dock's length, providing access from the overlook on Roeder Street bridge, installing historical exhibits, and install fishing furnishings. Thus, removal of this dock directly overlaps with this habitat restoration opportunity. It is located within the SMP Maritime use designation.

6.19 HABITAT OPPORTUNITY 16 – LOWER WHATCOM CREEK

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site and source control action.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal sites. It does overlap with potential remedial options, which include full or partial dredging of this area.

Aquatic Land Use – This opportunity overlaps with Whatcom Waterfront Master Plan Guidelines (Hough Beck & Baird 1997) which encompass the entire waterfront area next to Whatcom Creek and the Whatcom Creek Waterfront Action Program (Beckwith Consulting Group (1996). This habitat restoration opportunity would involve the removal of wooden structures and floats. These facilities are identified in the Action Program and include a dock and boat ramp at Colony Wharf, and a floating dock along Central Avenue. Thus, this habitat restoration opportunity overlaps with these aquatic land uses. Other planned uses in lower Whatcom Creek that may overlap with this habitat restoration opportunity include providing waterfront access between the Blue Dolphin and Waterfront Café, construction of a trail and fishing access along the creek next to the Shrimp Shack, restoration of riparian habitat along the creek from Holly Street to the pedestrian bridge, construction of a creek bed, and potential development of eelgrass habitat in the lower creek between Roeder Avenue and Holly Street.

6.20 HABITAT OPPORTUNITY 17 – HEAD OF WHATCOM WATERWAY

Sediment Cleanup and Source Control – This opportunity overlaps with a known or potential sediment cleanup site or source control action.

Sediment Disposal – This opportunity does not overlap with potential in-water sediment disposal sites. It does overlap with potential remedial options, which include full or partial dredging of this area.

Aquatic Land Use – This opportunity overlaps with Whatcom Waterfront Master Plan Guidelines (Hough Beck & Baird 1997) which encompass the entire waterfront area next to Whatcom Creek and the Whatcom Creek Waterfront Action Program (Beckwith Consulting Group (1996). In general, this habitat restoration opportunity would involve modifying elevations and substrates to establish riparian buffer, mudflat benches and marsh. Planned uses toward the head of the Whatcom Waterway that may overlap with this habitat restoration opportunity include providing waterway access points, Whatcom Creek trails, and fisheries enhancements such as restoration of riparian habitat along the creek.

6.21 HABITAT OPPORTUNITY 18 – G-P LOG POND

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site and potential source control action. Groundwater in this area is a potential source of mercury contamination to the bay.

Sediment Disposal – This opportunity has the potential to overlap with in-water sediment disposal or remedial options including capping, dredging, development of a CAD, or development of a nearshore fill (NSF). Capping and a CAD would be more compatible with this habitat restoration opportunity than a NSF or dredging.

Aquatic Land Use – There are existing floats and slips. Thus, this habitat restoration opportunity would overlap with this existing aquatic use and could potentially preclude certain future aquatic uses such as filling and moorage. It is located inshore of the inner harbor line within the SMP Maritime use designation.

6.22 HABITAT OPPORTUNITY 19 – PORT LOG RAFT

Sediment Cleanup and Source Control – This opportunity overlaps with a known sediment cleanup site.

Sediment Disposal – This opportunity does not overlap with an in-water sediment disposal options.

Aquatic Land Use – This opportunity is located in an area between the Bellingham Shipping Terminal (BST) and the Cornwall Avenue landfill where potential uses would overlap with the habitat restoration opportunity. Potential uses in this general area include dry boat storage and boat repair including a new pier, relocation of the U.S. Coast Guard from Seattle, expansion of the BST to the Cornwall Avenue landfill site with a possible office, shop storage complex and pier. This habitat restoration opportunity is also located between the inner and outer harbor line within the SMP Maritime use designation.

6.23 HABITAT OPPORTUNITY 20 – CORNWALL AVENUE LANDFILL

Sediment Cleanup and Source Control – This habitat restoration opportunity is located at a known sediment contamination site and a historical upland/aquatic municipal landfill. It is contaminated with solid waste from historic landfill activities and metals in nearshore sediments. This site is also considered to be a source control site.

Sediment Disposal – This opportunity has the potential to overlap with in-water sediment disposal and remedial options including capping, dredging, a CAD and a NSF site. Capping and a CAD are more compatible with the habitat restoration opportunity than dredging or a NSF. Full removal of sediment contamination from this area would provide an opportunity to increase the amount of in-water habitat.

Aquatic Land Use – This opportunity is located in an area between the Bellingham Shipping Terminal (BST) and the Cornwall Avenue landfill where potential uses would overlap with the habitat restoration opportunity. Potential uses in this general area include dry boat storage and boat repair including a new pier, relocation of the U.S. Coast Guard from Seattle, expansion of the BST to the Cornwall Avenue landfill site with a possible office, shop storage complex

and pier. In addition, the City has expressed an interest in providing for public shoreline access and use at the southern end of the Cornwall Avenue Landfill site. This shoreline access would also overlap with the habitat restoration opportunity. This habitat restoration opportunity is also located between the inner and outer harbor line within the SMP Maritime use designation.

6.24 HABITAT OPPORTUNITY 21 – BOULEVARD PARK

Sediment Cleanup and Source Control – This opportunity is near an identified sediment site. An area approximately one acre or less in size consisting of wood waste, phenol, and 4-methyl phenol has been identified. The actual footprint of the contamination has not been defined. The source of this contamination is thought to be from either previous activities on the site or from a storm drain.

Sediment Disposal – This opportunity does not appear to overlap with in-water sediment disposal or remedial options which could include a CAD.

Aquatic Land Use – Boulevard Park is an existing park that provides opportunities for the public to access and use the shoreline. The City has expressed an interest in providing a public shoreline connection between the northern end of Boulevard Park and the southern end of the Cornwall Avenue Landfill. This land use overlaps with this habitat restoration opportunity. It is within the harbor area and SMP Public designation.

6.25 HABITAT OPPORTUNITY 22 – TAYLOR STREET DOCK

Sediment Cleanup and Source Control – This site has been identified as a potential contaminated sediment site. Sampling of sediments in late fall 1998 will help to confirm whether this is a contaminated sediment site. Removal of creosote treated timber piles would help control a potential source of contamination to sediments.

Sediment Disposal – This opportunity does not appear to overlap with in-water sediment disposal or remedial options.

Aquatic Land Use – This is an existing degraded facility consisting of a pier and a dock structure that consists of old construction and more recent construction, old creosote treated timber piles from an old dock, and an old trestle. The City of Bellingham Parks and Recreation Department proposes to utilize the existing dock and build a pier in the footprint of the former railroad trestle to establish a shoreline public access and use connection between the Taylor Street Park and the southern end of Boulevard Park. This habitat restoration opportunity would overlap with this proposed aquatic land use. This habitat restoration opportunity is also located between the inner and outer harbor line within the SMP Public designation. Assuming that the harbor lines are not readjusted, uses currently reserved for commerce and navigation in this area may be affected. However, if DNR relocates the inner and outer harbor lines, than the opportunity would not overlap with commerce and navigation and other aquatic land uses.

6.26 HABITAT OPPORTUNITY 23 – PADDEN CREEK NORTH SHORELINE

Sediment Cleanup and Source Control – This opportunity does not appear to overlap with sediment contamination sites and source control actions.

Sediment Disposal – This opportunity does not appear to overlap with in-water sediment disposal and remedial options.

Aquatic Land Use – This restoration opportunity is within the harbor area and the SMP Public designation. It may overlap with a trail connection between Taylor Street dock and Padden Creek and a potential marina.

6.27 HABITAT OPPORTUNITY 24 – PADDEN CREEK NORTH IN-WATER

Sediment Cleanup and Source Control – This opportunity does not appear to overlap with sediment contamination sites and source control actions.

Sediment Disposal – This opportunity does not appear to overlap with in-water sediment disposal options.

Aquatic Land Use – This restoration opportunity is within the harbor area and the SMP Public designation. It overlaps with existing uses associated with the Padden Creek dock and planned dredging for this area and may overlap with a trail connection between Taylor Street dock and Padden Creek and a potential marina.

6.28 HABITAT OPPORTUNITY 25 – PADDEN CREEK UPLAND

Sediment Cleanup and Source Control – This is an upland site and does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This opportunity appears to overlap with some land uses identified by the Aquatic Land Use Subcommittee such as leaving the Padden Creek lagoon for habitat enhancement and retaining a small kayak launch in the lagoon. Although not an aquatic land use pre se, the habitat restoration opportunity does appear to overlap with plans to redevelop the site by the existing property owner.

6.29 HABITAT OPPORTUNITY 26 – POST POINT UPLAND

Sediment Cleanup and Source Control – This is an upland site and does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This habitat restoration opportunity overlaps with the City's plans to do limited expansion of the waste water treatment plant and the City's Parks and Recreation Department landscape buffer master plan for the upland area around the lagoon. It is located within the SMP Public designation and is in a harbor area.

6.30 HABITAT OPPORTUNITY 27 – POST POINT SHORELINE

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This restoration opportunity does not appear to overlap with existing or potential land uses. It is located in a harbor area in the SMP Public designation.

6.31 HABITAT OPPORTUNITY 28 – POST POINT SOUTH

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This restoration opportunity does not appear to overlap with existing or potential land uses. It is located within a harbor area in the SMP Clark's Point designation.

6.32 HABITAT OPPORTUNITY 29 – CHUCKANUT SPIT

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This restoration opportunity does not appear to overlap with existing or potential land uses. It is located within a harbor area in the SMP Clark's Point designation.

6.33 HABITAT OPPORTUNITY 30 – CHUCKANUT BREACH

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This restoration opportunity does not appear to overlap with existing or potential land uses such as a public access beach. It is located within the SMP Chuckanut Bay designation.

6.34 HABITAT OPPORTUNITY 31 – POST POINT TO CHUCKANUT PROTECTION

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – The Pilots Aquatic Land Use Subcommittee has not identified aquatic land uses for this area. However, depending on the uses that are recommended as being limited in this area (e.g., restrict personal mooring buoys to waterward of eelgrass, limit moorage, limit size of moorage floats, restrict or limit in-water log storage), this habitat restoration opportunity would overlap with aquatic land uses. It is located along the shoreline within the SMP Clark's Point designation.

6.35 HABITAT OPPORTUNITY 32 – PORTAGE ISLAND PROTECTION

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – The Pilot's Aquatic Land Use Subcommittee has not identified aquatic land uses for this area. However, depending on the uses that are recommended as being limited in this area (e.g., restrict personal mooring buoys to waterward of eelgrass, limit moorage, limit size of moorage floats, restrict or limit in-water log storage), this habitat restoration opportunity would overlap with aquatic land uses.

6.36 HABITAT OPPORTUNITY 33 – LUMMI PENINSULA

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – The Pilot's Aquatic Land Use Subcommittee has not identified aquatic land uses for this area.

6.37 HABITAT OPPORTUNITY 34 – NOOKSACK DELTA PROTECTION

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – The Pilot's Aquatic Land Use Subcommittee has not identified aquatic land uses for this area. However, depending on the uses that are recommended as being limited in this area (e.g., restrict personal mooring buoys to waterward of eelgrass, limit moorage, limit size of moorage floats, restrict or limit in-water log storage), this habitat restoration opportunity would overlap with aquatic land uses.

6.38 HABITAT OPPORTUNITY 35 – NOOKSACK DELTA EAST

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – The Pilot's Aquatic Land Use Subcommittee has not identified aquatic land uses for this area.

6.39 HABITAT OPPORTUNITY 36 – EAST SHORE PADDEN CREEK

Sediment Cleanup and Source Control – This opportunity is in an area that does not overlap with known or potential sediment contamination and source control sites.

Sediment Disposal – This opportunity does not overlap with in-water sediment disposal options.

Aquatic Land Use – This opportunity conflicts with an existing land use and appears to overlap with some aquatic land uses identified by the Pilot's Aquatic Land Use Subcommittee including maintaining depth at the Padden Creek dock for access to Padden Creek Marine by moderately sized recreational boats. It is located next to Padden lagoon which is designated as Lagoon Conservancy in the SMP.

7.0 REFERENCES

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