CHAPTER 8.
NEARSHORE HABITAT

This chapter gives a general overview of the nearshore of Vashon-Maury Island as an internal abstract type of this island ecosystem. The investigation of nearshore conditions presents the key facts, findings and recommendations from the *Reconnaissance Assessment of the State of the Nearshore Ecosystem: Eastern Shore of Central Puget Sound, Including Vashon and Maury Islands (WRIAs 8 and 9)*, abbreviated as the "State of the Nearshore Report (SONR)." Information on other nearshore studies and efforts, including recommendations from the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), now called Puget Sound Nearshore Project, is also presented to summarize available knowledge of ongoing efforts to understand and protect this important habitat.

8.1 GENERAL DESCRIPTION OF VASHON'S NEARSHORE

The nearshore ecosystem is strongly related to upland habitats and deeper waters and is the interface between marine and terrestrial environments. The nearshore encompasses all habitats where direct functional interactions between upland and marine habitats occur (e.g., sediment supply, primary production and export; Williams et al, 2001) The nearshore generally extends from the top of shoreline bluffs to the depth offshore where light penetrating Puget Sound's water supports plant growth (photic zone), and upstream in estuaries to the head of tidal influence. It includes bluffs, beaches, mudflats, kelp and eelgrass beds, salt marshes, gravel spits and estuaries. (Puget Sound Nearshore Project Team, May 2003)

For Vashon-Maury Island, the nearshore is the receiving water for all of the 75 basins and therefore all of the watershed activities that occur on the island. The upland surface water system, including natural streams and built drainage systems, link upland inputs, such as sediments, runoff, groundwater, nutrients, and toxins, to the nearshore receiving water downstream and their habitat systems. Land use management and changes in the upper reaches of basins also affect the health and success of the downstream nearshore habitats, and ultimately the marine system beyond. Appendix F presents a conceptual model of the nearshore extracted from the SONR.

Based on the Washington Department of Natural Resource's (WDNR's) 'ShoreZone" Inventory GIS data, the Vashon-Maury Island nearshore accounts for 51 miles of shoreline, which represents more than half of the 92 miles of marine shoreline in WRIA 9 in King County (when including Vashon-Maury Island). Due to the Puget Sound basin geometry, tidal patterns tend to circulate around Vashon-Maury Island. In East Passage (between Vashon-Maury Island and mainland King County), the net flow at all depths, except for a very thin surface layer, is southward, and in Colvos Passage west of Vashon Island, residual flow is northward at all depths. Eroding steep coastal bluffs, along with contributions from coastal streams, provide material for nearshore sediments and beaches. Drift cells, further discussed in Appendix F, transport materials along the nearshore. Nearshore habitats in Vashon-Maury Island are known to include eelgrass meadows, kelp forests, flats, tidal marshes, sub-estuaries, sand spits, beaches and backshore, and banks and bluffs. These habitats support a variety of communities and ecosystem functions.

However, substantial modifications have already occurred to the Vashon-Maury Island nearshore: 50 percent of the island's shoreline is already armored, and 30 percent of the shoreline vegetation has been removed. (SONR, p. 10-2, King County unpublished data, 2003) The waters of Quartermaster Harbor, an important spawning area for forage fish such as sand lance and surf smelt, has been listed for impaired

water quality due to dieldrin (an insecticide) and low dissolved oxygen (Ecology's 1998 303(d) list), and need protective measures against further impairment.

The Central Puget Sound Basin as a whole has become the most heavily urbanized area in the Puget Sound region, and the impacts of human activities have taken a toll on natural resources and the habitat that supports them. Nearshore habitat alterations, degradation, and losses have resulted from a number of activities, including filling, dredging, shoreline armoring, over-water structures, waste and wastewater disposal, nonpoint-source pollution, vegetation removal, shoreline development, roads, and changes in hydrology. Significant landscape changes, and species extinction or reduction, have occurred in less than 130 years, compounded by slow and inadequate response to habitat and species losses. As a result, many salmonid stocks are in serious decline. In the Puget Sound region, chinook salmon and bull trout are listed as threatened under the federal Endangered Species Act (ESA). Coho salmon is a candidate species for listing. Although the problems contributing to habitat and species decline are complex and extend beyond the Vashon-Maury Island nearshore, the island's nearshore and its tributary areas are an important and interrelated component of this system.

8.2 SUMMARY OF AVAILABLE INFORMATION ABOUT THE NEARSHORE

Over the last 30 years, Puget Sound marine and estuarine systems have received much less attention than freshwater and terrestrial ecosystems, and therefore knowledge of the nearshore ecosystem is much less advanced. Around 1998, governments and other organizations active in King County began to cooperatively discuss the condition of the nearshore. Concern that ESA listings and proposed listings indicated significant imbalances in the ecosystem, as well as concerns about the regulatory issues that follow such listings, continued to focus regional interest. The following is a partial summary of the development of nearshore knowledge since the late 1990s.

8.2.1 ShoreZone Inventory, 1994-2000

WDNR developed the ShoreZone Inventory. The ShoreZone Inventory, based on helicopter aerial videography taken between 1994 and 2000, describes physical and biological characteristics of intertidal and shallow subtidal areas along more than 3,000 miles of Washington saltwater shorelines. More than 50 habitat characteristics are described, including physical features such as shoreline type, vegetation types, such as kelp and eelgrass, and anthropogenic features such as bulkheads. The ShoreZone Inventory is used to analyze spatial patterns in habitat throughout Washington. WDNR has distributed ShoreZone Inventory data to more than 1,000 users for a wide range of research and planning projects. A link to information from the ShoreZone Inventory is available at the following location as of July 2003: http://www2.wadnr.gov/nearshore/research

8.2.2 Various Studies, 1998-2000

There are several studies and publications on problems facing the nearshore, more in recent years, cited in the SONR (see Appendix F of this report; PSWQA 1988 a, b; Shreffler and Thom 1993; West 1997; Ecology 1994; Broadhurst 1998; Lynn 1998; PSWQAT 1998; WDNR 2000; PSWQAT 2000).

8.2.3 Washington Trout Stream Mouth Study, 2000

Washington Trout completed a stream mouth study in association with the Vashon water-typing project that began in 2000. The following year, Washington Trout circumnavigated the island by boat to document where stream mouths were impeded for fish passage. Further information, including an

interactive GIS map, may be viewed at the web page: http://www.washingtontrout.org/Vbulkhead.shtml (as of June 9, 2003).

8.2.4 SONR, 2001

The 2001 *Reconnaissance Assessment of the State of the Nearshore Ecosystem (SONR)*, compiled and synthesized decades of information from various efforts, including data from the Washington Department of Fish and Wildlife, Ecology, and WDNR, to develop technical summaries and surveys of the conditions of and research on nearshore habitats and processes in the Central Puget Sound region. This report formed the basis for ongoing salmon recovery and nearshore study efforts in King County (see Appendix F).

8.2.5 Rapid Shoreline Inventory, 2001-2002

The Rapid Shoreline Inventory, funded and managed by King County and conducted by People for Puget Sound, gathered physical and biological information about shoreline and nearshore habitats on contiguous 150-foot segments of beach during extreme low tide. An inventory on part of the shoreline within the Maury Island Aquatic Land Reserve in the summer of 2001 and GIS data have been compiled. A project report was published in 2002, including five habitat models that have been used to identify conservation and restoration priorities in the study area. Further information can be viewed at the web page: http://www.pugetsound.org/RSI/default.html (as of June 9, 2003)

8.2.6 Vashon-Maury Island Beach Seining, 2001-2002

King County conducted beach seining on Vashon-Maury Island beaches during the summers of 2001 and 2002. The data indicate that the Vashon-Maury Island nearshore habitats are important for salmon, in particular for many juvenile chinook stocks, around the sound. A final report is pending by the end of 2003.

8.2.7 WRIA Reports, 2001-2005

Jurisdictions in King County have begun preparing watershed assessments for Watershed Resource Inventory Areas (WRIAs) 8 (Cedar River Watershed) and 9 (Green/Duwamish River Watershed). WRIAs 8 and 9 have active steering committees and technical publications, including the 2001 WRIA 9 *Salmon and Steelhead Habitat Limiting Factors Report* and the 2002 WRIA 8 *Near-Term Agenda for Salmon Habitat Conservation.* (www.metrokc.gov/wrias/8 and www.metrokc.gov/wrias/9, as of June 7, 2003) WRIAs 8 and 9 are expected to complete comprehensive salmon habitat plans by 2005.

8.3 NEAR-TERM FUTURE OF ASSESSMENT OF THE NEARSHORE

Interest in the condition and protection of Puget Sound continues to spread around the region. Organizations, coalitions, and committees have been forming and finding funding to further study and assess nearshore habitats.

8.3.1 WRIA 9 Green-Duwamish River and Vashon Island Watersheds

Vashon-Maury Island, though geographically located in WRIA 15, is being included in WRIA 9's assessment and planning efforts, which are focused on salmon recovery. Near-term activities for WRIA 9 include a nearshore habitat inventory and assessment by King County and other jurisdictions. The assessment is in the planning stages at this time, and discussions are being held with the Puget Sound Nearshore Ecosystem Restoration Project (see below) regarding research on nearshore historical conditions, tentatively to be conducted by the end of 2004. These efforts are expected to provide specific

technical information about the Vashon-Maury Island nearshore. The interested reader may refer to the webpage for WRIA 9 for more information, at:

http://dnr.metrokc.gov/WRIAS/9/index.htm

8.3.2 The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

This cooperative effort began in 1999 among the U.S. Army Corps of Engineers and local sponsors that include state and federal government organizations, tribes, industries and environmental organizations. The purpose of the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is to identify significant ecosystem problems in the Puget Sound Basin, evaluate potential solutions, and restore and preserve critical nearshore habitat.

A feasibility study for some early-action restoration and preservation opportunities has been underway since 2001. The Corps and local project managers expect that the feasibility study will be completed by 2005. These studies should be followed by preliminary engineering and design by 2008. Restoration and preservation work is projected to begin in 2008. More information is available at http://www.pugetsoundnearshore.org/ (as of July 2003)

8.4 CONCLUSIONS AND RECOMMENDATIONS FOR CONSERVATION AND ENHANCEMENT

CONCLUSIONS: Increased effort since 1994 has been made to understand habitat conditions and habitat formation process in the nearshore ecosystem. Though much remains unknown, available information indicates that nearshore habitats are vital to migratory species, including ESA listed chinook and other salmonids. As continued efforts seek to understand nearshore environments, recommendations have been made to preserve intact habitat and habitat-forming process and prevent further degradation. The following are recommendations from SONR and PSNERP.

8.4.1 SONR Recommendations

General Recommendations

The SONR provides general recommendations for monitoring and research to advance the knowledge base of the nearshore ecosystem for science and management, including the following:

- Develop, fund and implement a coordinated monitoring and research program for the nearshore.

- Develop a technical framework for understanding how the nearshore fits into the landscape of WRIAs 8 and 9 and Puget Sound as a whole.

- Establish and support a consortium of entities concerned with the nearshore environment and develop a long-term funding source for nearshore research and projects.

- Develop criteria and protocols for monitoring and assessment that may be used at various temporal and spatial scales that are widely accepted and may be used for research, protection, preservation, enhancement and restoration.

Recommendations for Habitat Protection, Enhancement and Restoration

Among SONR recommendations for resource management and protection, priority is given to the shorelines of Vashon-Maury Island that are recognized as the least developed and where protective measures may be initially more cost-effective. However, nearshore resources on the mainland must also be carefully managed and protected. The recommendations include the following habitat protection, enhancement, and restoration activities:

- Protect existing undeveloped shoreline areas in WRIAs 8 and 9 from development practices that would be detrimental to the nearshore ecosystem. Develop protection, acquisition, and incentive strategies for lands that would contribute to maintaining or restoring ecosystem processes and functions to the benefit of nearshore ecosystem health.

- Protect eelgrass and macro-algae beds from the adverse effects of shoreline modifications such as dredging, filling, over-water structures, armoring, and pollution.

- Protect and enhance marine riparian vegetation. In the development of standards for protection, restoration, and enhancement, consider multiple functions.

- Protect forage fish spawning areas and other upper intertidal habitats and species. Concentrate restoration and enhancement efforts on areas with shoreline armoring and other development practices that reduce ecological processes and functions that support habitat quality.

- Develop a restoration strategy for the WRIA 8 and 9 nearshore that takes an ecosystem perspective within the landscape and helps to build knowledge of the nearshore environment. Ensure that restoration projects and studies build upon a technical framework developed for the nearshore.

- Identify critical areas for protection, restoration, and enhancement in WRIAs 8 and 9, then protect, restore, and enhance them. Considering that the shorelines of Vashon-Maury Island are the least developed, concentrate protection efforts on them first, but don't exclude the mainland.

- Recreate intertidal acreage such as marshes, flats, and other habitats where they historically existed and where existing watershed scale factors can support them.

- Restore and recover estuarine intertidal flat and marsh habitat. Initial considerations should focus on appropriate salinity regimes and elevations, but should also consider other ecosystem processes in developing a functional design.

Recommendations for Reducing Shoreline Modifications

The SONR recommendations also include the following activities for the reduction of shoreline modifications:

- Shoreline Armoring

  – Reduce the amount of existing shoreline armoring in WRIAs 8 and 9, and prevent new installations of shoreline armoring.

  – Restore natural physical and biological processes lost as a result of shoreline armoring and other bank stabilization practices.

  – Determine and restore natural drift cell processes, specifically sediment budgets (i.e., rates, volumes, distribution). Feeder areas are particularly important. Where

sediment supply is unimpeded, protect it. Where it is impeded, restore or enhance it at the appropriate temporal and spatial scale. Prevent the loss of sediment supply from armoring and other structures (i.e., jetties, groins) within the drift cell.

- – Develop and implement technical guidance for alternatives to traditional shoreline armoring that maintain natural shoreline processes and functions.

- • Filling

  - – Reduce the amount of existing shoreline fill that has resulted from shoreline development practices and shoreline armoring.

  - – Prevent new fill in the nearshore.

  - – Where existing fill is removed, restore the area to low-gradient habitats such as flats, marshes, beaches, and backshore.

- • Over-Water Structures

  - – Protect and enhance light penetration in the nearshore, including areas under existing over-water structures.

  - – Reduce the amount of existing over-water and in-water structures.

  - – Eliminate the use of construction materials and construction practices that may release environmental contaminants into the aquatic environment (e.g., treated wood products such as pilings and other structural components of docks and piers).

  - – Remove existing sources of environmental contaminants (e.g., treated piles and old floats).

  - – Eliminate obstructions to migratory corridors in the nearshore, including both in-water and over-water structures.

- • Water Quality

  - – Identify and control nonpoint sources of pollution.

  - – Reduce, or preferably, eliminate point-source contaminants.

  - – Develop innovative methods of stormwater treatment, such as projects that use plantings of native vegetation to filter stormwater and retain sediments while improving fish and wildlife habitat.

8.4.2 PSNERP Recommendations

PSNERP recommendations are currently under review and may be revised or refined based on comments. The following is an abbreviated listing of draft PSNERP criteria for selecting appropriate recovery projects, which were developed after publication of the SONR recommendations:

- • Does the project have clearly stated goals and objectives and are they appropriate for ecosystem recovery?

- • Does the project have a conceptual model?

- • Does the project contribute significantly to the understanding of the ecosystem or how to restore it?

- • What is the likelihood that the project will have significant ecological benefits?

- What is the landscape context of the project? Landscape attributes that need to be incorporated into the development and selection of recovery actions include the following

  – What is the scale and size of the project?

  – What is the connectivity and complexity of the project?

- Does the action incorporate habitats important to key biota?

- Is the project part of a portfolio of recovery actions?

- Have the relationships between uncertainty, risk, expected ecological benefits, and potential learning been thoroughly evaluated and considered? The ideal project is one that is of low risk, high amount of certainty, high value of learning, and high expected benefits.

- What are the costs of the project relative to other factors?

- Is the action sustainable within the context of the expected natural evolution of the target ecosystem?

- Does the action have clear performance measures?

- Does the project have a rigorous monitoring plan?

- Does the project have an adaptive management and contingency plan?

- Do partnerships exist among communities, organizations, agencies potentially involved in the action, the owner of the land?

8.4.3 Additional Recommendations

The following additional recommendations were developed for this report and fit the SONR nearshore recommendations.

- VMI-1—Raab's Creek and Estuary Restoration

- VMI-9—Portage Salt Marsh Restoration

- VMI-10—Piner Point Acquisition

- VMI-11—Glacier Nearshore Conservation

- VMI-12—Ellisport Creek Estuary Cleanup and Restoration

- VMI-20—Bulkhead Assessment and Nearshore Habitat Restoration

- VMI-29—Baseline Habitat Survey

- VMI-30—KVI Beach Conservation

- VMI-33—Septic System Improvements

More projects could be added to protect the mouths and sub-estuaries of the major creeks—Judd, Shinglemill, Fisher, Tahlequah and Christensen—and the areas where the mouths of two large streams enter the Puget Sound side by side, such as Gorsuch and Dilworth Creeks.