

APPENDIX B - SHORELINE RESTORATION PLAN

CITY OF PORT ORCHARD



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TABLE OF CONTENTS

- 1. INTRODUCTION**
- 2. RESTORATION GOALS AND POLICIES**
- 3. EXISTING PROJECTS AND PROGRAMS**
- 4. RESTORATION AND ENHANCEMENT OPPORTUNITIES**
- 5. POTENTIAL FUNDING SOURCES**
- 6. REFERENCES**
- 7. APPENDICIES**

CHAPTER 1: INTRODUCTION

1.1 Purpose

This Restoration Plan intended to meet the requirements of the Shoreline Management Act. WAC 173-26-201 (2(f)) is specific to restoration planning, and is in italics below.

*(f) **Shoreline restoration planning.** Consistent with principle WAC 173-26-186 (8)(c), master programs shall include goals, policies and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program. The approach to restoration planning may vary significantly among local jurisdictions, depending on:*

- The size of the jurisdiction;*
- The extent and condition of shorelines in the jurisdiction;*
- The availability of grants, volunteer programs or other tools for restoration; and*
- The nature of the ecological functions to be addressed by restoration planning.*

Master program restoration plans shall consider and address the following subjects:

(i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;

(ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;

(iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;

(iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;

(v) Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;

(vi) Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

With this restoration plan, the City endeavors to first, do no harm to ecological functions along the shoreline. Where appropriate, feasible, and affordable, the City will attempt to restore ecological function at degraded sites. The major difficulty for restoration in Port Orchard, especially along the Sinclair Inlet shoreline, is the major transportation infrastructure that exists right up against the edge of the shoreline. It is not feasible to remove the waterfront roads and restore the shorelines to pre-development conditions.

The existing shoreline conditions can be found in the City of Port Orchard Shoreline Resource Analysis and Inventory, which can be found at http://www.cityofportorchard.us/docs/planning/Shoreline/info/final_inventory_characterization_report.pdf

Table 1.1 – Study Segments of the Port Orchard Marine Shoreline

Shoreline Segment	Location Description (Kitsap County Nearshore Assessment Units)	Approximate Length
1	From the western edge of City Limits/UGA to east edge of Commercial zoned property (NAU 207, 505)	1,850 feet
2	Greenbelt and Low-density residential areas of Ross Point (NAU 205-106, 503-505)	6,175 feet
3	Western edge of Commercially zoned property, through downtown, to western edge of Port of Bremerton Marina Park. (NAU 202-204)	4,875 feet
4	From Marina Park to east end of Westbay Center parking lot (NAU 200-201)	2,430 feet
5	From east end of Westbay center parking lot to eastern City limits at Annapolis (NAU 199, 501)	2,600 feet
6	Ross Creek (tidal influenced) (portion of NAU 205)	530 feet
7	Blackjack Creek (tidal influenced) (portion of NAU 200)	530 feet
8	Eastern City limits to eastern edge of UGA (NAU 188-198)	15,233 feet

The restoration projects that will be most successful in the City of Port Orchard, due to fiscal constraints, property ownership, and roadways on the shoreline, will be projects that are done with grant money and cooperation from other government agencies and private property owners. Many of the restoration projects listed in Chapter 4 may also be implemented as mitigation for other projects, whether proposed by the City, or by a private developer.

Port Orchard is in the process of planning and designing segments of a Citywide trail system. These trails will provide opportunities for restoration of degraded areas, and public involvement and educational opportunities for residents and visitors.

CHAPTER 2: RESTORATION GOALS AND POLICIES

SHORELINE RESTORATION GOALS

1. Protect unique shoreline features and habitat that supports threatened species and maintain and/or enhance their ecological function.
2. Where feasible, improve connectivity between shoreline habitat areas to promote contiguous, functional areas of native habitat, while protecting vital shoreline transportation links and water-dependent uses.
3. Encourage good shoreline stewardship and voluntary habitat restoration efforts by shoreline property owners.

Management Policies

RP-1 The importance of restoration of shoreline ecological functions and processes are recognized. Cooperative restoration efforts and programs between local, state, and federal public agencies, tribes, non-profit organizations, and landowners to address shorelines with impaired ecological functions and/or processes are encouraged.

RP-2 Restoration actions should restore shoreline ecological functions and processes as well as shoreline features and should be targeted towards meeting the needs of sensitive and/or locally important plant, fish and wildlife species as well as the biological recovery goals for threatened species, and other salmonid species and populations.

RP-3 Restoration should be integrated with other parallel natural resource management efforts by Kitsap County, Washington State Department of Ecology, Washington State Department of Fish & Wildlife, the US Navy, local Tribes, and non-profit organizations.

RP-4 The City shall endeavor to acquire ecologically sensitive shorelands as they are available and affordable in order to preserve fish and wildlife habitat.

CHAPTER 3: EXISTING PROJECTS AND PROGRAMS

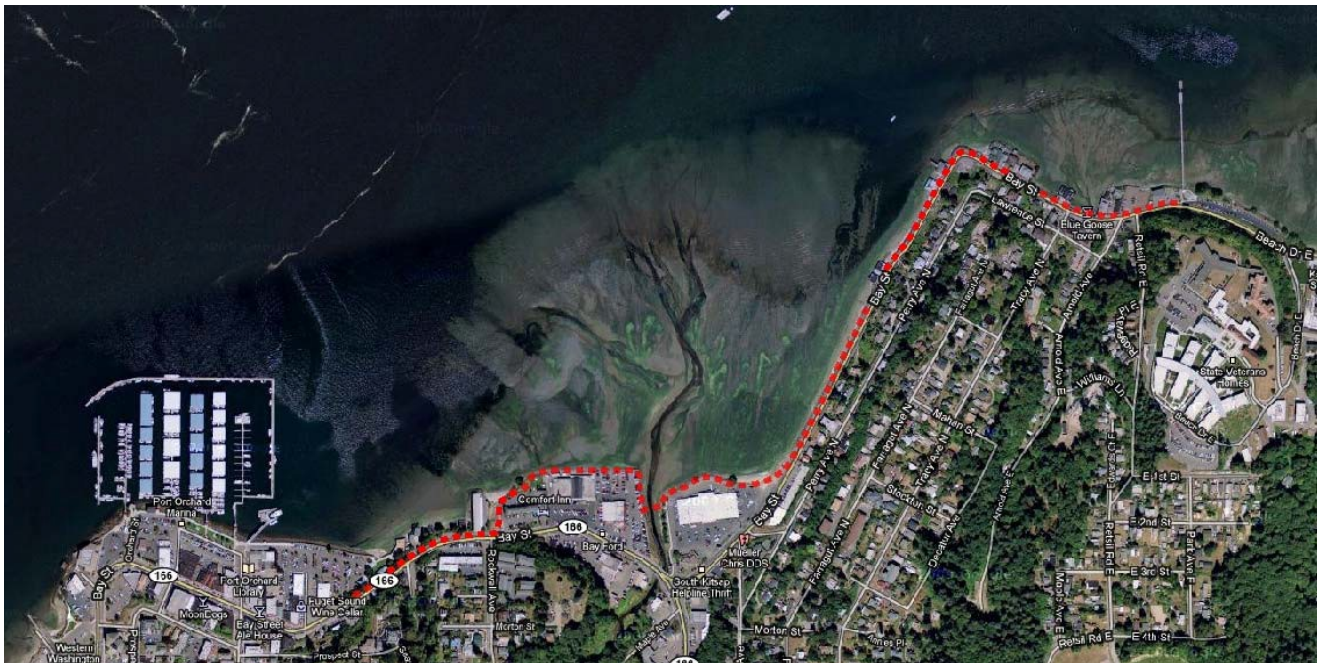
3.1 Port Orchard Public Works NPDES Updates

The City of Port Orchard Public Works and Engineering Department is currently updating its Procedures Manual for Illicit Discharge Detection and Elimination. The update will include procedures for cleaning and maintaining stormwater infrastructure, detention and retention pond maintenance, and an education program for citizens to learn how to avoid pollution of streams and the Puget Sound. This project is a part of the National Pollutant Discharge Elimination System (NPDES) permit from Department of Ecology which is mandated under the Federal Clean Water Act.

3.2 Blackjack Creek Viewing Platform and Trail

This project, referred to in Chapter 4 as project 31, is in the design stages. The City has received a grant from the State Department of Recreation and Conservation for construction of a viewing platform just upstream from the Creek mouth, as well as a trail running parallel along the Creek, but staying at least 50 feet away from the Creek for most of the length. It will connect to another trail which crosses the Creek with a pedestrian bridge built by the Boy Scouts in the early 1980s. The viewing platform and trail will eventually include informative displays about the Creek ecosystem and fish, and will increase public involvement and awareness about the Creek and its ecosystem.

3.3 Mosquito Fleet Trail



Proposed Bay Street Pedestrian Path

The Mosquito Fleet Trail project has been included in restoration and development plans for Port Orchard since the early 1980s. It has also been included in a County-wide planning effort to connect

communities and to provide public access, biking, and walking opportunities to the public. The preferred trail path has been chosen, and partial design has been completed. The City is in the process of looking for funding to construct a path from the current waterfront boardwalk to the Annapolis Ferry Dock.

In addition to the portion to be constructed by the City, current draft Shoreline Master Program regulations, as well as the regulations currently in effect, require construction of a public walkway, or some type of public shoreline access, for major redevelopment projects on the waterfront.

3.4 Dekalb Pier Improvements

The City is currently working on plans to replace the Dekalb Street Pier to make it safer for users and for the environment. The floats, which currently rest on the ground at low-tide, will be replaced and will not be able to touch the intertidal areas. They will also be using grating to allow light penetration that the current solid floats do not allow. The creosote-coated wooden pilings will be replaced with more environmentally-friendly concrete.

3.5 Water Street Boat Launch Improvements

The City of Port Orchard, in cooperation with the Port of Bremerton, is currently seeking funding for the design and repair of the only public boat launch within City Limits. The dock associated with the boat launch currently has creosote-coated pilings, which will be replaced with concrete. The boat launch decking, and the ramp itself will be removed and replaced with materials that meet current environmental standards. Additionally, soft-shore armoring will be installed to replace an existing stacked concrete revetment wall.

3.6 Sinclair Inlet Cleanup

Each Spring, a variety of volunteers and organizations, including Kitsap County, Waste Management, and the Washington Department of Transportation, among others, walk the shoreline and pick up garbage, debris and other waste.

3.7 Kitsap County Health District Pollution Identification and Correction Program

The Kitsap County Health District Pollution Identification and Correction Program (PIC) has Sinclair Inlet and its associated creeks on their workplan to be completed by 2013. The PIC takes water samples in streams, lakes, and in the Puget Sound to determine the causes and sources of bacterial water pollution. Common sources of bacterial pollution include failing on-site sewage systems and animal waste. Projects are generally funded by the Kitsap County Surface and Stormwater Management Program and grants from the Washington State Department of Ecology. The Health District also monitors and enforces sewage standards for marinas, and tests shellfish and provides lists of where shellfish are not safe to consume.

CHAPTER 4: RESTORATION AND ENHANCEMENT OPPORTUNITIES

In 2010, The Naval Facilities Engineering Command, Northwest prepared the *Sinclair Inlet Enhancement Opportunities (AQUASCAPE II)* document, in accordance with a 2008 Memorandum of Agreement (MOA) between the Navy and the Suquamish Tribe. The MOA was developed regarding the construction of a Maintenance Wharf and Intermediate Maintenance Facility at Naval Base Kitsap in Bremerton. The Navy actively sought input from stakeholders including: NOAA, the National Marine Fisheries Service, the U.S. Fish & Wildlife Service, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, Washington Department of Ecology, Kitsap County, the Puget Sound Restoration Fund, Washington Sea Grant, and the Cities of Bremerton and Port Orchard.

The most problematic obstacle to restoration of the Sinclair Inlet shoreline is the existence of important roadways immediately adjacent to the shoreline. These roads are State Route 166 (SW Bay Street), Bay Street, and Beach Drive. Removal of any of the roadways, or even portions of them, is not realistic, and would deny property access to many property owners, as well as the public.

Although there is room for improvement, Blackjack Creek has remained relatively healthy, despite the stress that it has been put under due to man-made alterations and stressors. Although elevated fecal coliform levels are present, the stream remains inviting to several salmonid species, birds, and mammals. Segment 1 is the segment most modified by human activities, including fill of the estuary, and armoring of the floodway. Segments 2 and 3 are the most natural. They contain steep ravines, which have played no small role in discouraging development in the area. Segment 4 has been altered significantly, especially in regard to removal of vegetation. However, it is currently not used heavily, and provides the most opportunity for restoration as part of future developments in the area. The following opportunities apply to segments S1, S2, S3 and S4.

The forty-five projects listed below are extracted from the *AQUASCAPE II* document. They are located in Port Orchard or within the Urban Growth Area that is subject to requirements of the Shoreline Management Act.

RESTORATION PROJECTS

GOAL: Protect processes, structures, functions

1. Purchase and Preserve Identify and purchase property for conservation Property

Ecological benefits:	Prevent future disturbance and changes
Process Improvements:	Ecological Function
Public Benefits:	Perpetual preservation, insurance against further development
Issues:	Would require land purchase, easement or agreement with owner.
Cost:	Unknown
Likelihood of Success:	High
Maintenance Needed:	Unkown

References: URS Greiner, Inc. and SAIC 1999

GOAL: Restore process, structures, functions

2. Culvert Replacement and Restore Estuary Functions, Ross Creek At Highway 166 Replace culvert at the SR 166 crossing with bridge or a much larger culvert into Sinclair Inlet, helping to restore saltwater tidal influence upstream and flush accumulated sediments into Sinclair Inlet, restore estuary functions

Ecological Benefits: Improved fish passage. Improved diversity of estuary habitat. Enhanced fish spawning opportunities.

Process Improvements: Sediment transport and hydrology, ecological function

Public Benefits: Action would contribute to healthy and more sustainable fish populations.

Issues:

- Should conduct Baseline Stream Assessment prior to implementation
- Would require land ownership, easement, or agreement with owner(s) prior to actions
- Would temporarily disrupt traffic on major arterial

Cost: Unknown

Likelihood of Success: High, with appropriate design, installation, and maintenance

Maintenance Needed: Yes

References: Borde et al. 2009. Applied Environmental Services, Inc. 2002. Haring 200. URS Greiner, Inc. and SAIC 1999. Bates et al. 2003.

3. Purchase and Remove or relocate restaurant, Ross Creek at SR 166 Purchase restaurant, remove or relocate buildings and pavement, remove invasive species.

Ecological Benefits: Improved fish passage. Improved diversity of estuary habitat. Enhanced salmonid spawning opportunities.

Process Improvements: Sediment transport, hydrology, and ecological function.

Public Benefits: Action would contribute to healthy and more sustainable fish populations.

Issues: Would require land acquisition prior to any action.

Cost: Unknown

Likelihood of Success: Moderate to high, with monitoring, adaptive management, and maintenance.

Maintenance Needed: Likely

References: Applied Environmental Services, Inc. 2002. Haring 2000.

4. Remove Bulkhead, Add Beach Nourishment, Ross Point Remove bulkhead, add gravel nourishment along edges of surf smelt spawning zone and monitor for spawning expansion.

Ecological benefits: Expanded surf smelt spawning zone, improved ecological function

Process Improvements: Augment sediment transport with addition of appropriate substrate.

Public Benefits: Improved public views. Action would contribute to healthy and sustainable fish populations by supporting forage fish populations.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: Moderate, with periodic maintenance.

Maintenance needed: Periodic replenishment required.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Restore Processes, Structures, Functions

5. Remove Old Foundations and Piles, Ross Point

Remove old homesite foundations and piles on intertidal area south of Ross Point.

Ecological benefits: Expanded natural shoreline. Increased forage fish spawning area.

Process Improvements: Hydrology, sediment transport, ecological function.

Public Benefits: Improved public views.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: High.

Maintenance needed: Unlikely.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

6. Remove Creosote Piling and Derelict Vessels, Ross Point

Remove old creosote pilings just south of barge anchorage. Remove derelict vessels and unauthorized moorage.

Ecological benefits: Improved water quality, reduced structural over-water coverage.

Process Improvements: Hydrology, sediment transport, ecological function.

Public Benefits: Improved public views.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: High.

Maintenance needed: Unlikely.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

7. Remove Barge Anchorages, Ross Point

Remove existing barge anchorages at Ross Point.

Ecological benefits: Improved water quality, reduced structural over-water coverage.

Process Improvements: Reduced shading, ecological function.

Public Benefits: Improved public views.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown
Likelihood of success: High.
Maintenance needed: Unlikely.
References: Aquascape II stakeholder meeting January 13, 2010.

8. Beach Nourishment Barge Anchorage, Ross Point Beach nourishment on beach adjacent to barge anchorage. Maintain beach nourishment through adaptive management.

Ecological benefits: Expanded surf smelt spawning zone.
Process Improvements: Augment sediment transport with addition of appropriate substrate.
Public Benefits: Action could contribute to healthy and sustainable fish populations by supporting forage fish populations.
Issues: Location is close to active forage fish spawning areas. Further investigation needed to determine potential benefits/impacts of nourishment at this location.
Cost: Unknown
Likelihood of success: Low to moderate, would require long-term monitoring and maintenance.
Maintenance needed: Yes, periodic replenishment required.
References: Applied Environmental Services, Inc. 2002. Haring 2000.

9. Large Woody Debris (LWD) Ross Point Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored.

Ecological benefits: Improved stream spawning habitat.
Process Improvements: Improved stream hydrology, ecological function
Public Benefits: Action could contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
Cost: Unknown
Likelihood of success: High, with appropriate design and implementation.
Maintenance needed: Likely
References: Applied Environmental Services, Inc. 2002. Haring 2000.

10. Riparian Buffers, Ross Creek Eliminate or reduce encroachment from existing development and establish functional riparian buffers.

Ecological benefits: Improved water quality. Increased riparian diversity.
Process Improvements: Improved riparian system, ecological function.
Public Benefits: Action could contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: Moderate to High, with periodic maintenance.
Maintenance needed: Likely

References: Applied Environmental Services, Inc. 2002. Haring 2000.

11. Remove Invasive Species, Ross Creek

Remove invasive plant species in Ross Creek.

Ecological benefits: Improved native vegetation diversity and habitat quality.
Process Improvements: Native vegetation succession, ecological function.
Public Benefits: Improved public views.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: Moderate to High, with periodic maintenance.
Maintenance needed: Likely
References: Aquascape stakeholder meeting January 13, 2010.

12. Trash Removal Ross Creek

Remove accumulated garbage and debris in Ross Creek.

Ecological benefits: Improved water quality, hydrology, and habitat quality.
Process Improvements: Hydrology, ecological function.
Public Benefits: Improved water quality, improved aesthetics, improved public views.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: High, with periodic maintenance.
Maintenance needed: Likely
References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Reduce Pollution

13. Low Impact Development, Ross Creek

Implement low impact development, including stormwater quantity control and water quality treatment for stormwater runoff. Retrofit existing development in watershed to state-of-the-art stormwater quality and quantity best management practices.

Ecological benefits: Improved water quality.
Process Improvements: Increased stormwater retention and infiltration.
Public Benefits: Improved water quality.
Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions. Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: High, with appropriate design and implementation.
Maintenance needed: Routine maintenance would be required.
References: Applied Environmental Services, Inc. 2002. Haring 2000.

14. Fecal Coliform and Dissolved Oxygen, Ross Creek	Identify and correct sources of fecal coliform contamination. Monitor dissolved oxygen levels, correct problems as warranted.
Ecological benefits:	Improved water quality.
Process Improvements:	N/A
Public Benefits:	Improved water quality.
Issues:	Department of Ecology has enforcement authority (RCW 90.48) for water quality in waters of the state. Kitsap County Health Department has local enforcement authority for water quality problems that put public health at risk and can also enforce local solid waste ordinances. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
Cost:	Unknown
Likelihood of success:	Moderate to High, with appropriate design and implementation.
Maintenance needed:	Routine maintenance likely.
References:	Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Public Involvement

15. Citizen-based Watershed Management, Ross Creek	Fund citizen-based watershed management efforts.
Ecological benefits:	Understand health of system and assist future planning efforts.
Process Improvements:	N/A
Public Benefits:	Increased public interest and involvement. Public feedback and input considered before decisions made.
Issues:	This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
Cost:	Unknown
Likelihood of success:	High, with appropriate outreach and participation.
Maintenance needed:	Ongoing efforts necessary to maintain public interest.
References:	URS Greiner, Inc. and SAIC 1999.

GOAL: Assess

16. Baseline Stream Assessment, Ross Creek	Assess existing stream channel conditions, historical changes, and that shape the channel over time. Assessment should include: <ul style="list-style-type: none"> • Processes that influenced past and current channel morphology and habitats. • Current channel conditions including morphology and stability. • Probable future channel morphology. • Potential constraints to recovery and restoration.
Ecological benefits:	Understand driving forces of channel morphology to increase likelihood of

success for habitat restoration, streambank protection, and other instream construction projects.

Process Improvements: Understand causes of change prior to designing/implementing projects to mimic or alter natural channel processes.

Public Benefits: Increased public education and awareness of stream processes and challenges.

Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions. Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: N/A

Maintenance needed: N/A

References: Saldi-Caromile et al. 2004

GOAL: Restore Processes, Structures, Functions

17. Intertidal Enhancement, Port Orchard Boat Launch Add gravel/cobble to intertidal area around the boat launch where the slope of the bottom is ideal for surf smelt spawning.

Ecological benefits: Improved surf smelt spawning habitat.

Process Improvements: Augment sediment transport with addition of appropriate substrate.

Public Benefits: Action would contribute to healthy and sustainable salmonid populations by supporting forage fish populations.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: Moderate, would require long-term monitoring and maintenance.

Maintenance needed: Yes. Periodic replenishment required.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Assess

18. Investigate Enhancement Opportunities at Port Orchard Marina and Sinclair Marina Determine need and feasibility of enhancing existing pocket beach. Pocket beach is highly productive surf smelt spawning area.

Ecological benefits: Assess opportunities to improve surf smelt spawning habitat.

Process Improvements: N/A

Public Benefits: Public education and awareness of values and challenges.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.

Cost: Unknown

Likelihood of success: N/A

Maintenance needed: N/A

References: Aquascape stakeholder meeting, January 13, 2010.

19. Investigate Transportation Alternatives and Improvements to Reduce Highway Use	Investigate transportation alternatives and improvements to reduce highway use. For example, water taxi service between Port Orchard and Bainbridge Island could reduce reliance on existing highways.
Ecological benefits:	Reduce highway use, reduced need for enlarged/upgraded transportation infrastructure.
Process Improvements:	N/A
Public Benefits:	Public education and awareness of transportation impacts and challenges.
Issues:	
Cost:	Unknown
Likelihood of success:	N/A
Maintenance needed:	N/A
References:	Aquascape stakeholder meeting, January 13, 2010.

GOAL: Protect Processes, Structures, Functions

20. Acquire and Protect High Quality Habitat along Blackjack Creek	Identify and protect high quality riparian habitat on Blackjack Creek through purchase and/or easements. Continue protection and development restrictions in lower Blackjack Creek canyon. Protect high quality riparian habitat on Blackjack Creek just upstream of Sidney Road. Protect/preserve/acquire as much of Square Creek upstream of Sidney Road as possible. Protect as much of Ruby Creek upstream of Sidney Road as possible.
Ecological benefits:	Prevent future disturbance and changes.
Process Improvements:	N/A
Public Benefits:	Perpetual preservation, insurance against further development.
Issues:	Would require land purchase, easement or agreement with owner(s).
Cost:	Unknown
Likelihood of success:	High
Maintenance needed:	Unknown
References:	Applied Environmental Services, Inc. 2002. Haring 2000. URS Greiner, Inc. and SAIC 1999.

GOAL: Restore Processes, Structures, Functions

21. Estuary Improvement Blackjack Creek	Rebuild the Blackjack Creek outlet and sub-estuary. Remove or relocate commercial development within the former Blackjack Creek estuary. Remove channel and rip rap, add more riparian vegetation. Protect and restore estuarine habitat (particularly upstream of Bay Street), including restoration of riparian function and reduction of commercial encroachment, where feasible.
Ecological benefits:	Increased natural shoreline habitat. Improved beach spawning habitat. Increased riparian diversity.
Process Improvements:	Hydrology, sediment transport processes, native vegetation succession.

Public Benefits: Aesthetic improvement, increased wildlife observation opportunities.
 Issues: Should conduct Baseline Stream Assessment prior to implementing action. Would require land purchase, easement or agreement with owner(s) prior to action.
 Cost: Unknown
 Likelihood of success: Moderate to High, with appropriate design and implementation.
 Maintenance needed: Maintenance likely, particularly if all actions not accomplished at one time.
 References: Applied Environmental Services, Inc. 2002. Haring 2000.

22. Channel and Riparian Improvements, Blackjack Creek Restore natural channel configuration and floodplain function on Blackjack Creek through the channelized agricultural area upstream from Sedgwick Road, and through the agricultural area of Ruby Creek downstream of Glenwood Road. Restore functional riparian zones throughout the watershed, with particular emphasis on Blackjack Creek upstream of Sedgwick Road, Unnamed 15.02506, and Square Creek.

Ecological benefits: Improved fish access and spawning habitat.
 Process Improvements: Hydrology, ecological function.
 Public Benefits: Action would contribute to healthy and sustainable fish populations.
 Issues: Should conduct Baseline Stream Assessment prior to implementing action. Would require land purchase, easement or agreement with owner(s) prior to action.
 Cost: Unknown
 Likelihood of success: Moderate to High, with appropriate design and implementation.
 Maintenance needed: Likely
 References: Haring 2000.

23. Agricultural Improvements, Blackjack Creek Reduce habitat impacts on agricultural lands upstream of SR 16, including development and implementation of farm plans that restore stream functions. Identify and correct areas in the watershed that have unrestricted livestock access.

Ecological benefits: Improved water quality.
 Process Improvements: Ecological function.
 Public Benefits: Improved water quality.
 Issues: - In the upper watershed, especially Ruby Creek, there are hobby farms of various sizes, some with cattle in the channel, etc. Ruby Creek itself has been straightened and somewhat channelized in many reaches, with wetlands filled and other impacts. There is also a history of conversion from agricultural to commercial use. Stormwater impacts from past poor practices are apparent. Riparian areas are compromised by past agriculture and current uses. Many old fields are covered in reed canary grass with little or no successional processes at work.
 - Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High, with appropriate design and implementation.

Maintenance needed: Likely
References: Applied Environmental Services, Inc. 2002. Haring 2000.

24. Upstream Fish Passage and Habitat Improvements, Blackjack Creek

Improve fish passage and upstream habitat at two culverts in the Ruby Creek drainage and at the Sidney Road crossing of Square Creek.

Ecological benefits: Improved fish access and spawning habitat.
Process Improvements: Sediment transport and hydrology, ecological function.
Public Benefits: Action would contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: High, with appropriate design and installation.
Maintenance needed: Likely
References: Haring 2000. Bates, et al. 2003.

25. Pocket Beach Improvements, Blackjack Creek

Improve pocket beach for baitfish spawning at north edge of mall parking lot next to informal parking lot. Remove informal parking lot and replace with riparian vegetation. Meet with business owners and operators to gain cooperation with shoreline vegetation restoration program in pocket beaches and specific locations.

Ecological benefits: Improved natural shoreline habitat. Improved beach spawning habitat, more riparian diversity.
Process Improvements: Sediment transport processes, hydrology, native vegetation succession.
Public Benefits: Aesthetic improvement, contribute to healthy and sustainable salmonid populations by supporting forage fish populations, increased wildlife observation opportunities.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: Moderate to High, with appropriate design, implementation and maintenance.
Maintenance needed: Likely, particularly if all actions not accomplished at one time.
References: Applied Environmental Services, Inc. 2002. Haring 2000.

26. Remove Asphalt, Blackjack Creek Shoreline

Remove concrete and asphalt along road end near hotel and revegetate with native trees and shrubs.

Ecological benefits: More native vegetation.
Process Improvements: Sediment transport processes, hydrology, native vegetation succession.
Public Benefits: Aesthetic improvement, contribute to healthy and sustainable salmonid populations.

Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: Moderate to High, with appropriate design, implementation.
 Maintenance needed: Likely. Expect to need maintenance until vegetation permanently established.
 References: Applied Environmental Services, Inc. 2002. Haring 2000.

27. Large Wood Debris (LWD), Blackjack Creek Develop and implement a short-term LWD strategy for lower two miles of Blackjack Creek and Square Creek, to provide LWD presence and habitat diversity until full riparian function is restored.

Ecological benefits: Improved stream spawning habitat.
 Process Improvements: Improve stream hydrology, ecological function.
 Public Benefits: Action would contribute to healthy and sustainable fish populations.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
 Cost: Unknown
 Likelihood of success: High, with appropriate design and implementation.
 Maintenance needed: Likely.
 References: Haring 2000.

28. Trash Removal, Blackjack Creek Remove accumulated garbage and debris in Blackjack Creek.

Ecological benefits: Improved water quality, hydrology, and habitat quality.
 Process Improvements: Improved stream hydrology.
 Public Benefits: Improved water quality, improved aesthetics, improved public views.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High
 Maintenance needed: Periodic trash removal likely.
 References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Reduce Pollution

29. Low Impact Development (LID), Blackjack Creek Implement low impact development, including stormwater quantity control and water quality treatment for stormwater runoff. Remediate existing stormwater impacts to the channel.

Ecological benefits: Improved water quality.
 Process Improvements: Increased stormwater retention and infiltration.
 Public Benefits: Improved water quality.

Issues: Would require land purchase, easement or agreement with owner(s) prior to action. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.

Cost: Unknown

Likelihood of success: High, with appropriate design and implementation.

Maintenance needed: Routine maintenance would be required.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

30. Fecal Coliform and Dissolved Oxygen, Blackjack Creek Identify and correct sources of fecal coliform contamination. Monitor dissolved oxygen levels downstream of Sedgwick Road and on Ruby Creek downstream of Sidney Avenue, correct problems.

Ecological benefits: Improved water quality.

Process Improvements: N/A

Public Benefits: Improved water quality.

Issues: Department of Ecology has enforcement authority (RCW 90.48) for water quality in waters of the state. Kitsap County Health Department has local enforcement authority for water quality problems that put public health at risk and can also enforce local solid waste ordinances.. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.

Cost: Unknown

Likelihood of success: Moderate to High, with appropriate design and implementation.

Maintenance needed: Routine maintenance likely.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Public Involvement

31. Viewing Platform, Blackjack Creek Construct a viewing platform at the estuary to promote public awareness and education. Locate platform to avoid estuary impacts.

Ecological benefits: N/A

Process Improvements: N/A

Public Benefits: Viewing platform would promote public awareness and education.

Issues: May require land ownership, easement or agreement with owner(s)/user(s).

Cost: Unknown

Likelihood of success: High, with appropriate outreach and participation.

Maintenance needed: Patrol and structural maintenance would be required.

References: Applied Environmental Services, Inc. 2002. Haring 2000.

32. Public Involvement, Blackjack Creek Fund citizen-based watershed monitoring groups and landowner education programs. Fund public access and interpretive program.

Ecological benefits: Understand health of system and assist future planning efforts.

Process Improvements: N/A
 Public Benefits: Increased public interest and involvement. Public feedback and input considered before decisions made.
 Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
 Cost: Unknown
 Likelihood of success: High, with appropriate outreach and participation.
 Maintenance needed: On-going efforts necessary to maintain public interest.
 References: URS Greiner, Inc. and SAIC 1999.

GOAL: Assess

33. Baseline Physical Stream Assessment, Blackjack Creek Assess existing stream channel conditions, historical changes, and processes that shape the channel over time. Assessment should include:

- Processes that influenced past and current channel morphology and habitats.
- Current channel conditions including morphology and stability.
- Probable future channel morphology.
- Potential constraints to recovery and restoration.

Ecological benefits: Understand driving forces of channel morphology to increase likelihood of success for habitat restoration, streambank protection, and other instream construction projects.
 Process Improvements: Understand causes of change prior to designing/implementing projects to mimic or alter natural channel processes.
 Public Benefits: Increase public education and awareness of stream processes and challenges.
 Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions Site access require land ownership, easement or agreement with owner(s).
 Cost: Unknown
 Likelihood of success: N/A
 Maintenance needed: N/A
 References: Saldi-Caromile et al. 2004.

34. Biological Stream Assessment, Blackjack Creek Perform continued stream assessments on Blackjack Creek to closely monitor its health and viability as a salmon stream.

Ecological benefits: Understand health of system and assist future planning efforts.
 Process Improvements: N/A
 Public Benefits: Public education and awareness of values and challenges.
 Issues: Site access may require land ownership, easement or agreement with owner(s).
 Cost: Unknown
 Likelihood of success: N/A
 Maintenance needed: N/A

References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Restore Processes, Structures, Functions

35. Culvert Replacement and Floodway Restoration, Annapolis Creek Replace undersized restrictive culvert, Annapolis Creek at Beach Drive, and restore floodway.

Ecological benefits: Improved fish access.
Process Improvements: Sediment transport and hydrology, ecological function.
Public Benefits: Action would contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: High, with appropriate design, installation, and maintenance.
Maintenance needed: Yes.
References: Borde et al. 2009. Haring 2000. Bates et al. 2003.

36. Culvert Replacement Karcher (Olney, Retsil) Creek at Beach Drive Replace culvert, Karcher (Olney, Retsil) Creek at Beach Drive.

Ecological benefits: Improved fish access.
Process Improvements: Sediment transport and hydrology, ecological function.
Public Benefits: Action would contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: High, with appropriate design, installation, and maintenance.
Maintenance needed: Yes.
References: Borde et al. 2009. Bates et al. 2003.

37. Estuary Restoration, Sacco (Sullivan) Creek Relocate roads away from estuary edge and allow marsh re-establishment.

Ecological benefits: Improved fish access, enhanced estuary, diversified habitat.
Process Improvements: Sediment transport and hydrology, ecological function.
Public Benefits: Action would contribute to healthy and sustainable fish populations.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions. Should conduct Baseline Stream Assessment prior to implementing action.
Cost: Unknown
Likelihood of success: High, with appropriate design, installation, and maintenance.
Maintenance needed: Yes.
References: Borde et al. 2009. Bates et al. 2003.

38. Riparian Improvements, Annapolis Creek

Restore functional riparian zones throughout the watershed, particularly through the high school property and along Arnold Avenue. Remove small hydro dam at the high school, and restore natural channel configuration and functional habitat conditions. Assess, prioritize, and correct fish passage barriers upstream of the high school, as warranted.

Ecological benefits: Improved fish and wildlife habitat. Increased fish access.
Process Improvements: Hydrology, native vegetation succession, ecological function.
Public Benefits: Improved public views.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: Moderate, due to existing development. Would require monitoring, adaptive management, and maintenance.
Maintenance needed: Likely.
References: Haring 2000.

39. Remove Invasive Vegetation, Karcher (Olney, Retsil) Creek

Remove invasive vegetation.

Ecological benefits: Improved native vegetation diversity and habitat quality.
Process Improvements: Native vegetation succession, ecological function.
Public Benefits: Improved public views.
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
Cost: Unknown
Likelihood of success: Moderate to high, with periodic maintenance.
Maintenance needed: Likely.
References: Borde et al. 2009.

40. Large Woody Debris (LWD), East Port Orchard

Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored.

Ecological benefits: Improved stream spawning habitat.
Process Improvements: Improved stream hydrology, ecological function.
Public Benefits: Action would contribute to healthy and sustainable fish populations
Issues: Would require land ownership, easement or agreement with owner(s) prior to actions. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions
Cost: Unknown
Likelihood of success: High, with appropriate design and implementation
Maintenance needed: Likely.
References: Applied Environmental Services, Inc. 2002. Haring 2000.

41. Remove Riprap and Restore Natural Shoreline Remove riprap at the site of the former Annapolis boat ramp and restore shoreline.

Ecological benefits: Improved beach and shoreline.
 Process Improvements: Sediment transport, ecological function.
 Public Benefits: Improved public views.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High
 Maintenance needed: Likely to require maintenance until shoreline stabilized.
 References: Borde et al. 2009. Applied Environmental Services, Inc. 2002. Haring 2000.

42. Beach Nourishment, East Port Orchard Beach nourishment at appropriate locations.

Ecological benefits: Improved beach habitat.
 Process Improvements: Augment sediment transport with addition of appropriate substrate and vegetation, ecological function.
 Public Benefits: Improved public views. Action would contribute to healthy and sustainable fish populations by supporting forage fish populations.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: Depends on location
 Maintenance needed: Yes, periodic replenishment required.
 References: Applied Environmental Services, Inc. 2002. Haring 2000.

GOAL: Reduce Pollution

43. Low Impact Development, Annapolis Creek Implement low impact development throughout the watershed, including stormwater quantity control and water quality treatment for stormwater runoff. Retrofit existing development to state-of-the-art stormwater quality and quantity best management practices.

Ecological benefits: Improved water quality.
 Process Improvements: Increased stormwater retention and infiltration.
 Public Benefits: Action would contribute to water quality improvement.
 Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions. Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High, with appropriate design and implementation.
 Maintenance needed: Routine maintenance would be required.
 References: Haring 2000.

44. Fecal Coliform, Annapolis Creek

Ecological benefits:	Improved water quality.
Process Improvements:	Decreased nutrient loading, improved dissolved oxygen (DO).
Public Benefits:	Improved water quality.
Issues:	Department of Ecology has enforcement authority (RCW 90.48) for water quality in waters of the state. Kitsap County Health Department has local enforcement authority for water quality problems that put public health at risk and can also enforce local solid waste ordinances. This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions.
Cost:	Unknown
Likelihood of success:	Moderate to High, with appropriate design and implementation.
Maintenance needed:	Routine maintenance likely.
References:	Haring 2000.

45. Baseline Stream Assessment, Annapolis, Karcher (Olney/Retsil) / Sacco (Sullivan) Creeks

Assess existing stream channel conditions, historical changes, and processes that shape the channel over time. Assessment should include:

- Processes that influenced past and current channel morphology and habitats.
- Current channel conditions including morphology and stability.
- Probable future channel morphology
- Potential constraints to recovery and restoration.

Ecological benefits:	Understand driving forces of channel morphology to increase likelihood of success for habitat restoration, streambank protection, and other instream construction projects.
Process Improvements:	Understand causes of change prior to designing/implementing projects to mimic or alter natural channel processes.
Public Benefits:	Increase public education and awareness of stream processes and challenges.
Issues:	This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions. Site access may require land ownership, easement or agreement with owner(s).
Cost:	Unknown
Likelihood of success:	N/A
Maintenance needed:	N/A
References:	Saldi-Caromile et al. 2004.

BIG LAKE AND SQUARE LAKE RESTORATION

46. Remove Invasive Vegetation, Big Lake, Square Lake

Remove invasive vegetation, both aquatic and riparian.

Ecological benefits: Improved native vegetation diversity and habitat quality.
 Process Improvements: Native vegetation succession, ecological function.
 Public Benefits: Improved public views.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: Moderate to high, with periodic maintenance.
 Maintenance needed: Likely.

47. Riparian Improvements, Big Lake, Square Lake

Restore functional riparian zones throughout the watershed, particularly within 200 feet of the shoreline. Restore natural channel configuration and functional habitat conditions. Assess, prioritize, and correct fish passage barriers downstream of the lakes, as warranted.

Ecological benefits: Improved fish and wildlife habitat. Increased fish access.
 Process Improvements: Hydrology, native vegetation succession, ecological function.
 Public Benefits: Improved public views.
 Issues: Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High. Would require monitoring, adaptive management, and maintenance.
 Maintenance needed: Likely.

48. Low Impact Development, Big Lake, Square Lake

Implement low impact development, including stormwater quantity control and water quality treatment for stormwater runoff. Retrofit existing development in watershed to state-of-the-art stormwater quality and quantity best management practices.

Ecological benefits: Improved water quality.
 Process Improvements: Increased stormwater retention and infiltration.
 Public Benefits: Improved water quality.
 Issues: This action is recommended in multiple watersheds. Implementing this action basin-wide would result in consistency, efficiency, and cost savings over individual actions. Would require land ownership, easement or agreement with owner(s) prior to actions.
 Cost: Unknown
 Likelihood of success: High, with appropriate design and implementation.
 Maintenance needed: Routine maintenance would be required.

ADDITIONAL POTENTIAL OPPORTUNITIES

1. Replace existing revetment wall with soft-shore armoring, boat launch

Remove existing stacked-concrete revetment wall at the Port Orchard boat launch and parking lot, replace with soft-shore armoring.

Ecological benefits: Improved beach and shoreline habitat
 Process Improvements: Sediment transport
 Public Benefits: Improved views and beach access
 Issues: Funding
 Cost: Unknown
 Likelihood of success: High
 Maintenance needed: Occasional
 References: Meeting between Port of Bremerton and City of Port Orchard

2. Remove two overwater residences in downtown area Remove two Port of Bremerton-owned houses east of Park and marina area and construct portion of Mosquito Fleet Trail.

Ecological benefits: Improved beach and shoreline habitat
 Process Improvements: Sediment transport, less shading
 Public Benefits: Improved views and beach access, public access
 Issues: Site access will require land ownership, easement, and/or agreement with owner. Houses are currently occupied.
 Cost: Unknown
 Likelihood of success: High
 Maintenance needed: Occasional, once trail is constructed
 References: City of Port Orchard waterfront trail plan

3. Replace existing riprap revetment with soft-shore armoring, Marlee Apartments, Comfort Inn Remove existing riprap at the Marlee Apartments and Comfort Inn, replace with soft-shore armoring.

Ecological benefits: Improved beach and shoreline habitat
 Process Improvements: Sediment transport
 Public Benefits: Improved views and beach access
 Issues: Site access will require land ownership, easement, and/or agreement with owner(s)
 Cost: Unknown
 Likelihood of success: High
 Maintenance needed: Occasional
 References: City of Port Orchard Waterfront Trail Plan

4. Remove Overwater Structures, City-wide Remove overwater structures (piers, docks, homes) that are obsolete, non-functional, and unnecessary.

Ecological benefits: Improved beach and shoreline habitat
 Process Improvements: Sediment transport
 Public Benefits: Improved views and beach access
 Issues: Site access will require land ownership, easement, and/or agreement with owner(s)
 Cost: Unknown

Likelihood of success: High
Maintenance needed: No
References: Suquamish Tribe comments on Port Orchard Draft SMP, March 25, 2011

CHAPTER 5: POTENTIAL FUNDING SOURCES

Funding Source	Allocating Entity
Aquatic Lands Enhancement Account	Washington State Recreation and Conservation Office
Bring Back the Natives	National Fish and Wildlife Foundation
Coastal and Estuarine Land Conservation Program	National Oceanic and Atmospheric Administration
Estuary and Salmon Restoration Program	Puget Sound Nearshore Ecosystem Restoration Project
Five-Star Restoration Program	National Fish and Wildlife Foundation
Land and Water Conservation Fund	Washington State Recreation and Conservation Office
Salmon Recovery Funding Board	Washington State Recreation and Conservation Office
State Wildlife Action Project	National Wildlife Federation
Water Quality Grants and Loans	Washington Department of Ecology
Washington Wildlife and Recreation Program	Washington State Recreation and Conservation Office
Wildlife and Habitat Conservation Fund	National Fish and Wildlife Foundation

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