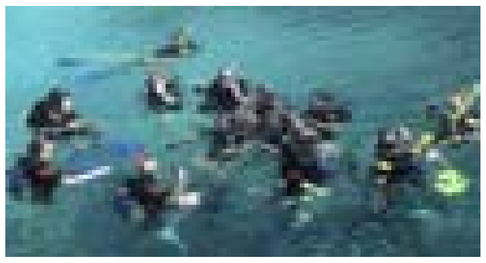
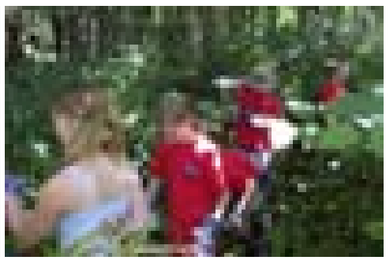
Green Vision Plan
Concept Report

Washington State Parks

produced by

Jones & Jones Architects and Landscape Architects, Ltd.
Seattle, Washington

June 2007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Green Vision Planning Team

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Washington State Department of Health (WDOH)
Washington Trout
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National Park Service

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1. WSPRC Sound-Friendly Mission

Overview

Increased residential and commercial development in the Puget Sound Region has put a strain on ecosystems and habitats. Dramatic changes in land cover over the last 50 years have reduced forested areas and replaced them with pavement, buildings, and landscaped areas with no habitat value. In this setting, the state parks of Washington have become oases: unique places where visitors from urban and suburban areas can access natural forests, lakes, rivers, and beaches. As intensive land use of the Puget Sound continues, contributing to the declining water quality and marine habitat of the Sound's ecosystem, alternative strategies that reverse this decline must be implemented throughout the region. The most visible locations for implementation of these **green strategies** are our state parks.

In December 2005, the Governor and Legislature identified Washington State Parks as ideal places to model green strategies to Puget Sound residents for effective care of the Puget Sound ecosystem. The idea of modeling green strategies came from the work of the Puget Sound Action Team and their goals for cleaning up the Sound. By showcasing effective best-management practices and renovations in public areas with a lot of visitors, Washington State can quickly disseminate practical strategies with measurable, ecological benefits.

The three Green Vision Plans were directly inspired by the eight priorities of the 2007-2009 Puget Sound Conservation and Recovery Plan (Puget Sound Action Team):

Clean up contaminated sites and sediments.

Prevent toxic contamination.

Prevent the harm from stormwater runoff.

Prevent nutrient and pathogen pollution.

Protect functioning nearshore and freshwater habitats.

Restore degraded nearshore and freshwater habitats.

Protect species diversity.

Prepare and adapt Puget Sound efforts to climate change.

Washington State Parks selected Fort Casey, Saltwater, and Twanoh State Parks to model sustainable design and low-impact development practices. Part of the Governor's Puget Sound Initiative, these projects demonstrate best practices that contribute to Puget Sound community health.

2. Project Purpose and Process

In addition to the Puget Sound Action Team's priorities, implementation of the Green Vision Plans must meet the following guidelines, specific to Washington State Parks::

- Maintain balance between natural resources, cultural resources, and recreational resources.
- Development concepts must maintain financial capacity of the agency (low operating impacts and high money generating capabilities).
- Solutions must not increase risks to the agency.
- Solutions must demonstrate a measurable benefit to the Puget Sound and park landscape.
- Solutions must have partnership elements.
- Solutions must be bold and easily explained.
- Solutions must not encumber large areas or main recreational areas of the park for non-recreational purposes.

To initiate this Sound-Friendly project, the Jones & Jones design team and WSPRC toured the state park sites in November 2006, and gathered data and site analysis information. In response to the Puget Sound Initiative, a fair amount of research had already taken place with the intention of embracing the overall issues that exist within the Puget Sound. This research included examining major water quality issue areas, park-specific data collection, site visits with professional environmental participants and brainstorming sessions both within the agency and with other agencies. This collected information along with the consultants' available resources were synthesized in narrative and graphic form describing the site conditions for each state park.

The design team also reviewed various planning documents and reports addressing Puget Sound issues and goals previously generated by groups such as the Puget Sound Action Team, Washington State Parks, Washington State Department of Ecology, and other organizations. This groundwork was incorporated into this green visioning process.

Washington State Parks hosted three Technical Team workshops in December 2006, scheduling one workshop at each of the parks. The purpose of these workshops was to develop a common site understanding of each park and brainstorm opportunities for green design strategies. The Jones & Jones design team facilitated discussion with the broad range of park staff and other interested stakeholders. The design team, which includes expertise in architecture, landscape architecture, fisheries, habitat restoration, civil engineering, economics and public involvement, exchanged information and ideas with these stakeholders to ensure that the team had an accurate understanding of the park's needs for improvement and the possible strategies for making those improvements.

Each workshop included an introduction to the project, and a group tour of the park to observe and examine key areas, as well as explore possible park improvements. The consulting team described their observations and analyses related to the current state and functioning of the parks' key ecological and social systems. These systems or topics included: hydrologic, biogeochemical, habitat, cultural/historic, recreation, and community. Workshop participants were then able to share their wisdom and ideas with the consulting team, creating both an improved sense of the situation "on the ground" at each park, as well as the Sound-Friendly opportunities that may be available at each site. The workshops resulted in engaged, interactive, and productive discussions that provided the consultant team with the in-depth information they needed to move forward on the Sound-Friendly Green Vision Plan.

The Jones & Jones team met with Washington State Parks core team members in January 2007 to synthesize the Technical Team's proposed actions into "green strategies" for each state park. Five major goals were identified as common to all state parks in the Puget Sound:

GOAL 1
HEALTHY WATER QUALITY: Reduce water and sediment pollution into the Puget Sound

GOAL 2
HEALTHY WATER QUANTITY: Address water quantity (e.g., flooding, sea level rise)

GOAL 3
HEALTHY HABITAT: Create healthy habitat and populations of fish and wildlife species

GOAL 4
HEALTHY PEOPLE: Promote diverse community and recreational opportunities that enhance Puget Sound health

GOAL 5
HEALTHY STRUCTURES: Sustainable design and low-impact design

The team identified a suite of "green" strategies common to all state parks to achieve the five goals. Very specific actions or concepts were developed to carry out a given strategy for an individual state park. Thus, while the goals and strategies remain consistent for each of the three focus state parks, and potentially for all state parks, the way they are carried out in an individual state park is tailored to that park's unique physical characteristics, recreational and social uses, management issues, and other important considerations. For example, the Goal "Healthy Water Quality" and its associate six Strategies (e.g., "treat storm water runoff before discharge to the Sound") apply to all state parks, however, the Actions vary at each park to fit the special park character.

Built upon stakeholder input and site analysis, these green strategies and actions form the basis of the Graphic Concept Plans for Fort Casey, Saltwater, and Twanoh State Parks, and the overall Concept Report. The Concept Report was circulated for review and comment by all of those who attended the December workshops, as well as a wide variety of other individuals and groups from throughout the Puget Sound region who expressed an interest in the planning effort.

After this initial public review, the concepts for the three parks was further modified and refined through cost-benefit and other analyses. A value assessment of the net qualitative and quantitative benefits along with general costs was conducted. Where alternative concepts or actions were presented, they were rated according to their value: "Highest Sound Benefit," "Moderate Sound Benefit," and "Modest Sound Benefit."

This Green Vision Report documents the refined green strategies and vision plans for each park. It shows how implementing the proposals of the Green Vision Report will: conserve energy and/or water; remove pollutants from non-point or point source discharges; improve near-shore and aquatic habitats; and otherwise model "Sound-Friendly" development. The report will be used as a platform for more detailed design work and project implementation.

3. Green Strategies Toolbox

Puget Sound State Parks

The following pages contain a summary of the Puget Sound Friendly goals, strategies, and actions recommended for the three featured parks in the Green Vision Report. In addition, the estimated ecological benefits of each of those actions are listed. This toolbox provides for each action a quick reference of which park(s) it applies to, and what the rating of that action was. For example: for Goal One, Strategy One, Action One (below) all three parks were recommended to take this same action, and for each case the action produced the same (full) ecological benefit. Scores of zero (indicated by a blank dot) through five quantify the measurable ecological benefits of conducting the most sound friendly actions at each specific state park. The ratings were estimated by our design team, and further details concerning how these numbers were calculated can be found in The Green Vision Report. This rating system characterizes actions within each state park as between zero, or a blank space, meaning not applicable, to five meaning it achieves full ecological benefit. The benefit rating signifies the degree of success each action achieves in working towards a balance between social, ecological and recreational uses at each state park.

GOAL 1

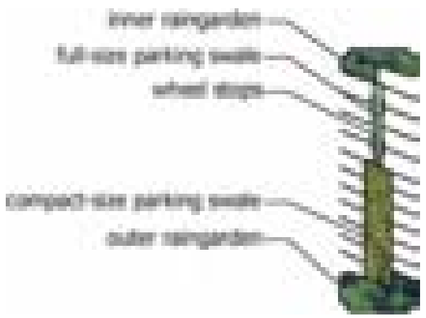
HEALTHY WATER **QUALITY:** Reduce water and sediment pollution into the Puget Sound.

The reduction in natural, forested areas creates challenges to park management and maintenance. Streams, creeks, and shorelines have been over-used to the degree that there is ongoing, potentially lethal damage to their ecosystems and dramatic affects to the water quality of water bodies. Natural edges of shorelines and streams have been realigned and confined to make way for parking and grass areas. Several older parking areas were not designed to treat water from automobile pollutants. Many park comfort stations are outdated; they were not designed to meet current capacity requirements and are therefore failing. Campgrounds and trails are located within riparian corridors; these creek-side facilities cause erosion and reduction of critical fish habitat.

Washington State Parks currently has the opportunity to restore natural elements, improve park amenities, and repair failing systems that are reducing the quality and ecologic function of adjacent water bodies.

Strategy 1: Reduce effective impervious areas and maximize infiltration.

	Fort Casey	Saltwater	Twanoh
Action 1: Re-surface and/or re-configure parking, and treat stormwater by using porous pavement or treatment infiltration with plantings, depending on infiltration analysis.	5	5	5
Action 2: Change the configuration, quantity, and/or size of parking lots and roads.	0	5	0

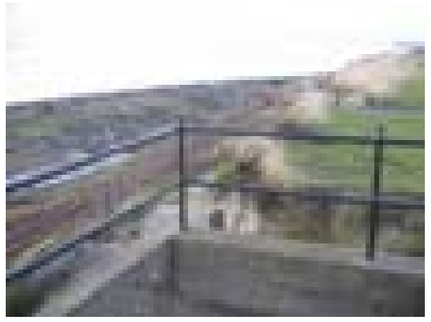


		Fort Casey	Saltwater	Twanoh
Action 3:	*Relocate parking further away from shorelines and streams where appropriate.*		5	5
Action 4:	*Direct runoff to a recharge facility such as a constructed wetland or pond that will allow natural infiltration of water.*		1	5
Action 5:	*Increase tree canopy cover over impervious surfaces to increase rainfall interception and evapotranspiration and reduce surface runoff.*			3
Action 6:	*Manage year-round parking uses to address peak and low seasons.*		0	
Strategy 2:	**Treat stormwater runoff before discharge to the Sound.**			
Action 1:	*Create park-wide natural stormwater system with plantings to enhance water quality and minimize erosion.*	4	0	0
Action 2:	*Treat water from parking lots and roadways using bioremediation methods (e.g., bioswales).*	4		5
Action 3:	*Incorporate Low-impact Development (bioswales, rain gardens, infiltration trenches) along parking lots and roads.*		4	5
Action 4:	*Increase vegetation buffer between parking areas and water bodies to filter stormwater.*		4	5
Strategy 3:	**Improve effectiveness of water use and wastewater treatment.**			
Action 1:	*Establish park-wide wastewater treatment system in place of separate drain fields, based on evaluation of existing system and projected demand.*	4		
Action 2:	*Move wastewater drain fields away from shoreline.*	5		

		Fort Casey	Saltwater	Twanoh
Action 3:	*Install composting toilets.*	5		
Action 4:	*Construct pre-treatment wetland as part of the wastewater treatment chain (polishing). Highlight this demonstration project to public.*	3		3
Action 5:	*Participate in an assessment of regional wastewater treatment needs.*	4		
Action 6:	*Implement water conservation measures, (e.g., waterless urinals and water-efficient fixtures).*	0	1	1
Action 7:	*Add facilities that can use graywater for irrigation.*	0	1	3

Strategy 4: Reduce, eliminate, and/or treat sources of toxic chemical pollutants (e.g., pesticides, fertilizers, gasoline, creosote, detergents).

Action 1:	*Provide a designated boat pre-rinse-off area with water treatment.*	5		5
Action 2:	*Create RV rinse-off and pump-out stations.*	5		
Action 3:	*Eliminate use of cleaning chemicals (e.g., restroom maintenance).*	4	3	4
Action 4:	*Develop and implement program for reducing sources of chemicals.*		3	
Action 5:	*Provide effective program for park visitors to clean up their pets' waste in the park.*		4	
Action 6:	*Create natural filtrations systems such as vegetative buffers and oyster beds to improve water quality.*			5



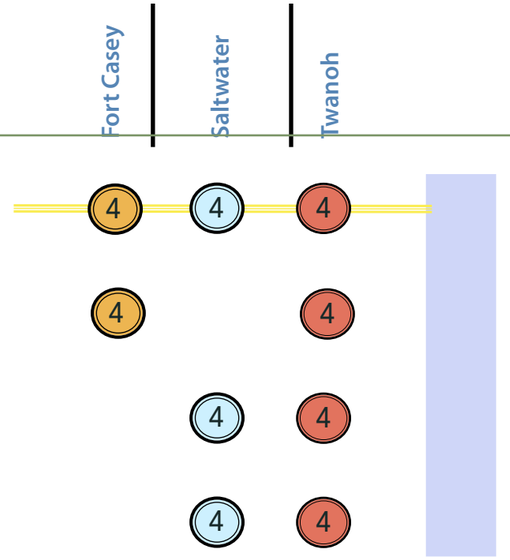
		Fort Casey	Saltwater	Twanoh
Strategy 5: Reduce erosion and fine sediment loads in streams and other water bodies.				
Action 1:	*Limit pedestrian access to specially designed viewpoints along the stream edges while protecting other sensitive stream areas to reduce erosion of banks and restore riparian vegetation.*		4	0
Action 2:	*Move camping and other high-impact uses away from creek edge.*		5	4
Action 3:	*Trap sediments in tributaries that are entering the park from off site sources in off-channel settling basins.*		3	
Action 4:	*Increase vegetation buffer along water bodies.*		4	
Action 5:	*Plant native vegetation in sediment source areas within park that may be outside of riparian corridor.*		4	
Action 6:	*Acquire adjacent property or easements in the upper watershed and restore forest cover.*			5
Action 7:	*Discuss road design opportunities with the appropriate transportation authority to incorporate Sound-Friendly ideas.*			3
Strategy 6: Improve water quality education.				
Action 1:	*Provide hydrology interpretation.*	4		4
Action 2:	*Partner with citizen scientists engaged in monitoring.*	4		4
Action 3:	*Provide demonstration rain gardens linked to existing downspouts.*	4	4	4

Action 4: *Provide interpretive information about Washington State Park's leading efforts to eliminate pollutants in maintenance and operation practices.*

Action 5: *Provide information and facilities for Sound-Friendly boat washing and waste disposal.*

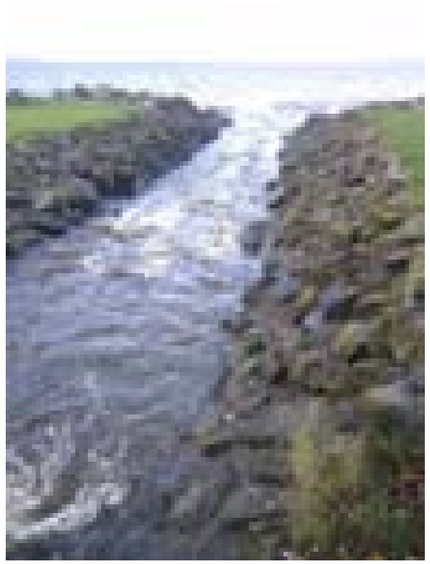
Action 6: *Model low-impact development and watershed health. Demonstrate upstream stormwater impacts to the park and ecosystem.*

Action 7: *Provide wastewater and water use interpretation (e.g., dump station interpretation, or wastewater treatment system explanation).*



GOAL 2

HEALTHY WATER **QUANTITY**: Address water quantity (e.g., flooding, sea level rise).



While there are many predicted effects on Puget Sound from climate change, one of the most important for shoreline state parks is sea level rise. In the Seattle area current models predict a two point eight-foot rise in mean sea level over the next 100 years (UW Climate Impacts Group website). Different amounts of sea level rise will occur in different locations around Puget Sound based on several factors including tectonic activity such as subsidence and uplift (Puget SoundAction Team, 2005). Such increases are compounded by extreme high tides combined with low air pressure, high waves, and more frequent storm events. Flooding will result when waves overtop the armoring or natural beach crest forming the shoreline of most parks. Climate change may also increase stream flow in the winter in the Puget Sound watersheds, dramatically altering the riparian ecosystems.

To mitigate the influence of climate change and lessen the impact of increased flood flows from urbanization, state parks can decrease the amount of impervious surfaces, restore denuded stream banks, and work with other landowners in the watershed to address these issues holistically.

Strategy 1: Identify areas and facilities at risk of sea level rise and re-design or re-locate them.

Action 1: *Prepare for sea level rise by relocating programmed spaces, (e.g., campgrounds) to higher ground and replacing with natural beach materials/slopes and less-intensive programming that can move with sea level changes.*

		Fort Casey	Saltwater	Twanoh
Action 2:	*Relocate all facilities at risk (0–100 year time frame) of projected sea level rise to higher areas. Develop phased removal or re-location strategy.*		3	4
Strategy 2: Manage watershed-wide hydrology.				
Action 1:	*Protect headwaters by including area in park's long-term boundary for potential acquisition, if possible, or through conservation easements.*		5	
Action 2:	*Address the primary sources effecting watershed hydrology: the park, adjacent properties, headwater wetlands, etc.*		5	
Action 3:	*Protect and restore sediment sources in watershed and within drift cell.*			4
Strategy 3: Manage floodplain to accommodate it within the park.				
Action 1:	*Restore natural floodplains within the parks capable of handling high flows. Give streams more room to meander within floodplains.*		4	4
Action 2:	*Widen stream corridors to expand capacity where feasible and appropriate.*		5	4
Action 3:	*Relocate facilities to areas outside of the floodplain or stream corridors.*			4
Action 4:	*Increase riparian vegetative buffer along creek.*			4
Strategy 4: Improve water quantity education.				
Action 1:	*Provide education on hydrologic processes.*	4		

Fort Casey | Saltwater | Twanoh

Action 2: *Interpret human impacts on upland and estuary environment.*

4 | 4 | 4

Action 3: *Create low-impact development demonstration projects that are replicable for residents and businesses.*

4 | 4 | 4

GOAL 3
HEALTHY HABITAT: Create healthy habitat and populations of fish and wildlife species.

The Washington State Parks system includes numerous parks along the shoreline of Puget Sound. These parks often provide a broad range of natural habitats including marine nearshore, streams, small estuaries, wetlands, and forested uplands. All of these habitats exist within systems of physical, habitat forming processes that support biological processes. In order to be good stewards of Puget Sound, park managers need to understand how their parks function within these larger systems. The stewardship of the parks has generally protected habitat function more so than in privately held shoreline areas; however, the Governor's Puget Sound Initiative is setting an even higher standard for how people and habitat coexist.

Habitat and human use are not necessarily in conflict. People come to parks to enjoy watching fish and wildlife and to interact with more natural habitats. The recognition by park managers that natural habitats attract visitors creates an opportunity to incorporate more habitat-friendly features and to use Puget Sound State Parks as models of good habitat stewardship.

A good example of this opportunity is the shoreline areas of parks. Currently, these areas often consist of mowed lawns on filled areas protected by rock armoring and lacking riparian vegetation. The armoring, fill, and removal of vegetation all negatively impact habitat quality, and also diminish the resource park visitors came to experience. Alternatively, a more Sound-Friendly shoreline would include a more natural beach, usable by park visitors, including drift logs, trails, picnicking, and native vegetation. Similar examples could be given for how parks are designed at stream mouth estuaries, along stream corridors, and around freshwater wetlands.

Strategy 1: Protect and restore natural shoreline and marine nearshore processes.

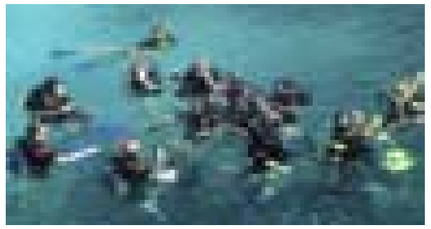
Action 1: *Protect off-site sediment sources for drift cells that supply sand and gravel to the park's beaches.*

2 | 3

		Fort Casey	Saltwater	Twanoh
Action 2:	*Remove riprap and upland fill around stream mouths to expand and restore the stream deltas or lagoons, and establish estuarine marsh vegetation where feasible.*		5	5
Action 3:	*Redesign piers, floats, and boat ramps to meet new aquatic habitat guidelines, reduce their impact on the intertidal zone, and allow sediment to pass below.*	5		1
Strategy 2: Protect and restore freshwater systems.				
Action 1:	*Widen stream reaches to restore natural stream meander where feasible.*		5**	5*
Action 2:	*Widen creek mouth to form an estuary.*			5
Action 3:	*Move existing campgrounds, facilities or structures away from streams where there are impacts to freshwater systems.*		0	0
Action 4:	*Add large woody debris and engineered log jams to provide habitat structure in streams where appropriate.*		3	3
Action 5:	*Allow fallen trees to remain in or over streams as long as visitor safety is not compromised.*		3	3
Strategy 3: Protect and restore native plant communities.				
Action 1:	*Remove invasive plants not maintained as part of cultural landscape.*	3	2	
Action 2:	*Restore native upland vegetation and reduce regularly mowed lawns.*	2		

		Fort Casey	Saltwater	Twanoh
Action 3:	*Restore vegetation impacted by non-desirable social trails; focus pedestrian circulation onto defined trails to reduce soil compaction and vegetation impacts.*	2	0	
Action 4:	*Expand or restore and enhance quality of riparian buffers along streams where appropriate.*		4	4
Action 5:	*Restore estuarine marshes at stream mouths and marine riparian buffers along shorelines where appropriate.*		5	5
Action 6:	*Locate new structures and paths away from sensitive habitats or ecosystems.*		0	
Action 7:	*Plant native species in campgrounds to replenish understory and provide bird habitat.*			2
Action 8:	*Promote forest duff contribution, allowing organic matter to accumulate.*			0
Strategy 4: Enhance native fish and wildlife species/communities.				
Action 1:	*Coordinate with agencies on habitat preservation/enhancement efforts.*	0	0	
Action 2:	*Restore beach area, estuary and upland vegetation to support spawning habitat for fish and habitat for birds.*			0
Strategy 5: Identify and reconnect fish and wildlife habitat connectivity.				
Action 1:	*Study fish and wildlife use and migration to identify potential barriers to critical habitat areas.*	0		
Action 2:	*Reconfigure campsites or structures to allow for a wider corridor of native riparian vegetation along creeks.*			4

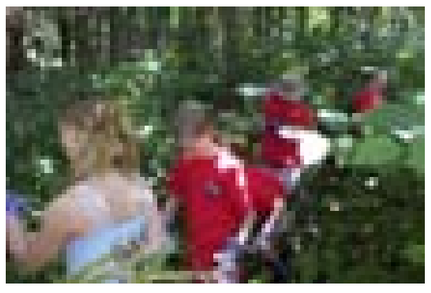
	Fort Casey	Saltwater	Twanoh
Action 3: Protect watershed from fragmentation caused by road-building, land-clearing, and residential development through land acquisition.			0
Action 4: Provide wildlife crossing structures under main roadways that can also potentially serve as safe pedestrian trails.			0
Strategy 6: Improve public education and interface with fish, wildlife, and sensitive habitats.			
Action 1: Develop stewardship programs and interpretive trails.		0	
Action 2: Work with adjacent landowners to manage public access to natural systems.			0



GOAL 4

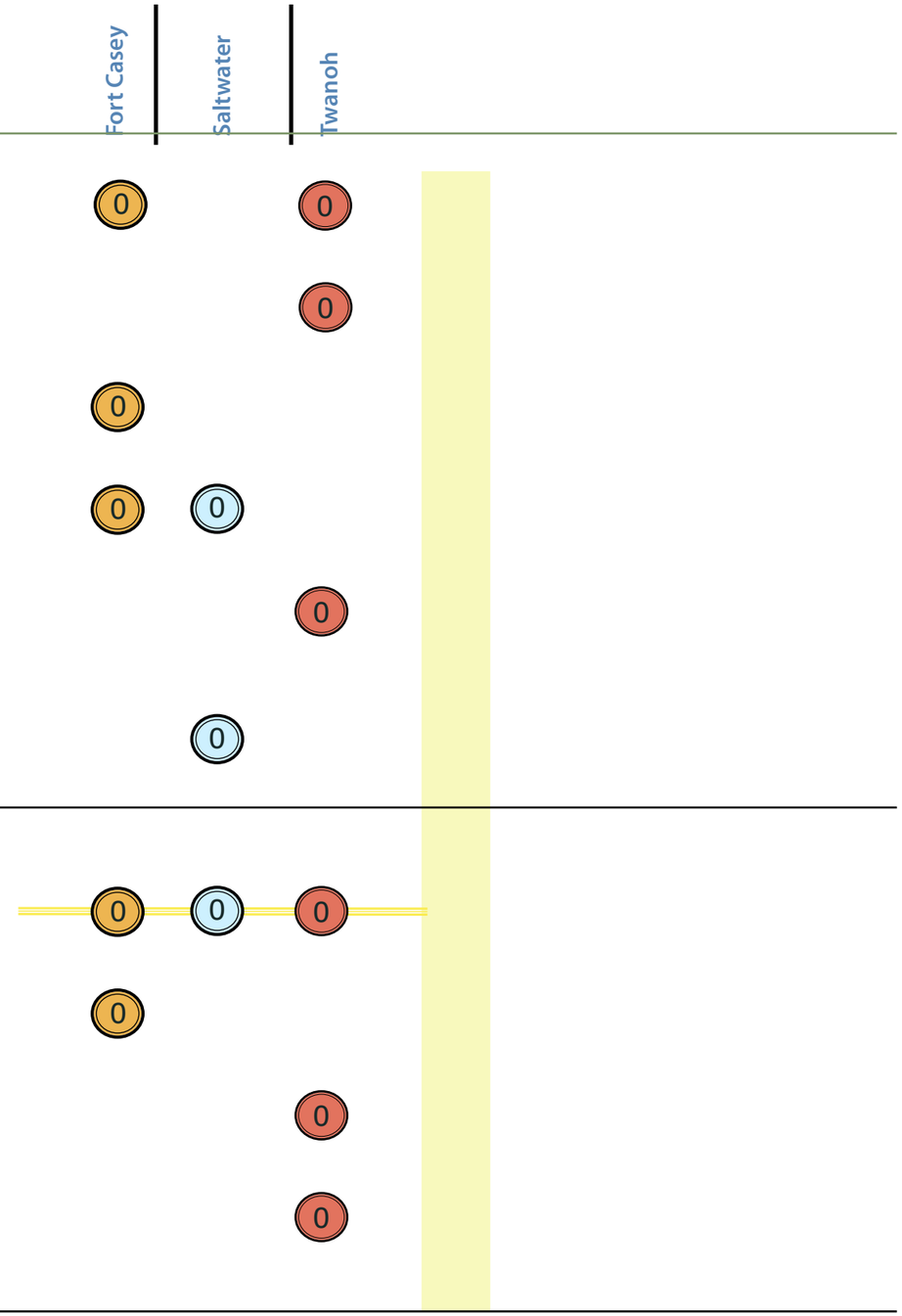
HEALTHY PEOPLE: Promote diverse community and recreational opportunities that enhance Puget Sound health

Washington State Parks is gearing up for their centennial celebration, improving park facilities, building community support, and adding new parks. The 94-year-old park system originally served the surrounding rural communities by providing recreational facilities for camping, boating, and day use. The types of recreation have not changed much, but the amount of use has changed dramatically. Visitors from out of state increasingly come to state parks to enjoy Washington's wonderful outdoor environment. As the state parks host more regional and national visitors, facilities such as boat launches, hiking trails, picnic areas, buildings, campgrounds, and transportation corridors are being improved to accommodate the higher use. Greater use has also led to more impacts to the environment and the health of the Puget Sound. Sound-Friendly recreational practices will become even more essential as the population grows, to avoid impacting Puget Sound.



While park facilities vary in terms of condition and quality, their Puget Sound setting makes them unique and provides a place for local communities to recreate and learn about their natural environment. Park staff work closely with local school groups, environmental stewardship groups and volunteers of all ages to preserve and protect these special places. As budgets shrink, invasive species maintenance, stream restoration, and Clean Up days are increasingly staffed by community volunteers who learn more about their state park's landscape than they could by just visiting for a day. This community connection is integral to the parks throughout Puget Sound and is the best hope for spreading a message of environmental stewardship to all park users and the people of Puget Sound.

	Fort Casey	Saltwater	Twanoh
Strategy 1: Facilitate and encourage community connection to park.			
Action 1: Identify partners to collaboratively steward the park and its surrounding landscape, such as nearby municipalities, the county, and other organizations or stakeholders.	0	0	0
Action 2: Incorporate local heritage and cultural references in signage such as an indigenous dialect to increase awareness of historical use of the park.			0
Action 3: Capitalize on regional connections to other parks and open spaces, surrounding communities, and the larger Puget Sound.	0	0	0
Action 4: Improve equipment and facilities to enhance visitor experience and potentially increase park revenue.			0
Action 5: Improve trailhead visibility, wayfinding, and cohesive trail system navigation with trails throughout the area.			0
Action 6: Increase year-round use of park by attracting visitors during the off-season with a variety of events and uses.			0
Strategy 2: Promote active lifestyle.			
Action 1: Tie into local or regional non-motorized trail systems.	0		
Action 2: For parks on Puget Sound, develop water trails in collaboration with Washington Water Trails Association (WWTA).	0	0	0
Action 3: Provide universal access to all constituents (e.g., disabled, children, elderly) as appropriate while protecting sensitive habitat and cultural areas.	0	0	0
Strategy 3: Promote low-impact recreation and Sound-immersion park activities.			



Action 1: *Increase year-round use of park by attracting visitors during the off-season with a variety of events and uses.*

Action 2: *Increase day usage areas for passive recreation.*

Action 3: *Explore opportunities for incentive-based recreation.*

Action 4: *Encourage Sound-Friendly recreation activities, e.g., birding, scuba diving, hiking, responsible fishing, etc.*

Action 5: *Concentrate water/beach access to several accessible locations that are less sensitive to disturbance and maintain the natural character of the landscape.*

Action 6: *Provide low-impact comfort camping.*

Strategy 4: Promote community stewardship of park.

Action 1: *Enhance and promote any existing stewardship programs.*

Action 2: *Provide outreach to community businesses; create incentive-based opportunities for participation in the Sound-Friendly Vision.*

Action 3: *Promote local traditional ecological knowledge and practices by educating visitors.*

Action 4: *Engage local community through volunteer restoration efforts and interactive workshops that gage people's ideas and values as they relate to the parks values and resources.*

Fort Casey | Saltwater | Twanoh

Strategy 5: Inform and educate public about park stewardship and Sound-Friendly recreational opportunities.

Action 1: *Provide information on how to be an "environmental camper" at campgrounds and introduce people to low-impact recreation activities.*

0 0 0

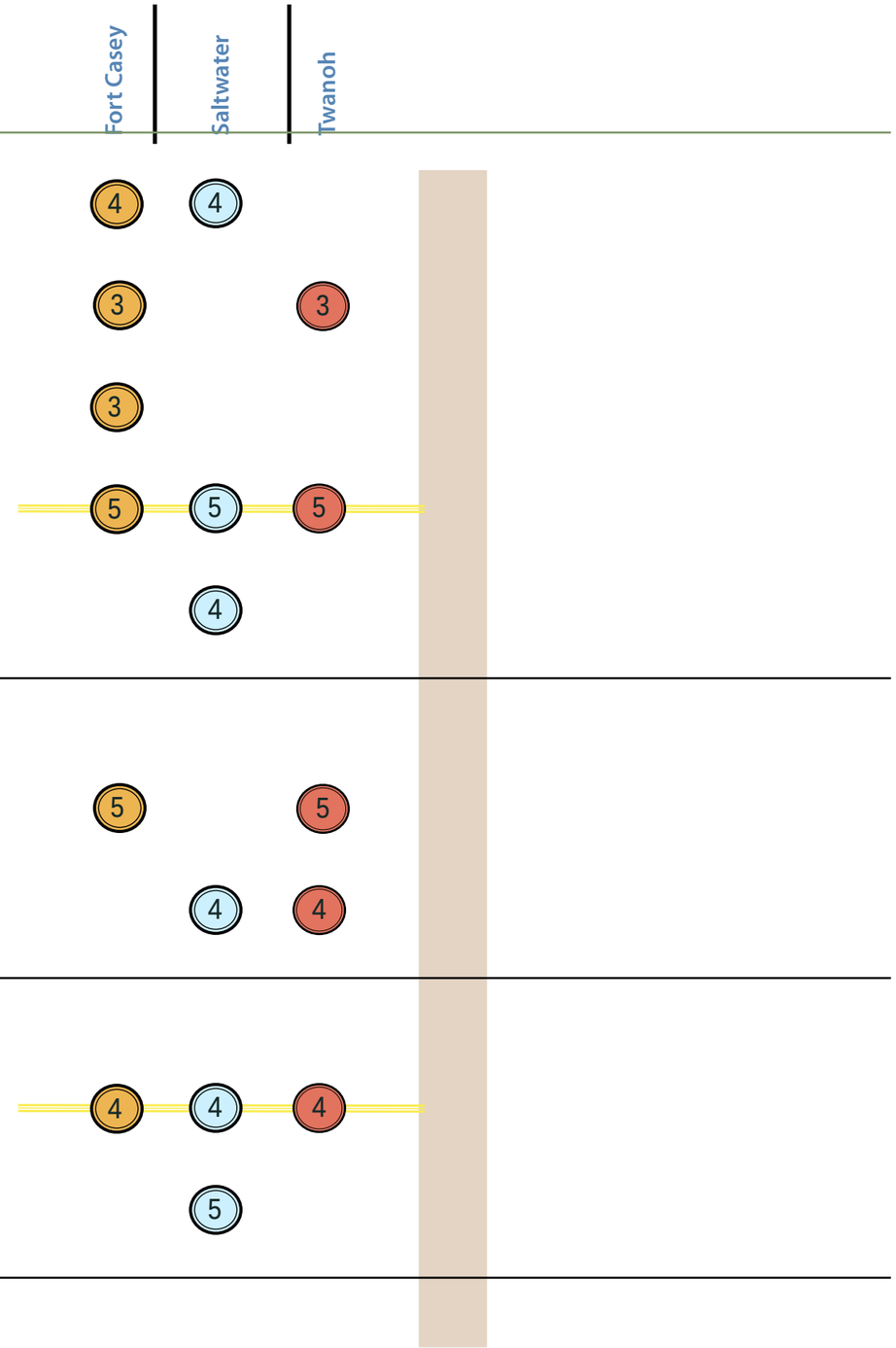
Action 2: *Educate public about Sound-Friendly Vision through various techniques: materials and talks at Interpretive Centers; guided tours of parks and their green design technologies; and hands-on participation opportunities.*

0 0 0

GOAL 5
HEALTHY STRUCTURES: Sustainable Design and Low-Impact Development.

Many of the parks in Washington State were originally developed in the 1930s (with the help of programs such as the Civilian Conservation Corps) or even earlier. Traditional design of parks and facilities at this time focused on maximizing recreational opportunities, as the scale and ramifications of human environmental impact had not yet become apparent. In spite of the challenge of this lack of foresight, the development of the Parks System offers a great opportunity for improving human impact upon the waters of Puget Sound. Parking areas can be redesigned to allow better infiltration; lawns can be strategically re-allocated to native habitat; buildings can be made significantly greener. When assessing the opportunities for minimizing the effects of human impact, the park architecture generally falls into one of three categories: historic structures, existing non-historic structures, and potential new construction to meet growing needs. Historic structures present the most limitations in terms of sustainable retrofits, though there are many interventions which can improve their efficiencies without detracting from their historic significance. Any proposed modifications to historic buildings must be reviewed for conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) and Cultural Resource Management Policy (2004). Rehabilitating existing buildings with sustainable features in turn offers more opportunities and can often be quite cost effective. Finally, new structures offer a chance to create low impact buildings and implement truly progressive design standards. All park development should aim to perform a double function, both as useful infrastructure and as visible interpretive components promoting Sound-friendly approaches to visitors.

Strategy 1: Promote energy-efficient and energy-producing design, and reduce resource and energy consumption.



Action 1:	*Improve energy-efficiency of all applicable historic park structures during planned rehabilitation.*
Action 2:	*Design of any new construction, or reconstruction should incorporate energy-efficient design.*
Action 3:	*Explore alternative energy production (e.g., solar lighting).*
Action 4:	*Implement low-flush fixtures, graywater re-use, and other water conservation techniques.*
Action 5:	*Implement Low-Impact Design elements (vegetated roofs, rain barrels, permeable paving, etc.).*

Strategy 2: Use sustainably harvested, local, non-toxic materials and finishes in building design and maintenance.

Action 1:	*Use "green" materials in historic structures' rehabilitation or reconstruction, and ongoing maintenance.*
Action 2:	*Use "green" materials in new construction.*

Strategy 3: Site and design new park structures in a way that achieves the Sound-Friendly Vision.

Action 1:	*Apply LEED and other green design criteria to new park structures.*
Action 2:	*Locate or re-locate structures to protect sensitive areas or enhance visitor experience.*

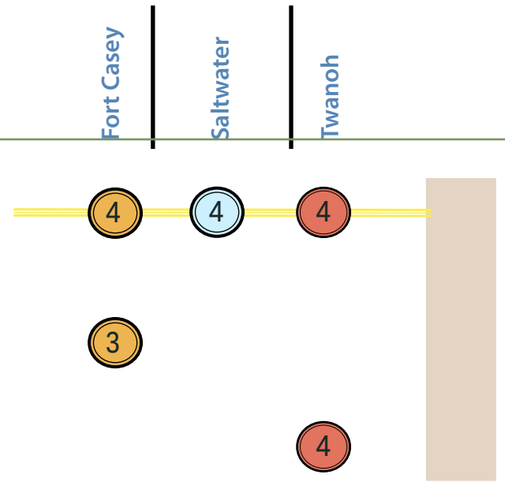
Strategy 4: Improve "green design" education.

TOOLBOX

Action 1: *Interpret and/or model the use of "green," non-treated construction materials in historic structures and in new construction using signage, pamphlets, or by hosting workshops.*

Action 2: *Use solar panels to illuminate signage.*

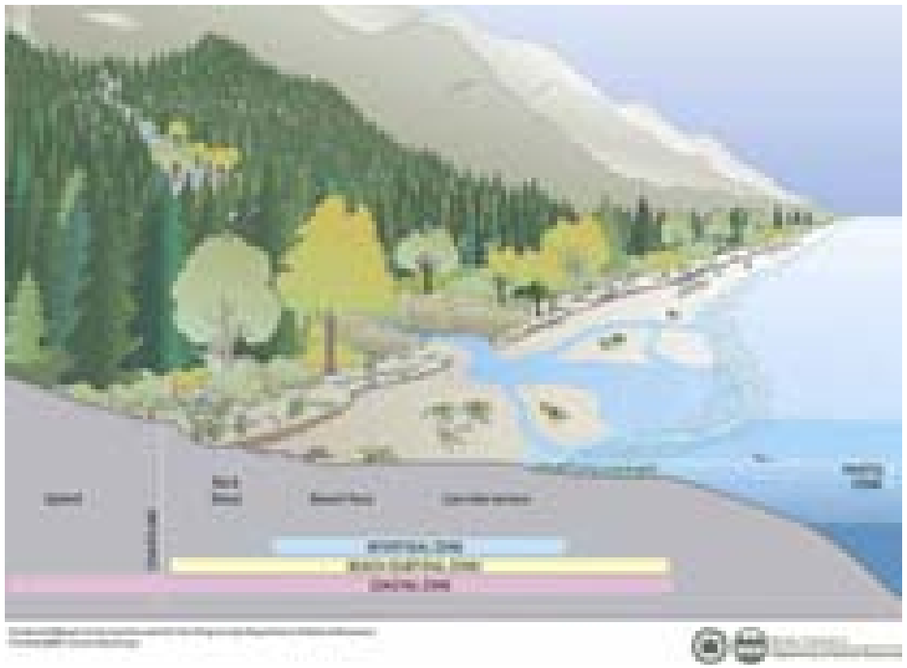
Action 3: *Decrease visitors' freshwater consumption, and interpret these practices where appropriate.*



4. Green Visions for Fort Casey, Saltwater, & Twanoh State Parks

Puget Sound State Parks

Many of Washington State Parks provide public access to the Puget Sound and offer visitors unique opportunities to visit forested areas within their communities. Parks provide protected habitat for animals and foster natural ecosystems (protecting trees, rivers, and beaches). However, increased residential and commercial development in the Puget Sound Region has put a strain on ecosystems and habitats. Dramatic changes in land cover over the last 50 years have reduced forested areas and replaced them with pavement, buildings, and landscaped areas. Parks have therefore become places where visitors from urban and suburban areas can enjoy a natural setting and access lakes, rivers, and beaches.



I. Water Quality

The reduction in natural, forested areas creates challenges to park management and maintenance. Streams, creeks, and shorelines have been over-used to the degree that there is ongoing, potentially lethal damage to their ecosystems and dramatic affects to the water quality of water bodies. Natural edges of shorelines and streams have been relaligned and confined to make way for parking and grass areas. Several older parking areas were not designed to treat water from automobile pollutants. Many park comfort stations are outdated; they were not designed to meet current capacity requirements and are therefore failing. Campgrounds and trails are located within riparian corridors; these creek-side facilities cause erosion and reduction of critical fish habitat.

Washington State Parks currently has the opportunity however to restore natural elements, improve park amenities, and repair failing systems that are reducing the quality and ecologic function of adjacent water bodies.

II. Water Quantity

Already the effects of climate change, also called global warming, are being felt around the world and right here in Puget Sound. While there are many predicted effects on Puget Sound from climate change, one of the most important for shoreline State Parks is sea level rise. Significant sea level rise is predicted in many areas of Puget Sound. In the Seattle area current models predict a 2.8-foot rise in mean sea level over the next 100 years.

Such increases are compounded by extreme high tides and low air pressure, high wave, storm events. Flooding will result when waves overtop the armoring or natural beach crest forming the shoreline of most parks. Some parks are already experiencing flooding problems in shoreline areas. Different amounts of sea level rise will occur by the end of this century in different locations, based on geologic factors of subsidence and uplift. Areas of most subsidence, or land lowering, such as in the Tacoma and Olympia areas, are predicted to experience sea level rise of approximately three feet, while areas of the greatest uplift, such as Neah Bay, are predicted to experience slightly over one foot of sea level rise.

III. Habitat

The Washington State Parks system includes numerous parks along the shoreline of Puget Sound. These parks often provide a broad range of natural habitats including marine nearshore, streams, small estuaries, wetlands, and forested uplands. All of these habitats exist within systems of physical, habitat forming processes that support biological processes. In order to be good stewards of Puget Sound, park managers need to understand how their parks function within these larger systems. For example, Puget Sound beach habitats are dependant on a supply of sediment (sand and gravel). The majority of Puget Sound sediment sources are unstable bluffs. When deposited on the beach, this sand and gravel sediment is pushed by prevailing wind driven waves from source areas to deposition areas. Often, beaches and bluffs are modified with bulkheads and rock armoring as part of upland development. As a result of these modifications, the sediment sources are often reduced, blocked, or eliminated.

Other results of shoreline modifications are elimination of habitats by conversion from aquatic to upland, and loss of shoreline vegetation. Similar, parallel effects can occur along streams that run through parks and end in Puget Sound. The small estuaries formed by streams entering Puget Sound are especially biologically productive habitats deserving special attention by park managers. The stewardship of the parks has generally protected habitat function more so than in privately held shoreline areas; however, the Governor's Puget Sound Initiative is setting an even higher standard for how people and habitat coexist.

A critical issue for park managers is the recognition that habitat and human use are not necessarily in conflict. As our shorelines continue to be developed, our State Parks serve more as habitat oases for people to enjoy. As a result, people come to parks to enjoy watching fish and wildlife and to interact with more natural habitats. The recognition by park managers that natural habitats are the attraction creates an opportunity to incorporate more habitat-friendly features and to use Puget Sound State Parks as models of good habitat stewardship.

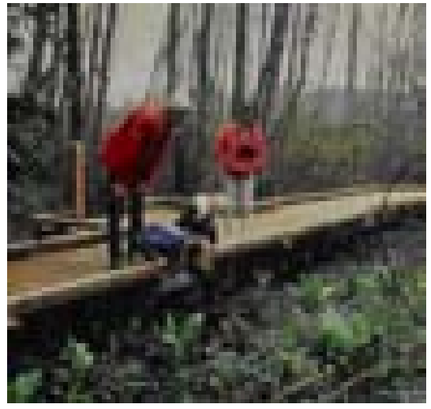
A good example of this opportunity is the shoreline areas of parks. Currently, these areas often consist of mowed lawns on filled areas protected by rock armoring and lacking riparian vegetation. The armoring, fill, and removal of vegetation all negatively impact habitat quality, and also diminish the resource park visitors came to experience. Alternatively, a more Sound-Friendly shoreline would include a more natural beach, usable by park visitors, including drift logs, trails, picnicking, and native vegetation. Similar examples could be given for how parks are designed at stream mouth estuaries, along stream corridors, and around freshwater wetlands.

IV. Community and Recreation

Washington State Parks is gearing up for their centennial celebration, improving park facilities, building community support, and adding new parks. The 94-year old park system originally served surrounding rural communities by providing recreational facilities for camping, boating, and day use. The types of recreation have not changed much, but the amount of use has changed dramatically. Visitors from out of state increasingly come to State Parks to enjoy Washington's wonderful outdoor environment. As the state parks host more regional and national visitors, facilities such as boat launches, hiking trails, picnic areas, buildings, campgrounds, and transportation corridors are being improved to accommodate the higher use. Greater use has also led to more impacts to the environment and the health of the Puget Sound. If 300 people used a boat launch during the summer 50 years ago, now 3000 people use that boat launch, increasing pollution from car and boat engines and from boat waste in the Sound. Sound-Friendly recreational practices will become even more essential as the population grows, to avoid impacting the Puget Sound.

The State Park System around Puget Sound has changed over the years from an agency focusing on recreation and on locating that recreation as close to the scenic and environmentally significant sites as possible to an agency that owns prime parcels of land in the Puget Sound and manages those properties by paying attention to their cultural and natural resources. Park staff increasingly provide education and interpretive programs, redefining recreation as a learning experience.

While park facilities vary in terms of condition and quality, their Puget Sound setting makes them unique and provides a place for local communities to recreate and learn about their natural environment. Park staff work closely with local school groups, environmental stewardship groups and volunteers of all ages to preserve and protect these special places. As budgets shrink, invasive species maintenance, stream restoration, and Clean Up days are increasingly staffed by community volunteers who learn more about their state park's landscape than they could by just visiting for a day. This community connection is integral to the parks throughout Puget Sound and is the best hope for spreading a message of environmental stewardship to all park users and the people of Puget Sound.



V. Design and Development

The Puget Sound has been a nexus of human development for centuries, first as a bountiful traditional homeland for Native peoples, and later as the location for most of the urban centers of choice for settlers arriving in the Northwest. The necessity of water transport for shipping, as well as the aesthetic appeal of the water pulled many of these later settlements into direct contact with the Sound, and as the pace and scale of construction increased, so did their effects upon the watersheds and habitats around the Sound.

Over the years, there have been increasing demands placed on both the Puget Sound and on the State Parks around it, as both local populations and tourist numbers have swelled. Development has changed the very nature of each park's boundaries. Saltwater and Twanoh State Parks, both originally rural parks, have increasingly become urban or ex-urban parks with heavy residential development surrounding them. In cases like these, the parks represent the most pristine and healthy ecosystem in a significant area; conversely the health of the local ecosystem depends upon the park's integrity more than ever.

Many of the parks in Washington State were originally developed in the 1930s (with the help of programs such as the Civilian Conservation Corps) or even earlier. Traditional design of parks and facilities at this time focused on maximizing recreational opportunities, as the scale and ramifications of human environmental impact had not yet become apparent. Many of the drivers in the development model from this era were user-based, and as often as not, attempted to bring the park visitor as close to the water's edge as possible. This policy created many parks whose infrastructures (parking, lawn, buildings) were adjacent to the most sensitive coastal areas, a condition that is not optimal for stormwater infiltration, healthy habitat, and the effects of rising sea level.

In spite of all these challenges, the development of the Parks System offers a great opportunity for improving human impact upon the waters of Puget Sound. Parking areas can be redesigned to allow better infiltration; lawns can be strategically re-allocated to native habitat; buildings can be made significantly greener. As opportunities for minimizing these effects, the Park architecture generally falls into one of three categories: historic structures, existing non-historic structures, and potential new construction to meet growing needs. Historic structures present the most limitations in terms of sustainable retrofits, though there are many interventions which can improve their efficiencies without detracting from their historic significance. Any proposed modifications to historic buildings must be reviewed for conformance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995) and *Cultural Resource Management Policy* (2004). Rehabilitating existing buildings with sustainable features in turn offers more opportunities and can often be quite cost effective. Finally, new structures offer a chance to create buildings which sit as lightly as possible upon the land and implement truly progressive design standards. All park development performs a double function, both as useful infrastructure and as highly visible educational objects promoting Sound-friendly approaches to visitors.

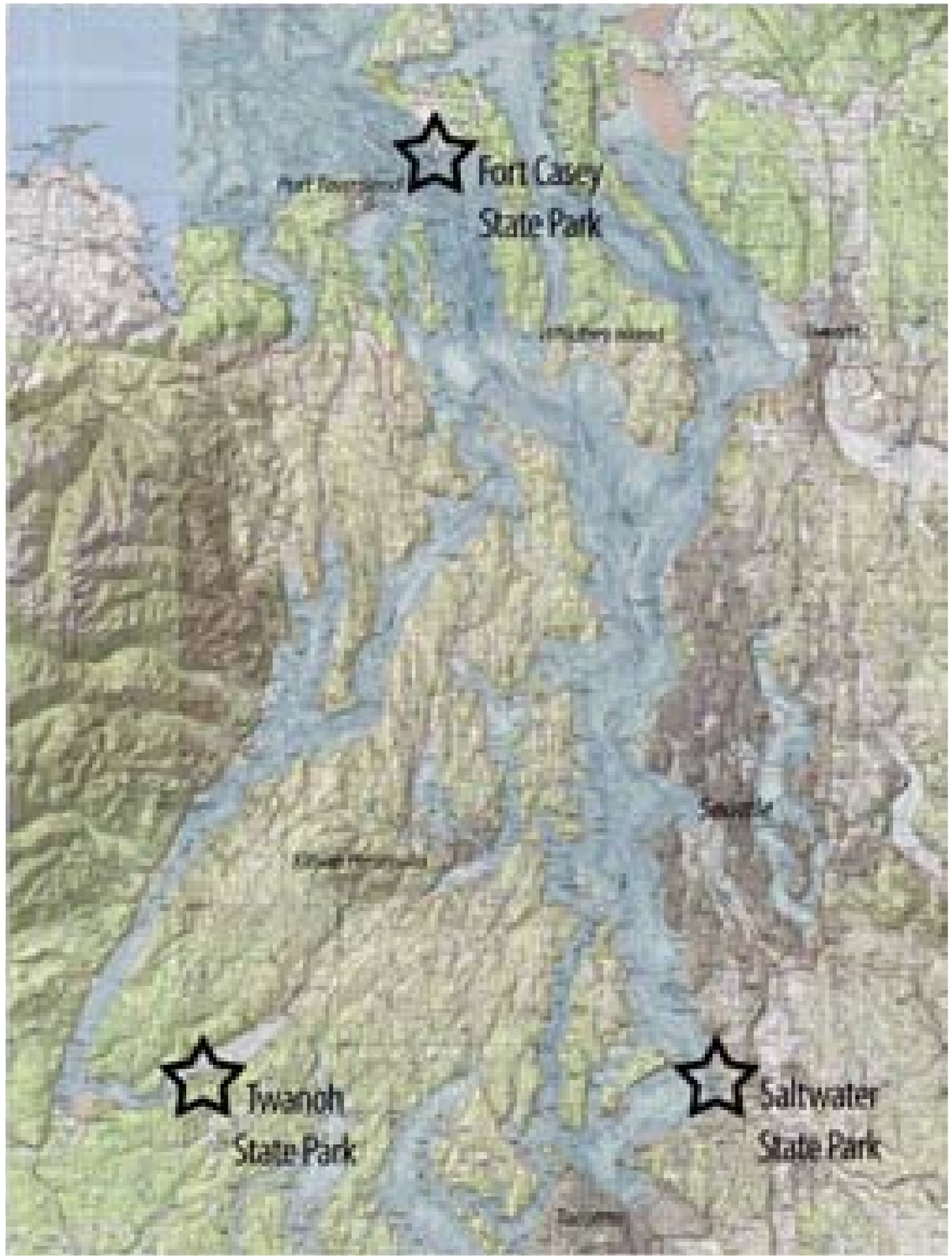
To apply the Puget Sound green strategies, Washington State Parks needed to select parks that represented a broad range of state parks throughout Puget Sound. While some green strategies, such as treatment of stormwater, would apply to all state parks, other issues, such as a specific park's Civilian Conservation Corps cultural heritage, would apply to specific parks only. State Park staff eventually selected three state parks with very different qualities and from different regions of the Sound.

Fort Casey State Park, located on Whidbey Island in the north Sound, is filled with military structures, natural areas, and sweeping meadows with dramatic views.

Saltwater State Park, located halfway between Seattle and Tacoma in the south Sound, represents a state park in a more developed area with greater day use visitation to the parks beaches and bluffs.

Twanoh State Park, located near the end of Hood Canal, is a heavily forested campground and beach area with a long history of recreational boating.

Each park is not a finished product, but has definite opportunities for Sound-friendly improvement.



4. Green Visions for Fort Casey, Saltwater, and Twanoh State Parks

Fort Casey State Park

Fort Casey State Park is located in the rain shadow of the Olympic Mountains at Admiralty Head on Whidbey Island. The fort was one of the coast artillery posts established during the late 1890s for the defense of Puget Sound, joined by Fort Worden (near Port Townsend), and Fort Flagler (on Marrowstone Island). Technological advances in the science of warfare made fixed coastal batteries obsolete during World War II, and the fort was deemed unnecessary for national defense purposes.

Today, Fort Casey is a cultural landscape contained within the Ebey's Landing National Historical Reserve. A majority of the state park is heavily forested with a mix of open grass, shrub thickets on the historic bluff area. The historic buildings and the campground at Fort Casey are served by a small road network and parking areas, which are surfaced with gravel or asphalt. There are no creeks or streams located within Fort Casey State Park. However, Crockett Lake receives runoff from the surrounding residential areas and adjacent ditches, and draws water via Keystone Harbor and Admiralty Inlet.

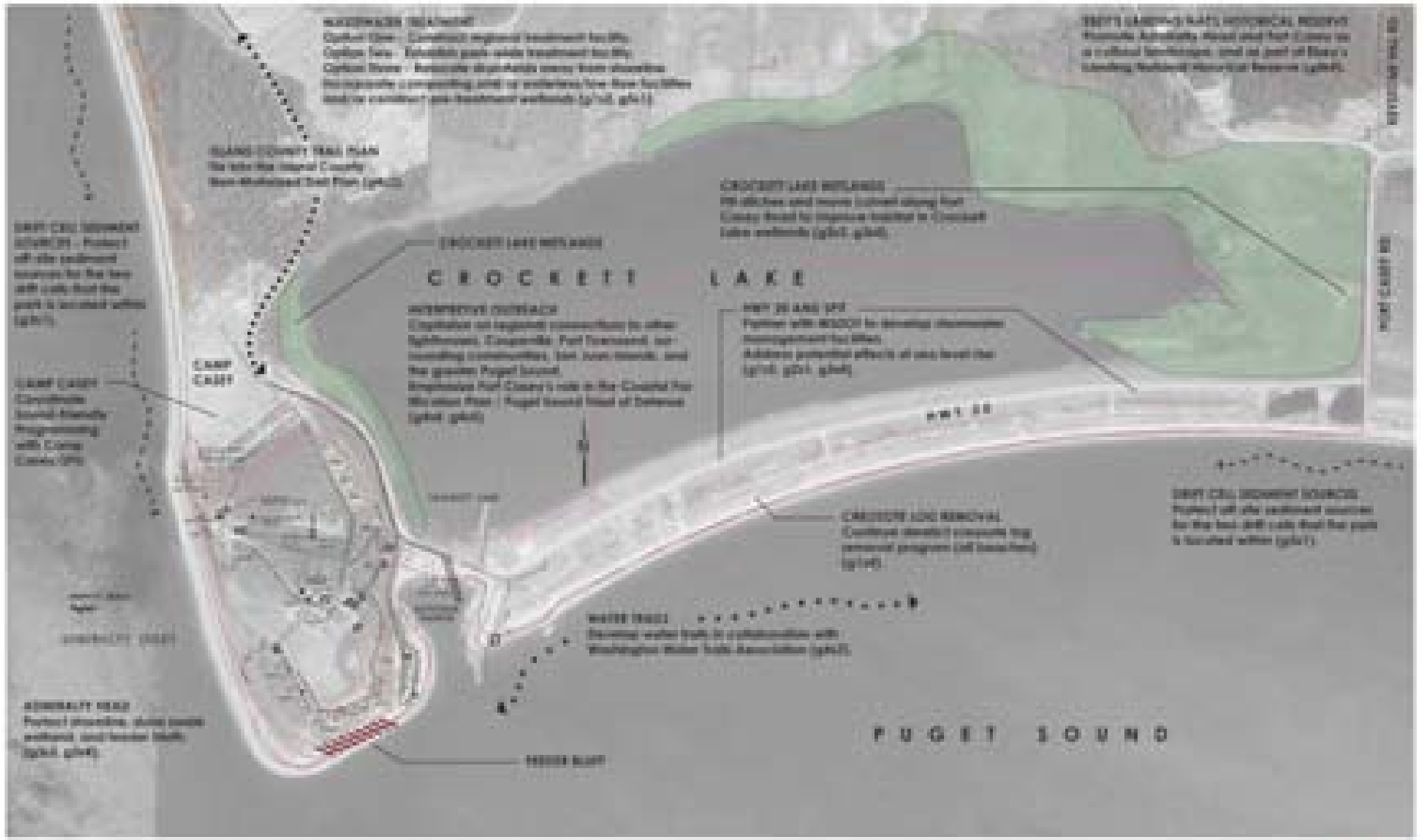
The Army Corps of Engineers constructed Keystone Harbor for use as a ferry terminal in 1948. The harbor interrupts movement of sediment from west to east. Sediment builds up in the harbor, and is blocked from accreting on the beach to the east by the jetty. Nearly 100,000 cubic yards of sediment dredged from the harbor has been placed east of the breakwater to re-nourish the beach, and this strategy has generally been successful in supplying the spit with sufficient sediment to mimic natural processes (Ecology, 1986).

Crockett Lake has a significant coastal wetland. A topographic sheet from late 19th century indicates that the lake was historically freshwater with an overflow channel. Currently, brackish marsh species such as pickleweed (*Salicornia virginica*) dominate the lake shoreline today. Significant saltwater intrusion was observed at the tide gate (*pers. observ.*).

The present lighthouse was built in 1903 and replaced an 1860s structure that was located about one-half mile to the south on the point. Future project work on the lighthouse will focus on the preservation and repair of the historic structure. The lighthouse has a historic water collection system with a baffle that can channel water to the ground or a cistern.

Recreation at the park is a vital activity that brings people close to the water. Sound-Friendly strategies and programming can promote recreational activities that enhance education and landscape immersion experience while protecting the health of the Puget Sound. Improvements could be made for boaters and campers that would further reduce the impacts of their actions, e.g., providing a boat pre-rinse-off facility that would capture any harmful chemicals from boats and motors before entering the water, and educating campers as to techniques and practices that are more Sound-Friendly.

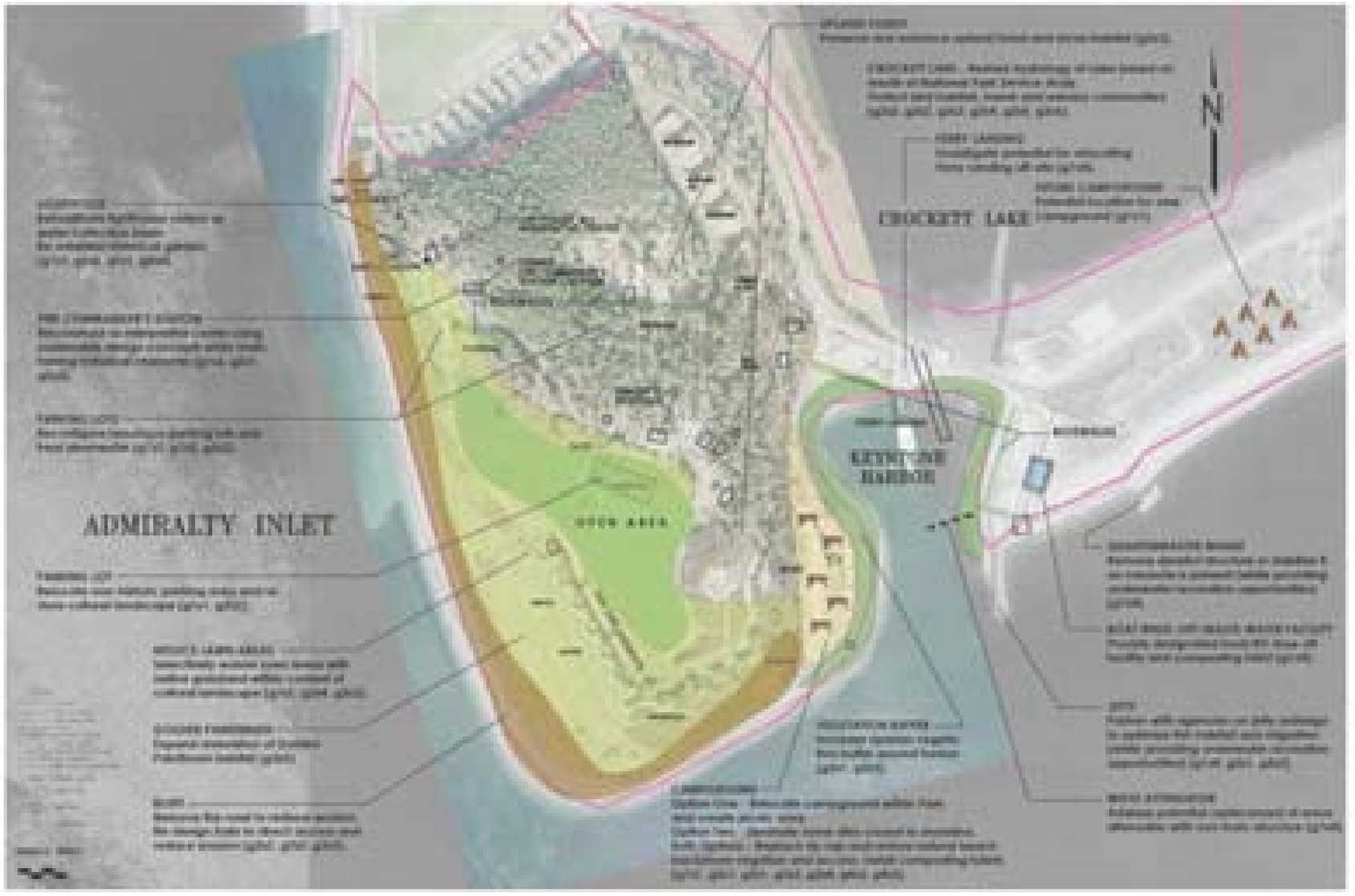
Fort Casey is a beloved park for Whidbey Island community members who enjoy its spectacular Puget Sound setting, its recreational and educational opportunities, and its rich history. It is also connected to the larger Puget Sound region via the ferry system and regional road system and is a popular destination for visitors to Whidbey Island. Finally, it is a world-class destination for all visitors who wish to experience the unique Sound environment and cultural history.



Fort Casey - Context Plan

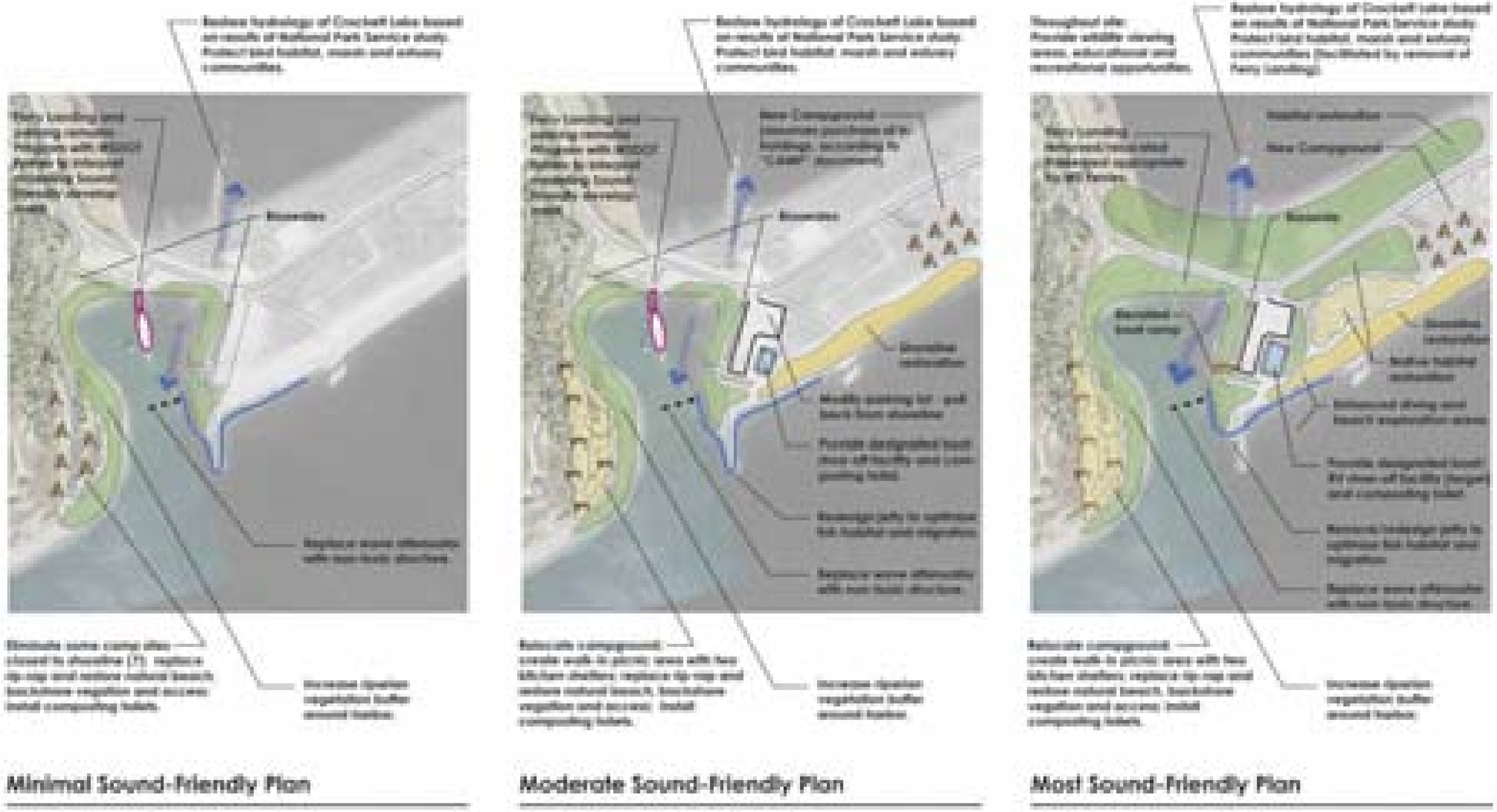
Washington State Parks Sound-Friendly Vision Plan

April 2007



Fort Casey - Concept Plan
Washington State Parks Sound-Friendly Vision Plan

April 2007



Minimal Sound-Friendly Plan

Moderate Sound-Friendly Plan

Most Sound-Friendly Plan

Fort Casey - Concept Plan Options

Washington State Parks Sound-Friendly Vision Plan

April 2007

GOAL 1

HEALTHY WATER QUALITY: Reduce water and sediment pollution into Puget Sound

Washington State water quality standards were updated in 2005. Providing stormwater treatment within Fort Casey State Park will bring the Park into compliance with current regulations. Reducing the amount of impervious surface within the Park by 30% will reduce peak flows from the Park by 20-30%. Low-impact development elements that treat stormwater, such as rain gardens, bioswales, porous pavements, and bioretention areas, can also serve as landscape amenities. Native plants should be used wherever possible to provide habitat and create a Pacific Northwest aesthetic throughout the Park.

Strategy 1: Reduce effective impervious areas and maximize infiltration.

Action: *Rehabilitate lighthouse cistern as water collection basin; restore lighthouse cultural landscape by replacing access road and parking with historic landscape; use cistern to irrigate garden.*

Historically, the lighthouse water supply came from the rainwater that was collected in a cistern adjacent to the building. As Fort Casey became more developed, the cistern was disconnected to the water supply in the lighthouse. State Parks could reconnect the downspouts to the cistern and use the water to irrigate landscaping around the lighthouse. The existing access road and parking area could be reduced or eliminated to bring the landscaped areas around the lighthouse back to a historic condition.

Action: *Re-surface and/or reconfigure parking, and treat stormwater by using porous pavement or treatment infiltration with plantings, depending on infiltration analysis.*

Stormwater runoff from the existing parking areas near the shoreline is collected into catch basins and asphalt ditches before discharging directly into Puget Sound. Reconfiguring the current drive aisles and parking spaces to minimize required pavement and using porous pavements will help to reduce runoff.

Possible cross section for new and or redeveloped parking areas.

Action: *Relocate non-historic parking from open field and restore cultural landscape.*

Removing and re-locating the parking lot from the open area promotes the rehabilitation of the cultural landscape. Planting the area in an eco-lawn or grassland would provide historic and ecological value.

Promity of existing camping to shoreline

Action: *Relocate existing shoreline campground area; replace parking lot with walk-in camping/picnicking and a restored shoreline.*

Providing camping opportunities further back from the shoreline or in other areas within the park will reduce shoreline impacts. Parking within the camping area and upper parking areas should be redesigned to narrow the drive aisle and create smaller spaces in order to reduce runoff. The shoreline parking lot could be replaced with walk-in camping/picnicking and a restored shoreline recreation area.

Strategy 2: Treat stormwater runoff before discharge to the Sound.

Action: *Create park-wide natural stormwater system with plantings to enhance water quality and minimize erosion.*

Low-impact development elements can be used in between parking stalls and along the perimeter of the parking areas and roadways to collect and treat stormwater runoff which contains sediments, metals, and oils from the cars and trucks that visit the park. Since all low-impact development elements improve water quality, they should be incorporated throughout the park, regardless of whether the stormwater is discharging into Puget Sound or a piped conveyance system.

Example of where bioswales could be installed along parking areas

Proximity of existing comfort station to shoreline

Action: *Treat water from parking lots and roadways using bioremediation methods (e.g., bioswales).*

Bioremediation methods use the biological and chemical processes of plants and soil microbes to remove pollutants from stormwater. Bioretention methods retain pollutants and sediment within an area, allowing bioremediation methods to be more effective. Bioremediation and bioretention methods can be incorporated into rain gardens, swales, and other low-impact development elements in order to improve the quality of collected stormwater runoff.

Strategy 3: Improve effectiveness of water use and wastewater treatment.

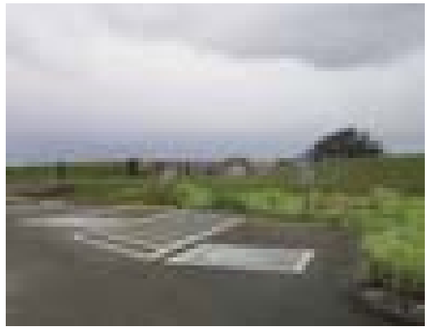
Action: *Establish park-wide wastewater treatment system in place of separate drain fields, based on evaluation of existing system and projected demand.*

Recent improvements at the main comfort station near the historic batteries included a new septic drainfield that also receives wastewater from the lighthouse. Various other buildings and comfort stations around Fort Casey State Park are connected to individual drainfields. Centralizing the park's wastewater treatment would streamline maintenance and allow for better treatment.

Action: *Move wastewater drain fields away from shoreline.*

Existing drainfields were built over 40 years ago and are located along the shoreline. These drainfields should be replaced and relocated outside of sensitive shoreline areas.

Action: *Install composting toilets.*



Example of bioswales along parking areas—After

Many rural or remote state parks with wastewater and waste management challenges opt to use composting toilets. Washington State Parks has successfully designed and installed composting toilets in rural or remote parks such as the nearby San Juan Marine Area. Composting toilets require vaults with access so that the waste can be periodically mixed to promote composting and prevent anaerobic pockets. Using such technologies models an innovative response to wastewater treatment.

Action: *Construct pre-treatment wetland as part of the wastewater treatment chain (polishing). Highlight this demonstration project to public.*

In addition to the newly constructed drainfield in the historic open field, Washington State Parks should consider constructing a pre-treatment wetland, as long as it would not compromise the integrity of the cultural landscape. Vegetation planted in gravel would be selected to create biological processes through which plants and microbes will reduce the nutrient levels in the wastewater before it enters the drainfield and infiltrates into the ground.

The pre-treatment wetland could be a powerful demonstration project for park users and nearby residents who have drainfields. Such wetlands are easy to install on residential property. Getting local homeowners to install pre-treatment wetlands could provide additional nutrient removal for the wastewater that ultimately filters into the Sound.

Action: *Participate in an assessment of regional wastewater treatment needs.*

Fort Casey State Park could partner with other agencies to investigate the need for a regional wastewater treatment system. Possible participants could include Camp Casey, Washington State Ferries, and surrounding residential and commercial properties. A regional wastewater treatment system would require a full time operator.

Action: *Implement water conservation measures, e.g., waterless urinals and water-efficient fixtures*

As comfort stations are upgraded and rebuilt, waterless urinals and water efficient fixtures can be installed to conserve water and reduce the park's wastewater. Water-efficient fixtures, especially showers and toilets, can substantially reduce water use in the busy summer months.

Action: *Add facilities that can use gray water for irrigation*

Water from outdoor rinse-off areas and showers near the shoreline can be used to irrigate planting areas. Drains from wash-off areas can be connected to underground irrigation pipes that water the planting areas' root zones. Diversion of gray water into irrigation will also reduce the amount of wastewater that is pumped to the park's drainfields

Strategy 4: Reduce, eliminate, and/or treat sources of toxic chemical pollutants (e.g., pesticides, fertilizers, gasoline, creosote, detergents).

Action: *Provide a designated boat rinse-off area with water treatment.*

Many visitors and local residents come to the park to use the boat launch. Boaters often rinse off their boats at home to remove salt and dirt, and this activity contributes to stormwater pollution. State Parks could build a centralized facility for boat washing that would collect the rinse water and either treat it or hold it until it could be pumped elsewhere. This strategy would reduce stormwater impacts to the Puget Sound resulting from conventional boat rinsing practices.

Action: *Create RV rinse-off and pump-out stations.*

Creating a RV rinse-off and pump-out station at Fort Casey would be a Sound-Friendly strategy to reduce stormwater and wastewater pollution. Additionally, Washington State parks can provide information on appropriate cleaning methods and chemicals that are safe for Puget Sound. Washington State Parks can also educate RV users on methods to reduce their waste by separating gray and black waste.

Existing Quartermaster wharf structure

Action: *Eliminate use of cleaning chemicals (e.g., restroom maintenance).*

Park buildings and facilities should be cleaned with biodegradable products to reduce the amount of toxic chemicals entering the park's stormwater and wastewater, as well Park staff's and visitors' exposure to such chemicals.

Action: *Partner with DNR and other agencies to continue derelict creosote log removal program*

DNR removed creosote logs from the beach at Fort Casey in 2005-2006. Approximately ⅓ of the quantity removed has been replaced by new creosote treated logs, according to park staff. Since creosote is a source of PAH contamination to Puget Sound, continuing this program is needed as a source control action.

Action: *Investigate Quartermaster Wharf structure to determine if pilings are creosote-treated. Evaluate structure for historic and environmental relevance. Pigeon guillemot (*Cepphus columba*) nest is in the structure, according to State Parks staff. Investigate potential for establishing a mitigation bank using its removal as advanced mitigation for Washington State Parks or Washington State Ferries.*

Significant efforts are underway in Puget Sound to remove derelict overwater structures with creosote treated pilings for two reasons. First, the shading and pilings are detrimental to juvenile salmon migrating along the nearshore as they provide habitat for predators. Second, creosote-treated pilings are a source of PAH contamination.

There is a mix of actions that could occur on this topic. State Parks needs to determine if the wharf has historic value and whether it should be renovated for use as a recreational feature. In addition, testing of the pilings is needed to determine if they are creosote-treated or not. If the pilings are creosote-treated, and if State Parks chooses not to renovate the structure or keep it as a historic artifact, it could be removed as mitigation to offset other marine structures at Fort Casey or other State Parks nearby.

Action: *Investigate presence of toxic materials at boat launch's wave attenuator, and replace with non-toxic materials.*

The existing wave attenuator at the boat launch is constructed out of creosote treated pilings according to State Parks staff. Replacing these pilings and other creosote structural members with non-toxic alternatives (such as concrete, steel, plastic, or some combination) would address the PAH contamination issue.

Action: *Partner with agencies regarding treatment of runoff from Washington State Ferries holding area.*

Any improvements or additions to the Washington State Ferry terminal should be brought up to current state stormwater management requirements for flow control and water quality. Metals and oils from cars on the ferry terminal contribute pollutants to Puget Sound and should be removed from the stormwater runoff prior to discharge. Such improvements would tie into the Sound-Friendly demonstration elements at Fort Casey State Park.

Action: *Partner with agencies regarding the potential re-location of Washington State Ferry dock facility.*

Washington State Parks can partner with Washington State Ferries, Army Corps of Engineers and other agencies to explore the feasibility and benefits of re-locating the ferry dock facility out of Keystone Harbor. An Environmental Impact Study has been conducted to explore alternative locations for the facility. Removing the current ferry facility would allow major ecological enhancements to the shoreline, the harbor, and Crockett Lake.

Strategy 5: Reduce erosion and fine sediment loads in streams and other water bodies.

Action: Reduce fine sediments and sands at shoreline comfort stations that contribute to clogged wastewater pipes.

Sand from the beach enters the park's wastewater system through the drains and toilets in the shoreline comfort stations. The sand flows to the drainfields and clogs the perforated pipes; this malfunction can cause the system to overflow and discharge untreated wastewater into Puget Sound. Rinse-off areas and showers should be located outside the comfort stations with discharge directed to a different facility.

Action: D*iscuss road design opportunities with WSDOT to incorporate Sound-Friendly ideas.*

Washington State Highway 20 traverses the narrow spit between Crockett Lake and Puget Sound. If WSDOT re-designs the road, Washington State Parks should coordinate with the agency to introduce Sound-Friendly strategies. For example, stormwater runoff from the highway is currently not controlled or treated before discharging into nearby water bodies. Any highway redevelopment must meet current Washington State stormwater management standards. Redevelopment of Highway 20 could also lead to improved hydrological, habitat and wildlife connectivity between Puget Sound and Crockett Lake.

Strategy 6: Improve water quality education.

Action: *Provide hydrology interpretation.*

There are opportunities to provide interpretation and educate visitors on Fort Casey's unique hydrological systems; including Crockett Lake, the upland forests, and the Puget Sound.

Action: *Provide interpretation of lighthouse cistern, green roofs, constructed wetlands, and wastewater treatment system*

Re-activating the historic water collection system at the lighthouse is an excellent way to demonstrate how we can use the lessons of the past to guide our future sustainability. Fort Casey should highlight the sustainability and the history of the cistern at the lighthouse. All low-impact development elements that are incorporated into the park facilities should be highlighted for their benefit to the hydrology of Fort Casey and to Puget Sound.

Action: *Reconstruct the historic fire control station as an interpretive center and interpret land use changes over time, including the Sound-Friendly changes.*

Fort Casey State Park plans to reconstruct the historic fire control station so that it serves as a park interpretive center. This interpretive center could be a focal point for not only interpreting the park's rich cultural and natural environment, but also highlighting the Sound-Friendly mission and developments.

Action: *Partner with citizen scientists engaged in monitoring.*

There are many community groups who may be engaged to gather information to monitor the ecological and social benefits of Sound-Friendly changes to the park. For example, water-quality sampling along the shoreline would help Washington State Parks evaluate the benefits of new Sound-Friendly improvements. Citizen monitoring can help WSPRC evaluate the benefits of various low-impact development strategies.

Action: *Provide demonstration rain gardens linked to existing downspouts.*

The park could install demonstration rain gardens and provide visitors with diagrams and instructions on how to install similar rain gardens on their own properties. The demonstration rain gardens should be placed in high-use areas within the Park, within the context of the cultural landscape, such as non-historic comfort stations and administration buildings.

View of spit and low elevation of Highway 20

Action: *Provide interpretive information about Washington State Park's leading efforts to eliminate pollutants in maintenance and operation practices.*

The park's maintenance practices can easily be transferred over to residential and business applications. Using environmentally friendly cleaning products and maintenance practices will contribute to cleaning up the Sound. Providing interpretive programming regarding these practices will encourage park visitors, local residents and businesses to implement these practices on their own properties.

Action: *Provide information and facilities for Sound-Friendly boat washing and waste disposal.*

Improvements to Fort Casey State Park's waste disposal programs should be highlighted to park visitors. For example, Fort Casey plans to install a new restroom facility that incorporates green design elements such as a living roof; this innovative design may be described to visitors. If State Parks decides to install a boat-washing facility, interpretive signage may be installed to let users know how the park is managing boat wash runoff and why it is important for the health of Puget Sound.

Existing site conditions along bluff at Fort Casey

GOAL 2

HEALTHY WATER QUANTITY: Address water quantity (e.g., flooding, sea level rise)

Global warming is changing weather patterns, causing higher temperatures, raising sea levels, and causing more frequent severe storm events. To preserve the precious shoreline access in Washington, State Parks must take measures to preserve the facilities and natural amenities within Fort Casey State Park. The sea level rise predicted for the North Puget Sound/San Juan Islands (Friday Harbor) is approximately two feet by the year 2100 (Puget Sound Action Team, 2005). Different amounts of sea level rise will occur in different locations around Puget Sound, based on several factors including tectonic activity, such as subsidence and uplift (Puget Sound Action Team, 2005).

Strategy 1: Identify areas and facilities at risk of sea level rise and re-design or re-locate them.

Action: *Prepare for sea level rise by moving programmed spaces, e.g., campground, to higher ground and replacing with natural beach materials/slopes and less-intensive programming that can move with sea level changes.*

The campground area is at long term risk of impacts from predicted sea level rise associated with climate change. This action entails mapping the extent of the projected rise (approximately two feet) above mean sea level, accounting for storm and high-tide events, and moving facilities at risk of damage, such as buildings and emergency access routes, out of these areas. It is recommended that relocation occur in a phased approach where facilities at most immediate risk (affected currently or within 25 years) would be addressed first, facilities at risk in 25 to 50 years second, etc.

Action: *Model and interpret changes to spit morphology associated with sea level rise and determine effects on Highway 20.*

This action is similar to the action above but also includes geomorphic modeling of how the spit that the highway is built on will change with sea level rise. It entails mapping the extent of the projected rise (approximately two feet) above mean sea level, accounting for storm and high tide events, and determining how the shape and location of the spit will change relative to the highway. The location and design of the highway on the spit may need to be modified during the next 25–100 years as a result of these change, as determined by Washington State Department of Transportation. As a significant shoreline park, Fort Casey State Park provides a vital opportunity to interpret and model appropriate responses to sea level rise to its visitors.

Existing historical military structure at Fort Casey

Strategy 2: Address watershed-wide hydrology.

Action: *Restore historic landscape within recreational and cultural landscape parameters to reduce overland flow of runoff and reduce bluff erosion.*

Restoring areas of Fort Casey to the historic landscape condition will reduce overland flow. Native plants naturally retain more water and allow for infiltration and evapo-transpiration in comparison to lawn.

In addition, native plants could be used a tool for wayfinding along the bluffs. The plants could be installed along the fire access road and the social trails between the bluffs and the batteries to reduce human impacts that cause erosion on the bluffs.

Action: *Remove fire road along bluff to reduce erosion, and eliminate social trails on bluff and re-design trail system to control access.*

Bluff trails should be re-designed to appropriately direct pedestrians on designated trails and viewpoints along the bluff, in order to reduce soil erosion and increase pedestrian safety. For example, further study may show that the fire road can be re-located slightly uphill from its current location away from the sensitive bluff edge and the golden paintbrush re-vegetation area. A re-designed fire road may be designed with a smaller cross-section and serve as a main pedestrian trail.

Action: *Restore natural hydrology of Crockett Lake based on results of NPS biological study.*

The National Park Service is currently conducting a study on Crockett Lake to evaluate its pre-developed connection to Puget Sound. Based on the results of the study, the existing tide gate at Crockett Lake may need to be designed to allow for anadromous fish passage if it is determined that a seawater connection existed historically. Washington State Parks support of NPS report findings will go far to address watershed hydrology, and should be appropriately interpreted.

Action: *Implement long-term boundary plan.*

Washington State Parks' long-term boundary plan for Fort Casey includes land acquisition of properties surrounding Crockett Lake. As they become available, Washington State Parks can restore the historic conditions of these properties. Restoration within the Crockett Lake Basin will maintain the health of the lake habitats and ecology.

Strategy 3: Manage floodplain to accommodate it within the park.

This strategy is not applicable to Fort Casey State Park.

Strategy 4: Improve water quantity education.

Action: *Provide education on hydrologic processes*

Changes to the hydrologic function of the park over time as a result of human uses may be interpreted and contrasted to Sound-Friendly strategies. In addition, the hydrologic benefits of the preservation and restoration of the forest, prairies, and estuaries should be highlighted throughout the Park.

Action: *Interpret human impacts on upland and estuary environment.*

Shoreline development, including cutting down trees and replacing native vegetation with lawns, roads, and houses, changes the way that water moves over the land and negatively impacts watershed health. State Parks should educate park users about these impacts. Such interpretive elements could be part of a campaign to extend Fort Casey State Park's Sound-Friendly efforts to include the watershed of Crockett Lake and the Puget Sound, thus connecting current events at the Park with the health of Puget Sound.

Action: *Create demonstration projects that are replicable for residents and businesses.*

As low-impact development elements are added to Fort Casey State Park, the Park can educate visitors as to the reasons for these additions and how they benefit Puget Sound. Low-impact development options, such as reducing impervious surfaces and disconnecting roof downspouts, are simple ways to improve hydrology that can be easily applied in residential and commercial settings.

GOAL 3

HEALTHY HABITAT: Create healthy habitat and populations of fish and wildlife species

Fort Casey State Park contains a diverse range of aquatic and terrestrial habitats whose function for fish and wildlife species is currently operating at a high level. It is important that the existing high functioning habitats, such as the bluffs, spit, beaches, and Crockett Lake, be protected from habitat degradation. The main area of focus for Puget Sound habitat restoration and enhancement is Keystone Harbor, which has high concentrations of juvenile and adult salmon during migration periods. Much of the harbor shoreline is hardened to protect the harbor from the wake of the ferry traffic; improving the shoreline condition will improve the quality and quantity of habitat for fish and wildlife species in this location.

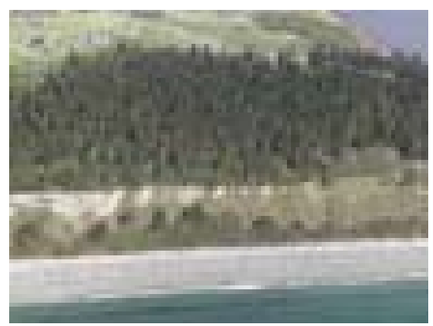
Strategy 1: Protect and restore natural shoreline and marine nearshore processes.

Action: *Protect off-site sediment sources for the two drift cells that supply sand and gravel to the park's beaches.*

Work with Island County and the National Park Service to ensure long-term protection of coastal bluffs north and south of Fort Casey as sediment sources. Protection could include shoreline management regulations and/or conservation easements.

Action: *Evaluate sediment issues, dredging, disposal related to ferry/Keystone Harbor.*

Maintenance dredging of Keystone Harbor by the U.S. Army Corps of Engineers occurs on a 5- to 7-year cycle. The dredge material is placed on the downdrift side of the harbors jetty where it naturally continues drifting south and east along the spit. This maintenance regime mimics natural processes. Any changes to this regime need to be carefully evaluated by State Parks as they could be detrimental to the sediment supply of the spit.

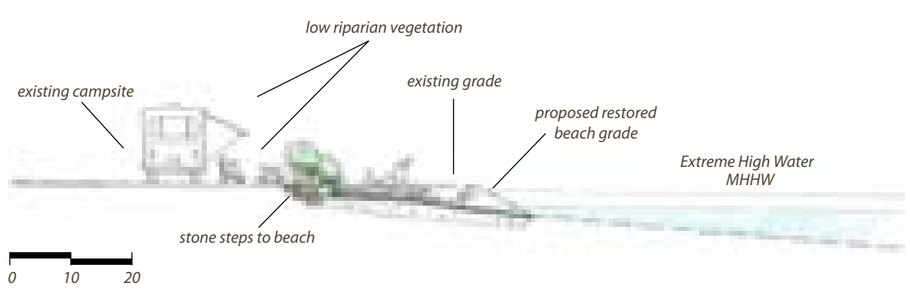


Feeder bluffs north of park that contribute s ediment to park's beaches

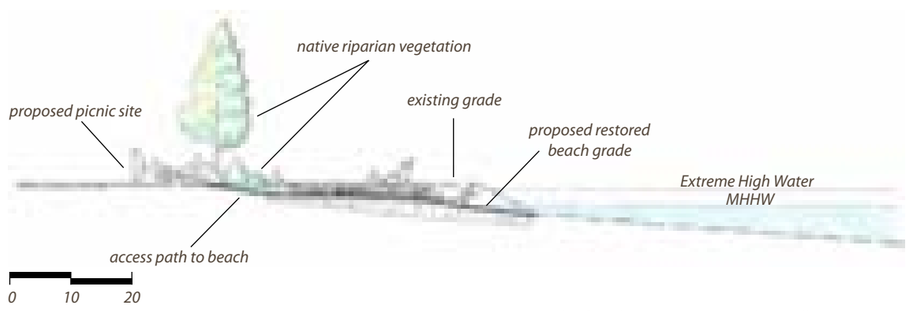
Action: *Re-locate some of the campsites to other areas away from the shoreline. Replace riprap and some upland with natural beach and backshore, native riparian vegetation, and access points to the beach.*

Riprap lining the campground shoreline could be removed to create a natural upper intertidal beach and backshore. The decision of how much riprap to remove will need to include consideration of shoreline armoring needed to address prop wash wake from the ferry terminal. Opportunities to remove some or all of the riprap armoring need to consider proposed changes to the ferry terminal. If riprap is removed and a beach restored, some uplands will be converted to sand and gravel beach with drift logs and beachgrass. This zone is conducive to beach access and use for recreation and is very beneficial as nearshore habitat.

Regardless of whether riprap is removed, native plants could be added along the shoreline to provide shade, contribute organic debris to the nearshore, produce terrestrial-origin prey items for fish, slow stormwater runoff, and uptake pollutants. An expanded riparian buffer, including beach grass in the backshore, would be particularly beneficial along the campground because of the potential contaminants from vehicles and the documented concentration of juvenile and adult salmon in this general area.



Example of Modest Sound-Friendly at Fort Casey



Example of Moderate or Most Sound-Friendly at Fort Casey

Strategy 2: Protect and restore freshwater systems.

Action: *Enhance vegetative buffer between Crockett Lake and Puget Sound.*

Adding a vegetative buffer of native plants on both sides of Highway 20 would enhance habitat between Crockett Lake and Puget Sound. An enhanced riparian buffer would contribute organic debris, produce terrestrial-origin prey items for fish, slow stormwater runoff, and uptake pollutants.

Crockett Lake vegetation

Action: *Restore natural hydrology at Crockett Lake outlet contingent upon ongoing NPS study and legal agreements.*

Ongoing investigations into the historic natural hydrology of Crockett Lake may lead to restoration actions that include or impact the park. To the extent possible, Park representatives should participate in the discussions of future actions and ensure outcomes are consistent with Sound-Friendly concepts.

Strategy 3: Protect and restore native plant communities.

Action: *Remove invasive plants not maintained as part of cultural landscape.*

Invasive plants should be removed and replaced with native vegetation that help the ecosystem function better. Areas where invasive vegetation has been removed can be replanted with an assortment of native understory trees, shrubs and groundcovers. If an invasive species was planted within the period of historical significance, it may be appropriate to actively manage it as part of the cultural landscape.

Action: *Continue restoration of Golden Paintbrush (*Castilleja levisecta*) habitat along bluff (federally listed "threatened" species) consistent with the Fort Casey State Park Vegetation Management Plan.*

The Vegetation Management Plan of the park has led to an increase in the abundance and spatial distribution of Golden Paintbrush. These restoration actions would continue to be applied.

Action: *Restore native upland vegetation and reduce regularly mowed lawns. Target habitats include native prairie, deciduous, and conifer forest.*

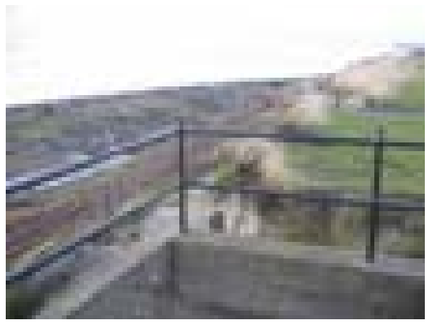
Native upland vegetation would be planted in areas where it occurred historically. Decisions regarding the types and locations of native vegetation would be informed by available information on the historic park setting. This action would benefit the habitat and reduce the park maintenance required to mow the areas.

Action: *Restore bluff vegetation impacted by social trails.*

Adding bluff vegetation in areas impacted by social trails would improve soil retention and reduce surface runoff during storm events. These benefits would contribute to improve the stability of the bluff face and prevent undesirable erosion along the trails.

Action: *Reconfigure campsites to allow for restoration of riparian vegetation. This action is contingent upon resolution of Washington State Ferry re-location issue.*

Reconfiguring campsites would provide a wider corridor to plant marine shore vegetation. Native plants could be added along the shoreline to provide shade, contribute organic debris to the nearshore, produce terrestrial-origin prey items for fish, slow stormwater runoff, and uptake pollutants. An expanded buffer, possibly including beach grass in a restored backshore, would be particularly beneficial along the campground because of the potential contaminants from vehicles and the documented concentration of juvenile and adult salmon in this general area.



Dune swale wetland and dune grass

Action: *Protect marsh and estuarine communities at Crockett Lake and dune swale wetland at Admiralty Head.*

This action would protect functioning components of the existing habitat in the park. The marsh vegetation of Crockett Lake and the dune swale wetlands on the beach at Admiralty Head are systems that improve water quality.

Action: *Restore beach backshore at campground area and along spit. Remove riprap and reduce camping at shoreline edge.*

Same action as Goal 3, Strategy 1, Action 3

Strategy 4: Enhance native fish and wildlife species/communities.

Action: *Re-design or relocate campsite along shoreline to reduce impacts and restore upper intertidal beach and backshore.*

Same action as Goal 3, Strategy 1, Action 3

Action: *Re-establish native vegetation buffer next to campground along shoreline.*

Same action as Goal 3, Strategy 1, Action 3

View showing sparse vegetation on spit

Action: *Protect health of Crockett Lake as valuable habitat.*

Ongoing investigations into the historic natural hydrology of Crockett Lake may lead to restoration actions that include or impact the park. To the extent possible, park representatives should participate in the discussions of future actions and ensure outcomes are consistent with Sound-friendly concepts.

Action: *Fill ditches and move culvert along Fort Casey Road to improve habitat conditions in Crockett Lake wetlands.*

This action would fill the ditches along Fort Casey Road and move a culvert to improve the hydrology of the Class I wetlands associated with Crockett Lake. It will improve habitat by enhancing the hydrological functions that support wetland health.

Action: *Protect western face of Admiralty Head shoreline.*

The western shoreline below Admiralty Head is a high-functioning nearshore habitat and should be protected. It is well supplied with sand and gravel sediment and drift logs and supports a small dune swale wetland. See actions on creosote log removal.

Action: *Partner with agencies to study effects of Highway 20 on movement of saltwater under spit into Crockett Lake.*

State Parks could partner with WSDOT and the National Park Service to study the hydrologic effects of Highway 20 on the spit. This study would determine if the road adversely affects the movement of water in and out of Crockett Lake to Puget Sound. If so, redeveloping the road to enhance hydrological connection would benefit Crockett Lake habitat by providing

Action: *Coordinate with agencies on habitat preservation/enhancement efforts.*

The National Park Service, Island County, state or federal regulatory agencies, and non-profit organizations such as Washington Trout, Audobon Society and others are potential partners for implementing habitat protection and enhancement efforts for the park's bluffs and beaches and Crockett Lake.

Strategy 5: Identify and reconnect fish and wildlife habitat connectivity.

Action: *Study fish and wildlife use and migration to identify potential barriers (e.g., Highway 20) to critical habitat areas.*

Highway 20 on the spit may block movement by amphibians and small mammals moving from the lake shoreline to the Puget Sound shoreline. Undercrossings for wildlife could be added in the form of culverts to improve wildlife connectivity. Study and implementation of recommendations to address this issue should be done in conjunction with the hydrologic study mentioned above.

Action: *Re-configure the connection to Crockett Lake outlet to allow fish passage, contingent upon NPS biological study and Dike District legal agreements.*

Same as Goal 3, Strategy 2, Action 2.

Action: *Consult with Washington State Ferries and Army Corps on the re-design of the jetty to optimize fish migration and habitat use.*

Specific considerations for the changes to the jetty include passage through or around it that minimize or eliminate exposure of juvenile salmon to deep water, rock armor and predators. Reducing the risk of predation resulting from shoreline modifications is an important strategy in salmon recovery efforts.

Action: *Increase riparian vegetation buffer around Keystone Harbor edge to enhance fish habitat.*

The addition of native plants along the riparian zone of Keystone Harbor would provide shade, contribute organic debris to the nearshore, produce terrestrial-origin prey items for fish, slow stormwater runoff, and uptake pollutants. An expanded riparian buffer, possibly including beach grass in a restored backshore, would be particularly beneficial along the campground because of the potential contaminants from vehicles and the documented concentration of juvenile salmon in this general area.

Strategy 6: Improve public education and interface with fish, wildlife, and sensitive habitats.

Action: *Research and interpret the cultural and environmental history of Crockett Lake, and highlight the lake's importance to bird, fish, and wildlife species.*

Enhancing the shoreline edge of Crockett Lake, particularly the area currently impacted by development, and bringing people to the lake edge through limited trails and overlooks would enhance visitor experience of Fort Casey's diverse ecology and history. Interpretive signage and activities such as guided environmental education walks or birding activities would enrich visitors' appreciation of this unique setting.

GOAL 4

HEALTHY PEOPLE: Promote diverse community and recreational opportunities that enhance Puget Sound health

Drawing both local and regional visitors, as well as tourists from other states and countries, Fort Casey State Park's unique setting and historical amenities provide a variety of recreational opportunities. Offering spectacular views of the Puget Sound Region, prime examples of healthy Northwest flora and fauna, vivid experiences of a World War I and II military facility, trails, and beaches, the park offers diverse activities for visitors to experience and enjoy. The purpose of this Sound-Friendly goal is to promote specific low-impact recreational programs over other intensive recreational activities that potentially degrade the Puget Sound.

Strategy 1: Facilitate and encourage community connection to park.

Action: Identify partners to collaboratively steward the park and its surrounding landscape, such as Island County, Washington State Ferries, the National Park Service, Camp Casey, and WSU Beach Watchers.

Community outreach and shared stewardship of Fort Casey State Park and its immediate surroundings can improve public awareness of and connection to Fort Casey. Establishing new contacts with other organizations and programs, and building on existing relationships will help to identify new partnership and shared resource opportunities.

Action: Capitalize on regional connections to lighthouses, forts, Coupeville, Port Townsend, surrounding communities, the San Juan Islands, and the larger Puget Sound.

Emphasizing how Fort Casey State Park fits into its regional context can help spread positive publicity about the park, help to increase public awareness, and foster a sense of connection and stewardship. Promoting the park as a gem within the larger Puget Sound region, and providing messaging about Fort Casey's stewardship and Sound-Friendly programs at other recreation facilities or on the ferries would promote the Sound-Friendly mission as it is exemplified at Fort Casey State Park.

Cascade Marine Trail Campsites - North Sound Section

Strategy 2: Promote active lifestyle.

Action: *Tie into Island County's non-motorized trail plan.*

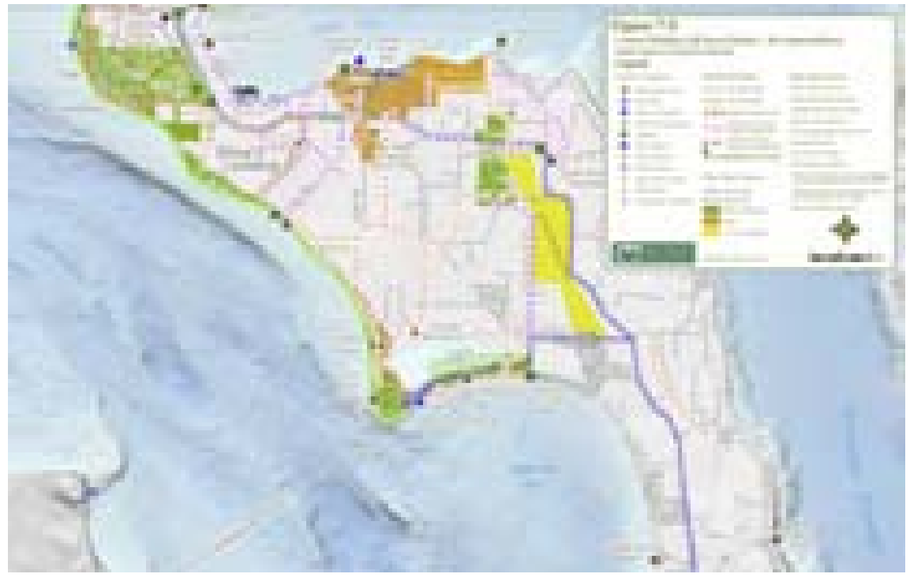
Making the public aware of how Fort Casey State Park fits within the Island County non-motorized plan has the potential to increase park visitation rates without increasing pollution and other impacts that are associated with automobiles. Promoting low-impact travel such as bicycling and public transit is in keeping with Sound-Friendly practices.

Action: *Develop water trails in collaboration with Washington Water Trails Association (WWTA).*

The WWTA has supported the development of a network of routes along rivers or across open bodies of water for people using small beachable boats like kayaks, canoes, day sailers, or rowboats. Water trails are associated with land facilities that support water travel, which include launch and landing sites, campsites, rest areas, and other points of interest. Exploring how Fort Casey State Park could fit into the network could provide additional exposure and connection to Northwest water recreationists. Cascade Marine Trail campsites already exist on Whidbey Island at Fort Ebey State Park, Joseph Whidbey State Park, Deception Pass State Park, and Oak Harbor City Park.

Action: *Provide universal access to all constituents (e.g., disabled, children, elderly) as appropriate while protecting sensitive habitat and cultural areas.*

Analyze universal accessibility of Fort Casey State Park facilities and develop prioritization list to improve access. Balance accessibility needs within the context of protecting sensitive habitat areas, cultural landscapes, and historic structures.



Island County Non-Motorized Trail—Central Whidbey Off-Street Route Recommendations

Strategy 3: Promote low-impact recreation and Sound-immersion park activities.

Action: *Increase year-round use of park by attracting visitors during the off-season with a variety of events and uses.*

Investigate ways to increase fall, winter, and spring use by sponsoring activities or events that take advantage of available Park facilities and staff. Promote activities, events, and uses that have low environmental impact, that encourage awareness and knowledge of the Puget Sound environment, and that foster stewardship. Increasing off-season use could increase revenue and provide additional community connections with the Park.

Action: *Provide better access to shoreline by removing riprap wall at campground shoreline to improve access*

Removing the existing riprap will improve beach access (which is currently awkward and difficult) and will encourage visitors to develop an appreciation for a more natural environment. Access should be at an easy gradient, without major debris or obstacles, and in keeping with the natural character of the beach.

Action: *Explore opportunities for incentive-based recreation.*

Consider using economic incentives to encourage Sound-Friendly recreational activities and practices. Where appropriate, provide economic incentives for use of alternative modes of transportation, including mass transportation, with the aim of decreasing levels of automobile traffic. Investigate the implementation of circulation practices that vary by day of the week or season, and that expedite entry and reduce congestion, thereby reducing air pollution from idling engines.

Action: *Encourage Sound-Friendly recreation activities, e.g., birding, scuba diving, hiking, responsible fishing, etc.*

Recreation programming for Fort Casey State Park should focus on activities that capitalize on the park's natural features and setting while minimizing environmental impacts. Activities that are dependent upon or enhanced by the natural features of the park should be highlighted to encourage users to care for and protect the natural environment. These types of activities should be emphasized in shoreline areas.

Suggested recreational programming for Fort Casey State Park includes:

- Diving—snorkel or scuba
- Boating
- Tidepooling
- Bicycling
- Fishing
- Hiking
- Kayaking
- Picnicking
- Low-impact camping
- Education-interpretation
- Bird/wildlife viewing
- Low-impact group gatherings
- Heritage Tourism

Strategy 4: Promote community stewardship of park.

Action: *Promote Admiralty Head and Fort Casey as a cultural landscape, and as part of the Ebey's Landing National Historic Reserve (NHR).*

Develop and promote awareness of Fort Casey in the context of Ebey's Landing NHR, and find ways to relate the Park's history to that of the NHR, to Whidbey Island, and to the region. Coordinate educational and cultural programs with Ebey's Landing NHR administrators and staff.

Action: *Enhance and promote existing stewardship programs, e.g. Beach Watchers Program.*

Find ways to increase participation in the Beach Watchers as well as other existing stewardship programs, and explore the development of additional programs that would support park goals and stewardship ideals.

Action: *Provide outreach to community businesses; create incentive-based opportunities for participation in the Sound-Friendly Vision.*

Develop relationships with local businesses and business leaders and inform them about and/or involve them in planning processes. Their knowledge of local business practices, community values, and connections to real estate has the potential to enhance the implementation of green strategies and may provide innovative solutions for revenue generation. Provide incentives to businesses who implement Sound-Friendly strategies on their own properties.

Strategy 5: Inform and educate public about park stewardship and Sound-Friendly recreational opportunities.

Action: *Provide information on how to be an "environmental camper" at campground.*

Educating and encouraging campers to practice environmentally sustainable stewardship has the potential to greatly reduce degradation of the park and the surrounding environment from inappropriate use.

Action: *Implement Coastal Fortification Interpretive Master Plan.*

Emphasize Fort Casey State Park's role in the Coastal Fortification Plan, and coordinate activities and events with other forts and historic sites.

Action: *Educate public about Sound-Friendly Vision through various techniques: materials and talks at the new Interpretive Center; guided tours of the Park and its green design technologies.*

Through stewardship programs, workshops, seminars, talks, work-parties, and any other methods, provide education and training on the Sound-Friendly green technologies practices that are demonstrated within the Park. Coordinate with Camp Casey, Washington State Ferries, and other partners to disseminate Sound-Friendly information to public.

GOAL 5

HEALTHY STRUCTURES: Sustainable Design and Low-Impact Development

Fort Casey State Park is the home to a wide variety of structures, of both historic military as well as more recent construction, which comprise a valuable built infrastructure for both park recreation and maintenance. Each building offers a set of needs and opportunities in terms of its continued utility and contribution to the park's impact upon the health of the Puget Sound: for instance, some are threatened by erosion and material degradation, while others would greatly benefit from increased energy and water consumption efficiency. In addition to retrofitting existing buildings, there is the potential that new structures will be built to meet growing park needs in the coming years. The thoughtful design of this new architecture provides a fertile ground for creating an agency-wide precedent for progressive and low-impact design to both shelter and educate the park's visitors and employees alike.

Strategy 1: Promote energy-efficient and energy-producing design, and reduce resource and energy consumption.

Action: *Improve energy-efficiency of all applicable historic park structures during planned rehabilitation.*

Stopping air-infiltration with the introduction of weatherstripping at openings or caulking sheathing gaps can be a non-intrusive means to increase heating efficiency. Adding insulation as needed in attic or roof plenum spaces and sub-floors can also provide significant added R-value without disturbing historic building envelopes. The lighthouse and offices are all prime examples of conditioned historic structures which might benefit from these energy efficient measures.

Action: *Design of any new construction, or reconstruction (e.g., Fire Control Station) should incorporate energy-efficient design*

This can be achieved through a variety of measures, including ensuring a rigorous insulating standard for new construction that meets or exceeds LEED certification (through the use of thermally-efficient glazing, generous wall, roof, and sub-grade insulation (e.g. using high density foam and minimization of air-infiltration around openings). In addition, thoughtful building siting, glazing, and shading design can maximize natural daylighting and winter heat gains in the structure while minimizing unwanted heat gain and glare in the summer months. Reconstructed buildings need to balance sustainable shading and siting practices with the need to be historically sensitive and accurate in terms of the original structures' materials and location (Hansen, 1997).

Action: *Explore alternative energy production, e.g., solar lighting.*

Explore viability of renewable, non-polluting, small-scale, on-site energy production and implement trial uses.

Examples of these alternative methods and some potential applications are solar-powered site and emergency building lighting, and/or small, discreetly-placed wind turbine arrays for restroom lighting and fixture electricity. Any applications would need to meet park guidelines for preservation of cultural landscape vistas.

Action: *Implement low-flush fixtures, greywater re-use, and other water conservation techniques.*

In addition to installing low-flush fixtures and waterless urinals at comfort stations, consider capturing roof runoff at all possible places in a cistern or rain barrel for re-use as greywater to flush those fixtures. Other greywater uses can also include "rain gardens" at building perimeters or rinse stations for Park service vehicles, for example.

Strategy 2: Use sustainably harvested, local, non-toxic materials and finishes in building design and maintenance.

Action: *Use "green" materials in historic structures' rehabilitation or reconstruction, and ongoing maintenance (e.g., Fire Control Station, Lighthouse, NCO Quarters).*

Whether as an intensive use of resources, such as the reconstruction of a complete historic structure (such as the slated Fire Control Station), or more minor maintenance and repair (e.g., upkeep on existing structures such as the lighthouse, gun emplacements, and NCO Quarters), restrict use to safe and Sound-friendly materials and substances. For wood products, consider locally-harvested or small diameter engineered products, and encourage the use of sustainably harvested Forest Steward Council (FSC) certified wood. Specify non-toxic architectural finishes, such as low-VOC paints, and recycled content products wherever possible, such as in fly-ash concrete and recycled post-consumer steel products.

Strategy 3: Site and design new park structures in a way that achieves the Sound-Friendly Vision.

Action: *Apply LEED and other green design criteria to new park structures.*

Site new structures away from sensitive habitat areas (e.g., Golden paintbrush vegetation, juvenile salmon shallows, etc.). Maintain a minimum distance from shoreline when siting septic drain fields and parking lots to allow effective infiltration. Siting and design of new structures should be consistent with historic preservation and management of the cultural landscape.

Strategy 4: Improve "green design" education.

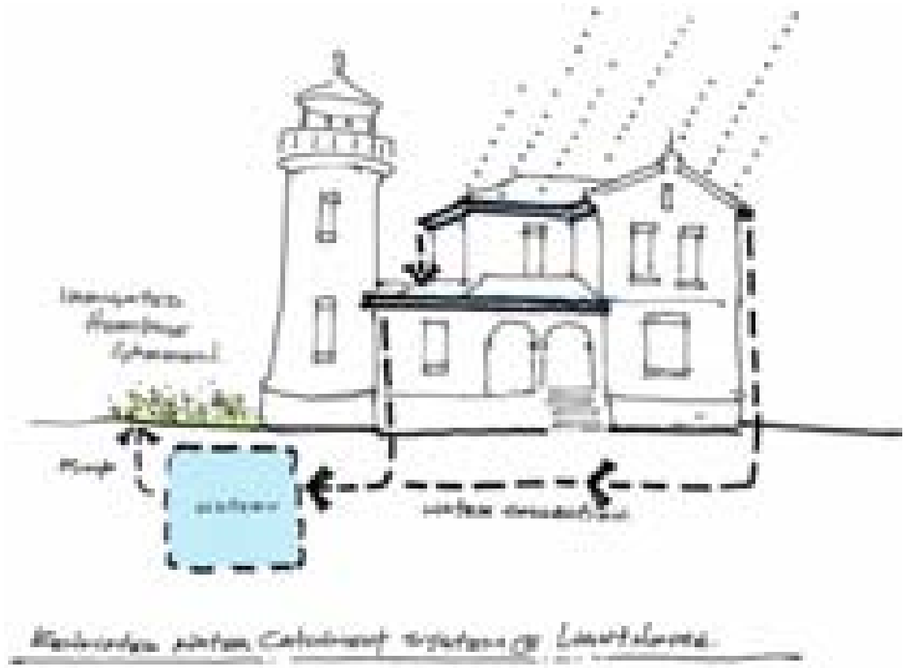
Action: *Interpret and/or model the use of "green," non-treated construction materials in historic structures and in new construction.*

Action: *Use solar panels to illuminate signage.*

Solar panel use would be an excellent opportunity to highlight the value of alternative energy methods, while saving money and resources and providing an interpretive opportunity simultaneously.

Action: *Re-activate Lighthouse's historic cistern to demonstrate smart technologies and historic application of Sound-Friendly techniques.*

Continue the rehabilitation of the historic buried water cistern adjacent to the lighthouse and re-connect to the building's roof gutter and downspout system. Utilize the recycled roof runoff to irrigate the historic planting area. Interpret this system and its historic context for park visitors.



Saltwater State Park

When originally dedicated in 1926, Saltwater State Park was intended to end the rivalry between the cities of Tacoma and Seattle. Located halfway between the two cities, a symbolic hatchet lies buried under a rock within the park (Washington State Parks web page 2007). Constructed in the 1930s, largely by the Civilian Conservation Corps (CCC), the park contains buildings which exemplify the unique design and construction of this era. The most historically significant structures are the park office and ranger housing buildings near the entry. Constructed with indigenous stone bases and logs, they are relatively intact and provide an opportunity to educate the public about the massive work effort of the CCC.

The natural setting of these historic structures is characterized by a diverse cross-section of habitats. Key habitat features of the park include McSorley Creek, approximately one-quarter mile of shoreline along Puget Sound, and a large forested area. While the park provides greater habitat function than the highly developed adjacent areas, many of the alterations made for park uses have reduced the quantity and quality of habitat. In fact, the altered park shoreline and creek are identified in the WRIA 9 Salmon Habitat Plan as a priority restoration action to support salmon recovery in the Green-Duwamish Watershed.

McSorley Creek is a salmon-bearing stream that flows approximately one mile through the park before draining into Puget Sound. The creek supports coho and chum salmon and cutthroat trout. Historically, this lower creek section likely meandered across the entire valley floor. The inability of the creek to migrate across an active floodplain now limits natural creek processes; the creek is unable to form natural stream meanders that provide habitat complexity such as pools and gravel bars. Also, in the lower portion of the creek, the modified corridor is significantly narrowed and channelized.

As a precious sliver of the native Puget Sound environment surrounded by urban uses, Saltwater State Park provides visitors with numerous recreation opportunities that are consistent with its natural character. Activities such as diving, swimming, fishing, tide-pooling, biking, hiking, wildlife viewing, kayaking, picnicking, and low-impact camping all harmonize with the natural bluffs, upland forest, riparian creek corridor, and saltwater beach that characterize the park. These types of recreational activities immerse the visitor in the Puget Sound environment by providing a direct connection with nature. These low-impact uses and programs are Sound-Friendly in that they can be designed to minimize environmental disturbance; Washington State Parks can continue to encourage these activities through future design and planning efforts.

Other recreational amenities, such as the playground and lawn, were placed along the waterfront and offer important recreational benefits. However, these amenities lack significant environmental benefits. Their nearshore location impacts the environment by displacing the natural beach habitat, and its associated ecological functions, with lawn. Recreational playing, picnicking, and gathering can continue to exist in the park, but design efforts should seek a more ecologically sensitive integration of these activities into the natural environment. Design efforts could work to incorporate playing and picnicking within a natural beach or bluff environment in a way that minimizes impact while enhancing visitor experience and connection with the unique Puget Sound setting. Additionally vehicular camping which, while popular, does not contribute to a healthy Puget Sound. While the local community benefits from the opportunity to camp without lengthy travel time, vehicles and campers require a large area of paved surface and contribute camping waste and vehicular pollutants to the watershed.

Saltwater State Park - Context Recommendations

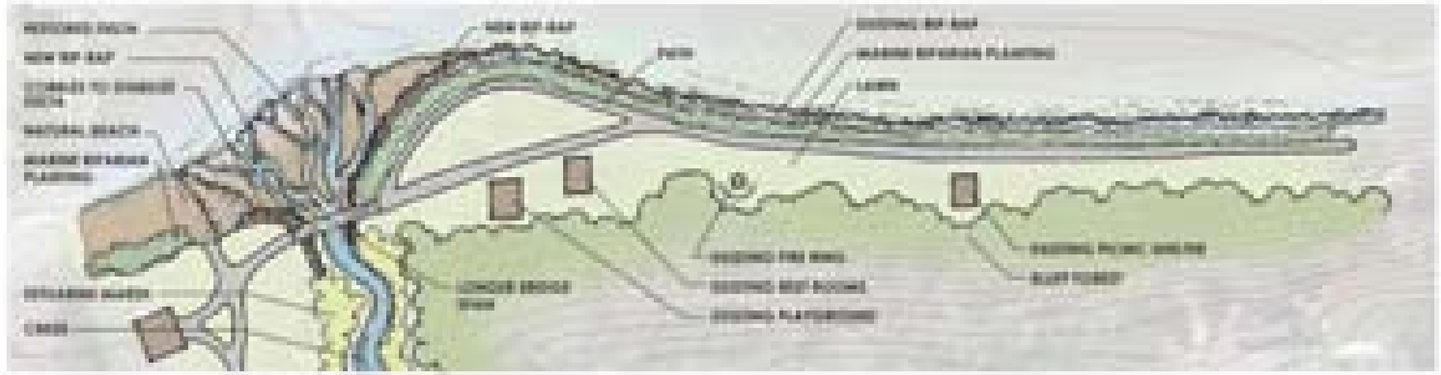
Washington State Parks Sound-Friendly Vision Plan

April 2007

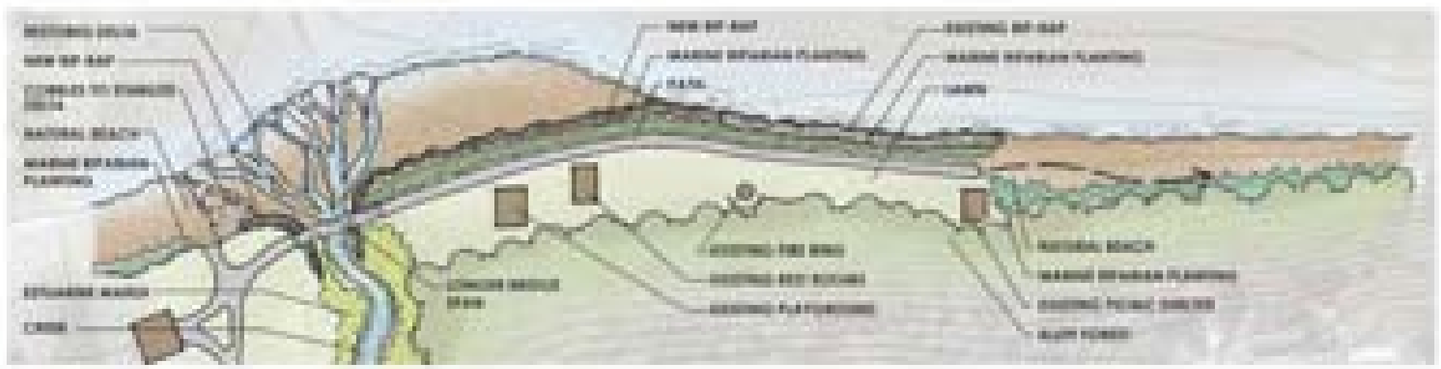
Saltwater State Park - Concept Plan
Washington State Parks Sound-Friendly Vision Plan

April 2007

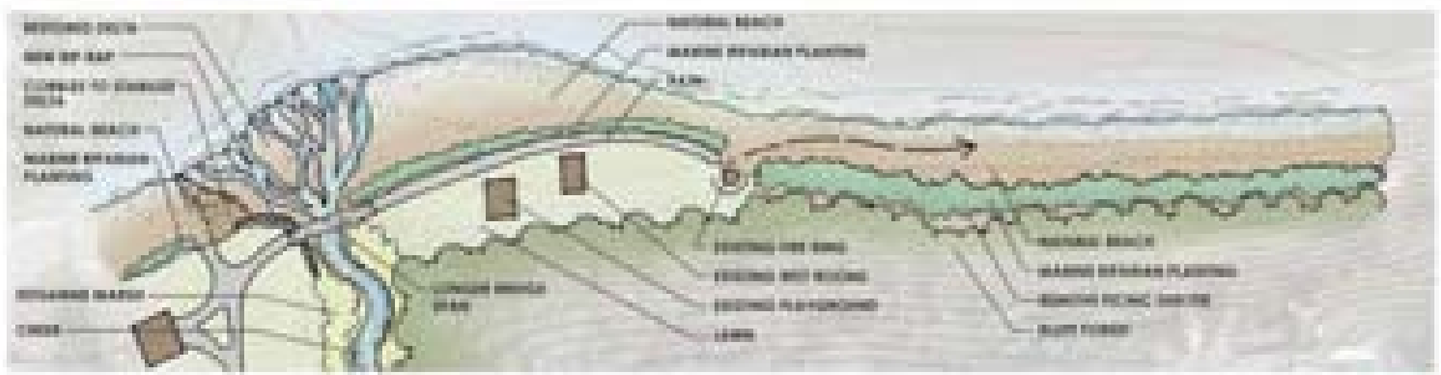
Minimal Sound-Friendly Shoreline Plan



Moderate Sound-Friendly Shoreline Plan



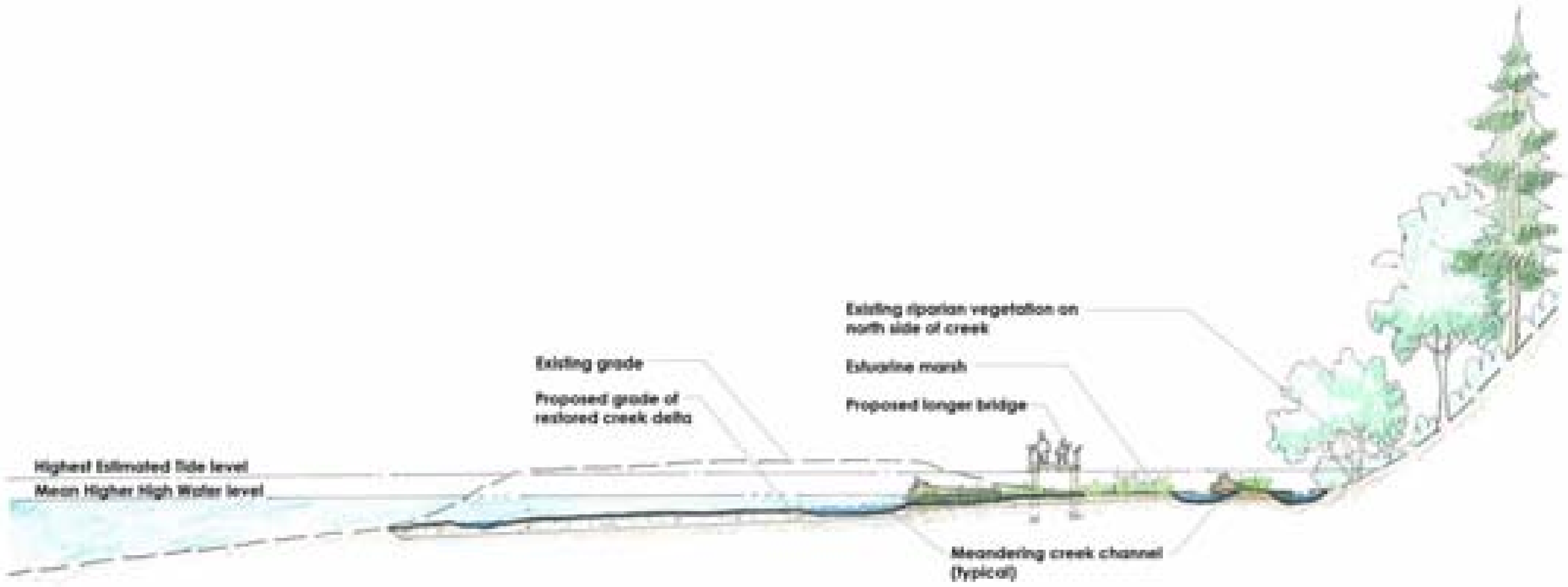
Most Sound-Friendly Shoreline Plan



Saltwater State Park - Shoreline Options

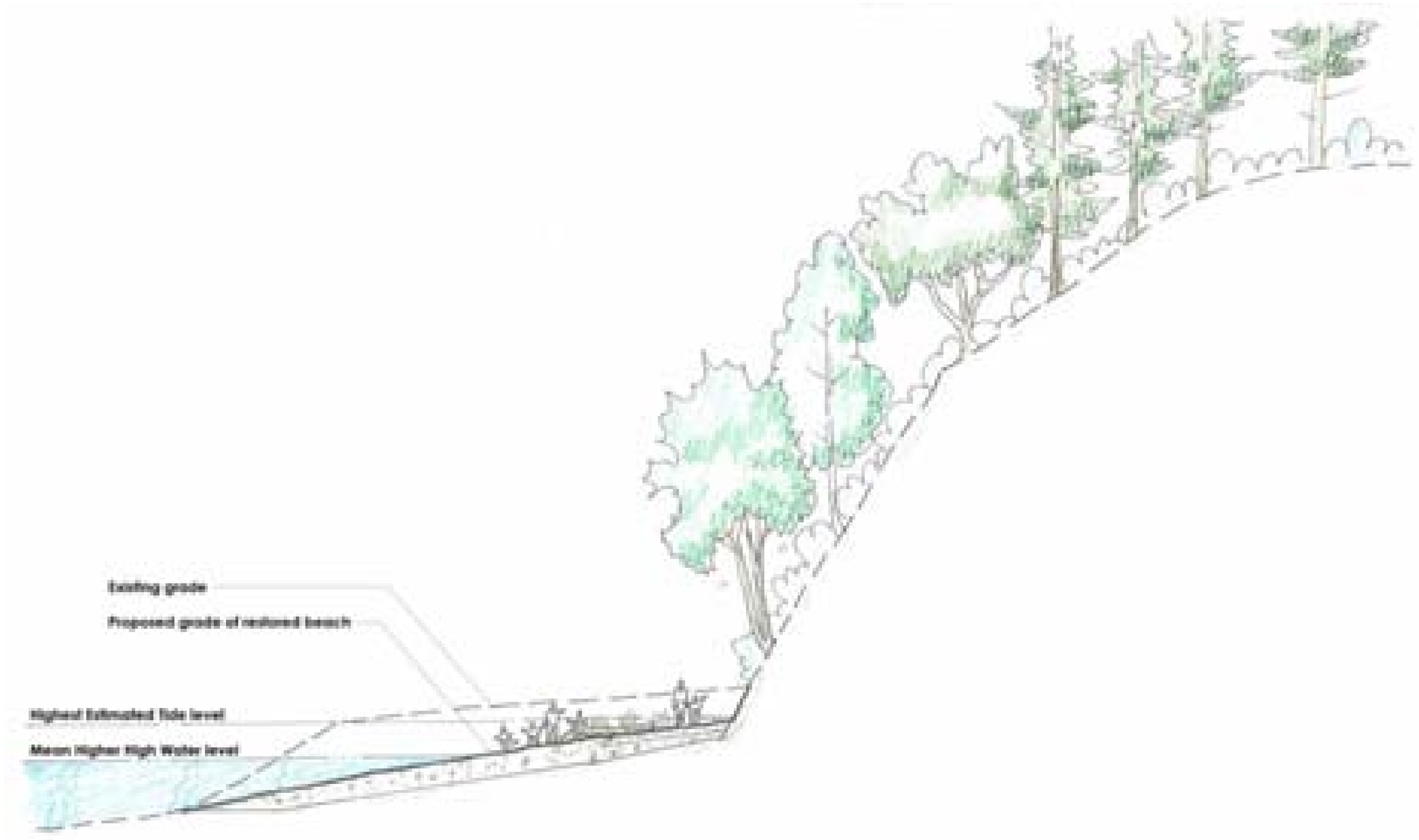
Washington State Parks Sound-Friendly Vision Plan

April 2007



Saltwater State Park - Creek Delta Cross Section
(Section cut on diagonal)

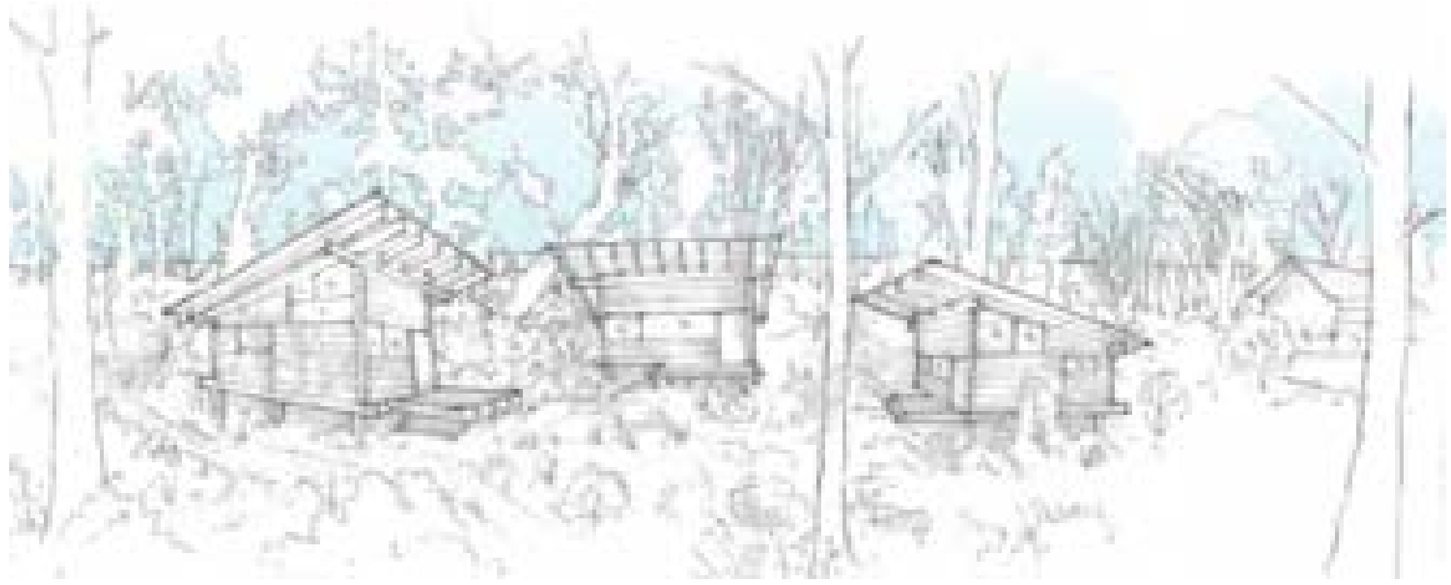
0 10 30 40

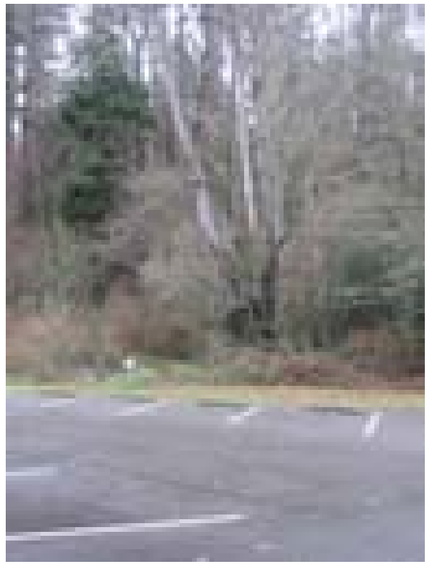


Saltwater State Park - North Beach Cross Section

0 5 10 20


WELCOME CENTER
- Visitor information
- Park office
DROP-OFF &
SHORT TERM PARKING
PARKING
NON-HISTORIC
BUILDING
SECTION
REMOVED
CAMP GROUND
Cabins 7 of 9
RESTROOM
OVERLOOK
(TYPICAL)
PICNIC
PAVILION
ROAD
PICNIC
GROVE
BOARDWALK
BLUFF-TOP
FOREST
PATH
FIREPLACE
GATHERING AREA
UPLAND
FOREST
OVERLOOK





Example of where bioswales and rain gardens could be installed along parking areas

GOAL 1

HEALTHY WATER QUALITY: Reduce water and sediment pollution into the Puget Sound

Washington State water quality standards were updated in 2005. Providing stormwater treatment within Saltwater State Park will bring the Park into compliance with current regulations. Reducing the amount of impervious surface within the Park by 30% will reduce peak flows into McSorley Creek and the Sound by 20–30%. Low-impact development elements that treat stormwater, such as rain gardens, bioswales, porous pavements, and bioretention areas, can also serve as landscape amenities. Native plants should be used wherever possible to provide habitat and create a Pacific Northwest aesthetic throughout the Park.

Strategy 1: Reduce effective impervious areas and maximize infiltration.

Action: *Reconfigure parking, and treat stormwater by using bioswales and vegetated infiltration areas.porous pavement or treatment infiltration with plantings.*

At present, stormwater runoff from parking areas near the shoreline collects in a catch basin and discharges directly into Puget Sound. Reconfiguring the current drive aisles and parking spaces to minimize required pavement and using porous pavement will reduce runoff. Infiltration swales or rain gardens along a parking area's perimeter and between parking stalls will remove pollutants and sediments from stormwater runoff before it discharges into the Sound.

Action: *Change the configuration, quantity, and/or size of parking lots and roads.*

The current parking configuration was designed over 50 years ago. All parking areas within the Park should be redesigned to meet current parking standards, including stormwater management requirements.

Action: *Relocate parking further away from shoreline and creek.*

Relocating current shoreline parking further east in the Park to the camping area and upper parking areas will reduce car-related water pollution entering Puget Sound. The relocated parking should be designed to narrow the drive aisle and create smaller parking spaces in order to reduce runoff.

Action: *Provide overflow parking off-site and provide a shuttle, perhaps by incorporating a nearby Metro Park and Ride lot or provide shared parking at surrounding businesses.*

Providing off-site parking and giving visitors multi-modal options for arriving at the park will reduce the need for parking within the Park. Existing Park and Ride areas along State Highways 509 or 99 could be used for overflow parking during times of low commuter use and high park visitor use, such as summer weekends. State Parks could manage the Park's internal parking and bus drop-off areas to encourage visitors to park off-site. This system could be implemented on a trial basis during programmed events.

Action: *Direct runoff to a recharge facility such as a wetland or pond that will allow natural infiltration of water.*

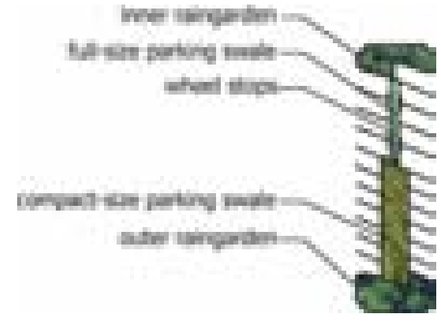
A constructed wetland or pond can be used to collect and clean stormwater. Biological processes in the wetland remove pollutants while the sediments settle out of the water. The clean water is then slowly released into Puget Sound, McSorley Creek, or the subsurface.

Action: *Manage year-round parking uses to address peak and low seasons.*

Existing paved parking lots could be removed and/or replaced with pervious paving. Grass or permeable pavers could be used in the upper areas of the park that are closed during the winter in order to create overflow parking for the peak summer months. Pervious surfaces could also be used in the upper camp areas, especially on the sites that walk-ins frequently use.

Strategy 2: Treat storm water runoff before discharge to the Sound.

Action: *Incorporate Low-impact Development (bioswales, rain gardens, infiltration trenches) along parking lots and roads.*



Components of LID stormwater treatment elements in a parking area

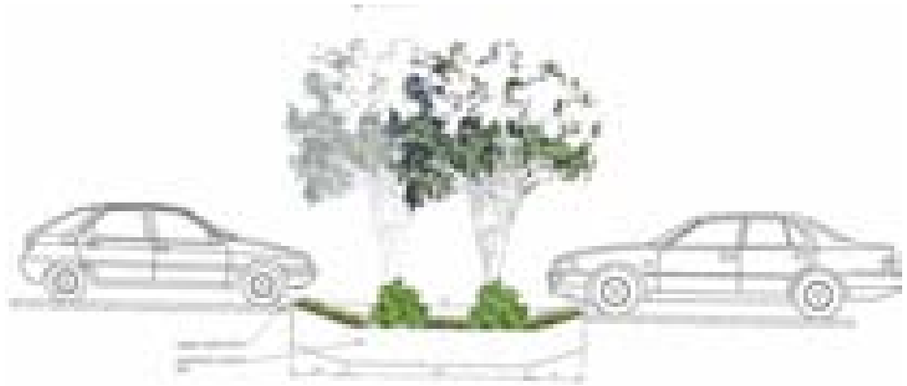
Low-impact development elements can be used between parking stalls and along the perimeter of parking areas and roadways to collect and treat stormwater runoff that contains sediments, metals, and oils from cars and trucks. Since all low-impact development elements improve water quality, they should be incorporated throughout the Park, regardless of whether the stormwater is discharging into the creek, Puget Sound, or a piped conveyance system.

Action: *Increase vegetation buffer between parking areas and water bodies to filter stormwater.*

Stormwater runoff, especially upland in the campground area, can cause erosion and pollution in McSorley Creek. Increasing the vegetation buffer between the camping areas and the creek will stabilize the adjacent stream bank and reduce bank erosion. Native plantings will slow down stormwater runoff and filter out pollutants and sediments.

Action: *Treat water from shoreline parking lots and roadways using bioremediation methods (e.g. bioswales).*

Bioremediation methods use the biological and chemical processes of plants and soil microbes to remove pollutants from stormwater. Bioretention methods retain pollutants and sediment within an area, allowing bioremediation methods to be more effective. Bioremediation and bioretention methods can be incorporated into rain gardens, swales, and other low-impact development elements in order to improve the quality of collected stormwater runoff.



Example of bioswales cross sections that could be installed along parking areas

Strategy 3: Improve effectiveness of water use and wastewater treatment.

Action: *Reduce or eliminate chemical discharge in recreation vehicle (RV) sewage at park's dump station. Consider re-locating dump station if RV camping is eliminated from park.*

RV owners use the dump station located in the Park's upper parking area to empty and clean out their waste tanks. The State Park can educate RV users on appropriate cleaning methods and chemicals that are safe for the Midway Sewer District.

Action: *Implement water conservation measures, e.g., waterless urinals and water-efficient fixtures.*

As comfort stations are upgraded and rebuilt, waterless urinals and water efficient fixtures can be installed to conserve water and reduce wastewater. Water efficient fixtures, especially showers and toilets, can substantially reduce water use.

Action: *Add facilities that can use gray water for irrigation of a demonstration lawn or plant bed.*

Water from outdoor wash-off areas and showers near the shoreline can be used to irrigate planting areas. Drains from wash-off areas can be connected to underground irrigation pipes that water the planting areas' root zones.

Existing comfort station at Saltwater State Park

Action: *Add dishwashing stations at campground.*

Dishwashing stations at the campground can educate park users on soaps and detergents that are watershed-healthy. Drains from the dishwashing stations can also be incorporated in gray water irrigation systems. In addition, composting areas can be located throughout the park to reduce organic waste and nutrient levels in Park wastewater.

Strategy 4: Reduce, eliminate, and treat sources of toxic chemical pollutants (e.g., pesticides, fertilizers, gasoline, creosote, detergents).

Action: *Evaluate pollution management at Midway Landfill to determine potential impacts to McSorley Creek.*

The Midway Landfill is located in Kent, Washington, and maintained by the City of Seattle. In 1986, the landfill was placed on the National Priorities List for Superfund Sites. The landfill's cleanup is managed by the Department of Ecology under the authority of the Model Toxics Control Act. The First Five-Year Review Report for the Midway Landfill site was prepared in 2005 by the Department of Ecology. Reviews of the cleanup process are required every five years. State Parks should participate in this review process and in downstream monitoring for pollutants from the landfill.

Action: *Develop and implement program for reducing sources of chemicals.*

Vegetation management practices and the cleaning products used at the Park can add pollutants to stormwater and wastewater. The State Park should reduce its use of hazardous chemicals and fertilizers that contain high levels of phosphorus since these products can degrade nearby sensitive areas, including McSorley Creek and Puget Sound.

Action: *Eliminate use of cleaning chemicals (e.g., restroom maintenance).*

Park buildings and facilities should be cleaned with biodegradable products to reduce the amount of toxic chemicals entering the Park's stormwater and wastewater, as well Park staff's and visitors' exposure to such chemicals.

Action: *Provide effective program for Park visitors to clean up their pets' waste in the park.*

Providing bags for dog waste is an affordable way to remind Park users that pet waste can pollute McSorley Creek and Puget Sound.

Strategy 5: Reduce erosion and fine sediment loads in streams and other water bodies.

Action: *Limit pedestrian access to specially designed viewpoints along the creek edge while protecting other sensitive creek areas to reduce erosion of banks and restore riparian vegetation.*

The existing trash area enclosure next to McSorley Creek could be relocated outside of the riparian corridor.

Vegetation along McSorley Creek provides nutrients and food for stream organisms, as well as shade which helps regulate the stream's temperature. Providing Park visitors with controlled access and view points along and over McSorley Creek will allow the Park to better manage the riparian corridor and restore vegetation where previous pedestrian access has degraded the stream bank.

Action: *Move camping and other high-impact uses away from creek edge to reduce erosion of banks and restore riparian vegetation.*

McSorley Creek's location has changed since the Park was created. Camping and trails along the riparian corridor draw Park users to the streambed. Clustering campground spaces closer together and further away from the creek will reduce campers' impact on McSorley Creek as well as re-establish the creek's riparian vegetative buffer.

Action: *Trap sediments in creek tributaries that are entering the park from off site sources in an off-channel settling basin.*

McSorley Creek is an urban watershed. The creek's North and South Forks are located amongst residential and commercial land uses. The stormwater detention pond at the Midway Landfill discharges into McSorley Creek. During storm events, sediments from upstream roadways and properties are carried into the stream. A settling basin could be installed on either tributary of McSorley Creek or closer to the shoreline where they meet. This effort should be coordinated with the City of Des Moines. An existing Stormwater Management Capital Improvement Plan has scheduled a McSorley Creek Drainage Basin Plan to be developed in 2008.

Action: *Increase vegetation buffer along water bodies.*

Increasing buffer vegetation along the stream and shoreline will increase nutrients in the stream, prevent erosion and increased sediment loading, increase shade in the riparian corridor, and increase habitat.

Action: *Plant native vegetation in sediment source areas within Park that may be outside of riparian corridor.*

Revegetating the bluff and the forest understory throughout the Park will reduce sediment loading and improve hydrologic function in McSorley Creek's lower basin. Restoring forest vegetation will also ensure that the Park's vegetation is diverse in terms of species and maturity, which will further assist in enhancing the forest's ability to retain stormwater and prevent sediment runoff.

Strategy 6: Improve water quality education.

Action: *Model low-impact development and watershed health. Demonstrate upstream stormwater impacts to the park and ecosystem.*

Saltwater State Park makes up a significant portion of the McSorley Creek Basin. The Park's low-impact development measures should be highlighted to Park visitors and the local community as techniques that can improve the whole basin's health and should be considered in the City of Des Moines's development of a Stormwater Management Plan for the McSorley Creek basin.

Action: *Provide hydrology interpretation (stormwater runoff and estuarine history).*

There is some interpretive signage concerning the McSorley Creek basin in the lower parking lot; however, the creek cannot be seen from the sign's location. Signage about the basin should be located throughout the Park and along the stream.

Action: *Model low-impact development and watershed health. Demonstrate upstream stormwater impacts to the park and ecosystem.*

The State Park, City of Des Moines, City of Kent, and Federal Way should work together to create a campaign to inform residents and Park users about the watershed and how actions in the surrounding developed areas upstream impact the Park and the basin. The parties should also work to create upstream connections to the Park via green infrastructure networks and low-impact development which will improve the health of the creek's upstream reaches and, consequently, the health of the creek, the Park, and the Sound.

Action: *Provide wastewater and water use interpretation (e.g., dump station interpretation).*

Park users who empty their RV and camp waste in the Park and use the Park's water resources should be reminded that their actions affect the Park and Puget Sound.

Action: *Provide a demonstration rain garden linked to existing downspouts.*

A series of rain gardens in the residential neighborhoods surrounding the State Park would be easy for homeowners to install and could reduce high flows into McSorley Creek. Saltwater State Park could install demonstration rain gardens within the Park and provide visitors with diagrams and instructions on how to install similar rain gardens on their own properties. The demonstration rain gardens should be placed in high-use areas within the Park, such as existing comfort stations and administration buildings in the Park's upper areas.

Action: *Use the park to demonstrate upstream stormwater impacts to the park and ecosystem.*

Saltwater State Park could host "spring clean-up" days to educate Park users about the impacts of upstream activities on the creek basin. Clean-up activities could include repairing trails that have been washed out by heavy rainfalls and picking up litter that has washed into the Park with upland stormwater runoff.

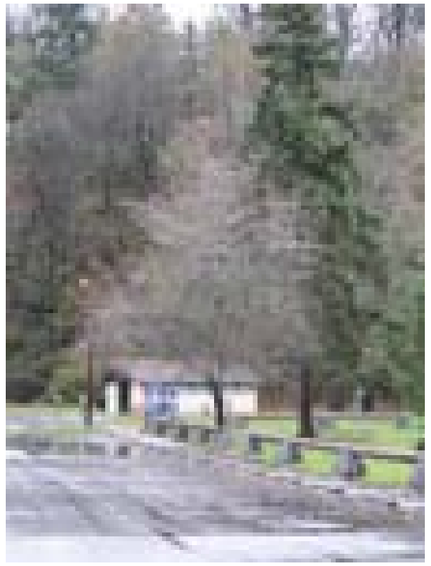
Action: *Provide interpretive information about the Park's leading efforts to eliminate pollutants in maintenance and operation practices.*

All cleaning products sold at the concessions area should be consistent with Sound-friendly practices. If low-flow fixtures are installed in the comfort stations, signage should inform users about the fixtures and explain why the fixtures were installed. Vegetation management within the Park should support efforts to preserve the diversity and maturity of the Park's native vegetation.

GOAL 2

HEALTHY WATER QUANTITY: Address water quantity (e.g., flooding, sea level rise)

New development and redevelopment within the McSorley Creek basin will contribute to increased stormwater runoff in the downstream reaches of the creek. Global warming is changing weather patterns and creating higher temperatures and more frequent severe storm events. The sea level rise predicted for the Seattle area is 2.8 feet by the year 2100 (UW Climate Impacts Group website). To preserve precious shoreline access within this urban area, Washington State Parks must take measures to preserve the facilities and natural amenities within Saltwater State Park.



Existing comfort station and parking lot near the shoreline at Saltwater State Park.

Strategy 1: Identify areas and facilities at risk of sea level rise and re-design or re-locate them.

Action: *Move concessions building out of the flood zone **

Action: *Review and adapt the existing concessions building to a flood tolerant use such as an open-air gathering pavilion**

*Note: Actions contingent upon further study of the Park Cultural Landscape and its Historic Structures.

Action: *Relocate all facilities and upland use areas at risk (0–100 year timeframe) of projected sea level rise to higher areas. Develop a phased removal or re-location strategy.*

This action entails mapping the extent of the projected rise (between two to three feet) in mean sea level, accounting for storm and high tide events, and moving facilities at risk of damage, such as buildings emergency access routes, out of these areas. It is recommended that relocation occur in a phased approach where facilities at most immediate risk (affected currently or within 25 years) would be addressed first, facilities at risk in 25 to 50 years second, etc.

Strategy 2: Manage watershed-wide hydrology.

Action: *Protect headwaters wetlands by including area in park's long-term boundary for potential acquisition or conservation easements.*

Multiple wetland systems critical to the watershed's health are located on private property within the basin's upper reaches. These wetlands are critical to watershed health, and naturally treat stormwater pollutants, nutrients, and sediments that flow into McSorley Creek's upper reaches. State Parks should explore opportunities to work with landowners and within its own agency to include these sensitive areas within the Park boundary and to make connections between these areas and the Park.

Action: *Address the primary sources effecting watershed hydrology: the park, neighborhoods, headwater wetlands, and the landfill.*

Washington State Parks should partner with the City of Des Moines, City of Kent, and Federal Way to complete the McSorley Creek Basin Plan.

Strategy 3: Manage floodplain to accommodate high flows within the park.

Action: *Restore an expanded natural floodplain within the park capable of handling high flows. Give stream more room to meander within floodplain.*

McSorley Creek is disconnected from its floodplain throughout most of its route through the park and is constrained to a narrow alignment adjacent to the valley floor. The removal or setback of the dike currently constraining the southern creek bank would improve the connectivity of the creek with its floodplain and give the creek more room to meander. This widens the area available to convey storm flows and as a result can decrease the scour and damage associated with high water events. The reconnected floodplains can provide important refuge habitat for juvenile salmon.

Widening in the lower portion of the creek along the large parking area is of highest priority because it is the most significantly narrowed reach. Widening this reach would enhance habitat for downstream migrating juvenile salmon and prevent the occurrence of the fish being swept into Puget Sound before they have completed the physiological transition that enables them to survive in salt water.

Existing seasonal park access located along the riparian corridor.

Action: *Relocate campground out of riparian valley.*

Relocating the campground out of the riparian valley would provide much more space to make the habitat improvements described in Strategy 3. If camping is removed or re-located to a nearby state park, then wider stream and riparian corridors could be restored. This would be particularly beneficial to stream habitat function because the additional space would allow for process-based restoration.

Action: *Re-establish surface water connection between freshwater seeps near parking lot and creek as part of an expanded floodplain.*

A seep and wetland is located east of the restroom building at the toe of slope, on the south side of the ravine. The large day-use parking area is located between this seep and McSorley Creek. In conjunction with reconfiguring the lower parking area, moving the campground out of the riparian valley, and restoring an expanded natural floodplain, this seep could be reconnected to the creek. The intent is to have an open, natural channel connecting the seep to the creek. The open channel could also serve to convey stormwater from the reconfigured parking lot and lawn areas.

Action: *Address lower parking lot flooding.*

The Park's lower parking area periodically floods, especially when a high tide and a storm event occur simultaneously. Relocating all or some of the parking stalls closest to the shoreline to areas higher up into the Park will reduce the runoff that needs to be collected by the existing catch basin. Shoreline parking could be removed and redistributed among higher areas in the Park, such as the area in the vicinity of the campground. Visitor access to the shoreline would be non-motorized. Moving the lower parking to the east away from the creek, and raising the parking lot's elevation could also reduce flood severity.

Roadway and grass area that could be narrowed to increase the width of the riparian corridor.

Action: *Widen stream corridor to expand capacity*

Widening the stream corridor by removing or setting back dikes would expand its capacity to convey storm flows. This beneficial restoration can decrease the scour and damage associated with high water events and restore the stream corridor to a more natural floodplain condition.

Strategy 4: Improve water quantity education.

Action: *Interpret human impacts on upland and estuary environment.*

Action: *Create low-impact development element demonstration projects that are replicable for residents and businesses including options.*

As mentioned in Goal 1: Strategy 6, some low-impact development elements can easily be applied to residential and commercial applications in an urban setting. For example, rain gardens can be created at the base of downspouts to reduce the amount of runoff from existing structures.

Action: *Interpret rationale for renovating or relocating concessions building due to rising sea levels.*

Create interpretive exhibits that illustrate the impact of sea level rise on existing shoreline buildings and structures. If the concession building is renovated or relocated to accommodate rising water levels, interpret this action to the public. Interpretation could be multi-media by using 3-D modeling or mapping projections to show rising water levels at Saltwater State Park.

GOAL 3

HEALTHY HABITAT: Create healthy habitat and populations of fish and wildlife species

Saltwater State Park contains a diverse range of aquatic and terrestrial habitats whose function for fish and wildlife species can be significantly enhanced through a variety of actions. McSorley Creek is a salmon-bearing stream that flows through the park before entering into Puget Sound. The in-water and riparian habitats along the creek's route and Puget Sound marine nearshore offer opportunities to improve the quality and quantity of habitat for the park's fish and wildlife species.

Strategy 1: Protect and restore natural shoreline and marine nearshore processes.

Action: *Remove riprap and upland fill around creek mouth to expand and, restore the creek delta, and establish estuarine marsh vegetation.*

The riprap bounding both banks of the creek severely narrows the creek mouth and impairs its function. Removing some or all of the riprap and fill to expand the creek mouth would allow creek flows to disperse more widely across the delta and provide a broader area over which salinities transition from freshwater to saltwater. This is beneficial for juvenile salmon outmigrating from McSorley Creek as the transition between these habitats is physiologically demanding. In addition, the expanded estuary would support more expansive and diverse estuarine community of plants and animals. The marsh vegetation that could grow at the expanded creek mouth provides high functioning habitat for juvenile salmon by providing structure and cover, as well as contributing to the food base supporting the fish.

View of backshore vegetation and upper intertidal zone from a wide creek delta

Removing the riprap and fill at the creek mouth would create approximately one quarter acre of highly functioning intertidal creek mouth delta habitat. This would result in the loss of approximately one eighth of an acre of lawn, as well as removal of riprap which has low recreation and habitat value. This action would require the relocation of approximately 7 picnic tables and removal of one fire pit. In addition, the existing creek bridge would need to be replaced with a new and longer bridge. No changes to the restroom, historic fire ring, or shoreline picnic shelter are needed to implement this action.

Without careful design, removal of the riprap and fill at the creek mouth could facilitate the loss of some of the beach sediment south of this area, including in shoreline areas south of the park. This potential loss is due to the existing creek mouth armoring functioning as a groin that stops northerly sediment drift, thus causing sediment to accumulate to the south. To address this potential loss and to maintain the beach south of the creek delta, installation of a two foot thick layer of beach cobbles (4-8" naturally occurring rounded rock) is proposed just south of the existing riprap to match the current beach profile south of the creek. These cobbles would maintain the current beach conditions south of the creek, but allow sediment transport over the cobbles and natural creek delta formation.

Action: *Remove riprap and upland fill around creek mouth, remove north and south ends of the riprap revetment and some of the upland fill north of McSorley Creek, reconnect bluff to beach at the north end of the park, and replace approximately 50% of the lawn with natural beach containing gravel and logs.*

Before and after view of park where shoreline was pulled back to restore habitat and improve beach accessibility for park users

The riprap revetment and upland fill extending from McSorley Creek to the northern Park boundary reduces the amount of high functioning intertidal habitat and alters important habitat forming and sustaining processes such as sediment input, sediment transport, and energy dissipation. This action would remove and/or relocate the riprap revetment along the north and south shoreline portions of this area north of the creek and restore natural beach in both. At the north end of the park, the beach and bluff would be reconnected, partially restoring an important ecological process. This action would result in an expanded intertidal area and significantly reduce the extent of riprap revetment. The restored natural beach would provide natural beach slopes similar to those found in nearby unmodified shorelines with a mix of sand, gravel, and cobble substrates. This more natural beach setting would also recruit large drift logs into the high intertidal and backshore areas. The restored beach would provide improved migratory and rearing conditions for juvenile salmon and high intertidal spawning habitat for surf smelt, an important prey item for juvenile salmon and other fishes. Shorebirds would also benefit from the added intertidal areas habitat and associated prey resources.

Removal of the riprap and fill at the creek mouth would create nearly one acre highly functioning intertidal habitat, including the creek delta. This would result in the loss of approximately half of the lawn (approximately half an acre) from the creek mouth north, as well as removal of riprap which has low recreation and habitat value. This action requires the relocation of approximately 17 picnic tables and removal of one fire pit. The existing creek bridge would need to be replaced with a new and longer bridge. No changes to the restroom, historic fire ring, or shoreline picnic shelter are needed to implement this action.

Example of a shoreline armored with rip rap

Example of a functioning shoreline condition with mixed beach cobbles and logs

Example of meandering stream and constructed logjam for habitat at higher flows

Balancing the deficit in sediment supply at the north end of the park with the current abundance of beach sediment at the south end of the park is needed for this action to be successful. In order to maintain the beach south of the creek delta and south of the park, installation of a two foot thick layer of beach cobbles (4-8" naturally occurring rounded rock) is proposed just south of the existing riprap. This cobble feature would be designed to allow more beach sediment to move north than is described in the previous action. Allowing some sediment movement to the north is an important aspect of this action because it addresses the current deficit of sediment supply to the beach just north of the park boundary. The natural transport of sediment to this shoreline section from sources to the south will reduce the risk of accelerated beach and bluff erosion n at the north end of the park.

Action: *Remove the entire riprap revetment and most of the upland fill at the creek mouth and along the Puget Sound shoreline to restore the creek delta, intertidal beach and the bluff to beach sediment supply. Replace 75–90% of the upland lawn with natural beach containing gravel and logs.*

This action would provide all the benefits described above and more. The reconnection of the bluff to beach sediment supply would restore the natural sediment input processes along much of the park's shoreline. This restoration of shoreline sediment supply and transport processes, as well as the expanded backshore beach area is highly desirable ecologically. Of the three shoreline actions, it is the most consistent with the process-based restoration being advocated throughout Puget Sound. These activities contribute to make the park's shoreline habitat more self-sustaining, but will also benefit shoreline areas to the north of the park where the current disconnection of sediment supply decreases shoreline habitat function. In addition, the presence of riprap in the intertidal zone along the park's shoreline would be eliminated through this action. The removal of riprap and restoration of continuous intertidal beach is a significant habitat improvement for migrating juvenile salmon, and the entire Puget Sound nearshore plant and animal community.

Removing the riprap and fill at the creek mouth would create nearly one and one quarter acre highly functioning intertidal habitat, including the creek delta. This would result in the loss of most of the lawn (approximately three quarters of an acre) from the creek mouth north, but allows for preservation of approximately one quarter acre of lawn between the creek and the fire ring. This action would also require the removal of the riprap which has low recreation and habitat value. This action would require the relocation of approximately 25 picnic tables, the shoreline picnic shelter, and removal of one fire pit. The existing creek bridge would need to be replaced with a new and longer bridge. No changes to the restroom and historic fire ring are needed to implement this action.

Strategy 2: Protect and restore freshwater systems.

Action: *Widen stream reaches to restore natural stream meander.*

This action would remove or set back the bank armoring that occurs along McSorley Creek. Widening the creek corridor to restore natural stream meander will add habitat by making the creek longer and enhance habitat quality by restoring processes leading to added beneficial instream habitat structure. The addition of instream habitat structure could be accelerated through the action described below that entails adding log jams. Additional actions described below would affect the location and scale of this action.

Widening in the lower portion of the creek along the large parking area is of highest priority because it is the most significantly narrowed reach. Widening this reach would enhance habitat for downstream migrating juvenile salmon and prevent the occurrence of the fish being swept into Puget Sound before they have completed the physiological transition that enables them to survive in salt water.

Action: *Reconnect floodplains and valley bottom wetlands to McSorley Creek and integrate with natural drainage features from developed areas.*

McSorley Creek is disconnected from its floodplain throughout most of its route through the park and is constrained to a narrow alignment adjacent to the valley floor. The removal or setback of the dike currently constraining the southern creek bank would improve the connectivity of the creek with its floodplain. This widens the area available to convey storm flows and as a result can decrease the scour and damage associated with high water events. The reconnected floodplains can provide important refuge habitat for juvenile salmon.

Action: *Remove camping from Saltwater Park to restore McSorley Creek and the riparian valley. Re-locate or expand camping in a nearby state park.*

Removing the camping area in the park would provide much more space to make the habitat improvements described in this Strategy and in Strategy 2. If camping is removed or re-located to a nearby state park, then a widened stream and riparian corridor could be restored. This action would be particularly beneficial to stream habitat function because the additional space would allow for process-based restoration.

New programming would be created in the area currently occupied by the campground. Newly design trails and viewpoints would provide directed access to the creek while reducing impacts to the creek. A McSorley Creek interpretive and educational focus area would be created for visitors to learn more about McSorley Creek and the upper watershed.

Action: *Remove existing camping and create new lodgings away from the creek (e.g., yurts or cabins or complex in upland Administration area).*

This action would provide more space for stream and riparian habitat improvements by creating more separation between camping areas and McSorley Creek. This would be particularly beneficial to stream habitat function because the additional space would allow for process-based restoration.

Action: *Add large woody debris and engineered log jams to add habitat structure in stream.*

This action can provide immediate improvements to instream habitat structure in McSorley Creek. This is particularly important in the lower portion of the creek where very little instream structure currently exists. A series of engineered log jams could provide pools that would provide habitat for juvenile salmon and reduce stream velocities which would allow more gravel and cobble substrate to remain in the creek for spawning salmon. The log jams could direct flow to establish more meandering of the creek channel, particularly if the stream corridor is widened as discussed elsewhere in this strategy. The added habitat structure could improve habitat until more natural large wood recruitment processes, such as those through enhanced riparian vegetation (Strategy 3) begin to provide wood.

Action: *Allow fallen trees to remain in or over creek as long as visitor safety is not compromised.*

The existing riparian vegetation in the park currently provides fallen trees that lie either in or across the creek. These trees provide valuable habitat structure for fish. This action is specific to the creek and riparian zone. It would modify park management of fallen trees and allow the fallen trees to remain in or over the creek.

Strategy 3: Protect and restore native plant communities.

Action: *Restore upland forest native vegetation and remove invasive plants such as English Ivy. Restore native vegetation to reduce erosion of bluff. Focus pedestrian circulation onto defined trails to reduce soil compaction and vegetation impacts.*

While the ravine slopes at the park are well vegetated with large, native trees, the understory (small trees, shrubs, and groundcovers) lacks a multi-layered structure, and is dominated by non-native invasive species. The goal of this action is to remove the abundant English ivy and replace it with higher-functioning native vegetation. Invasive plants such as English ivy, Japanese knotweed, and Himalayan blackberries all limit the space available for native plants and threaten the health of native vegetation. These invasive plants typically expand rapidly and can completely dominant the vegetation community. Invasive removal that includes removing the root structure is necessary to control the species. Areas where invasive vegetation has been removed can be replanted with an assortment of native understory shade tolerant trees, shrubs, and groundcovers.

Efforts by volunteers in the park have been successful at removing English ivy from trees, but the effort has not expanded to removing the presence of the ivy and groundcover and ongoing threat to native plant community health. The action aims to broaden the effort to more community and non-profit groups so that a more comprehensive removal and replanting effort can be launched and sustained.

Establishing trails out to the viewpoint would limit park user trampling and reduce the soil compaction that currently occurs throughout the top of bluff portion of the park. Planting native vegetation adjacent to the top of the bluff will establish a root structure that will enhance the stability of the upper slope by holding soil and enhancing percolation of stormwater into the soil rather than across the surface. Additional native understory vegetation in the off-trail areas would further improve slope stability.

Action: *Expand width and enhance quality of riparian buffer along both sides of the creek (includes actions in Goal 1, Strategy 5).*

Expanding the width and quality of the riparian vegetation will enhance the habitat and water quality of the creek. Native riparian vegetation can provide shade, slow stormwater runoff, and contribute organic matter to fuel the base of the food web. With time, the vegetation can also provide small and large woody debris to form instream habitat structure.

Action: *Restore estuarine marsh at creek mouth and marine riparian buffer along shoreline.*

The removal of riprap and upland fill at the mouth of McSorley Creek as described in Goal 3, Strategy 1, creates habitat to support the establishment of an estuarine marsh. The extent of marsh vegetation will be limited by elevation relative to tidal inundation. Marsh vegetation would provide limited but high-functioning habitat for juvenile salmon by providing structure and cover, as well as supporting a community of macroinvertebrate prey for salmon and contributing organic matter to support the base of the food web.

Marine riparian vegetation along the backshore of the park shoreline north and south of the creek could further enhance habitat function. The functions provided by marine riparian vegetation to nearshore areas is an emerging science, but the importance of the vegetation continues to grow as more is learned. Marine riparian vegetation can contribute terrestrial-origin prey species to the nearshore and leaf litter to support the base of the food web, and in the long-term can provide large woody debris. Marine riparian vegetation also enhances percolation of stormwater into soils, thereby reducing surface water runoff, and increases shoreline stability through the establishment of the root structures to hold material in place.

Action: *Restore beach backshore vegetation such as native beachgrass.*

This action would add backshore vegetation such as native beachgrass. This vegetation would enhance the stability and sustainability of the backshore areas and contribute organic material and prey into the aquatic environment.

Action: *Locate new structures and paths away from sensitive habitats or ecosystems.*

New structures and paths will be separated from sensitive habitats to provide space for the habitats to function naturally. This will also provide a buffer between park users and the species utilizing the sensitive habitats.

Action: *Restore McSorley Creek's lower riparian corridor by re-locating creek-side campground to a nearby state park.*

Re-locating the campground to a nearby park and restoring the riparian corridor would greatly benefit the ecological functioning of McSorley Creek. This action would provide a wider corridor along the creek where native vegetation could be added. Native riparian vegetation can provide shade, slow stormwater runoff, and contribute organic matter to fuel the base of the food web. With time, the vegetation can also provide small and large woody debris to form instream habitat structure.

Strategy 4: Enhance native fish and wildlife species/communities.

Action: *Restore vegetated riparian corridor to increase inputs of detritus and organic matter.*

This action would restore the vegetated riparian corridor. In addition to other beneficial functions of such vegetation, the riparian corridor would provide increased inputs of detritus and organic matter. These inputs fuel the base of the food chain that supports the fish and wildlife communities of the park.

Action: *Provide suitable beach habitat for forage fish (sand lance and surf smelt) spawning.*

The removal of riprap on the north shoreline within the park as described in Goal 3, Strategy 1, would provide important spawning habitat for forage fish. Forage fish are major prey items for juvenile salmon. These fish spawn in sand and gravel in the mid to upper intertidal zone. Currently the riprap shoreline north of McSorley Creek does not provide suitable spawning habitat for forage fish. The removal of riprap and the restoration of a natural beach would support forage fish spawning.

Action: *Promote wildlife crossings connecting uplands and headwaters to the park.*

This action requires partnership beyond the park as it establishes upland corridors for wildlife movement from the headwaters of McSorley Creek watershed (outside of park) into the park. Currently some road crossings may limit this connectivity.

Action: *When trees in the park blow down, exposing root masses, and removal is necessary, trees should be removed with root mass intact and added to the creek for habitat structure.*

Native trees such as Black cottonwood, Red alder, Western red cedar, or Douglas-fir trees that fall in the park in developed areas should be stockpiled for later addition into the creek to provide habitat structure. Trees with or without rootwads would have habitat value. Their effectiveness and sustainability as habitat in the creek will depend upon their placement within the stream; therefore design plans should be developed prior to placement.

Strategy 5: Improve public education and interface with fish, wildlife, and sensitive habitats.

Action: *Improve bird-watching interpretation.*

Action: *Create an "Inter-tidal Learning Center" that is coordinated with other regional learning centers, possibly by renovating the existing concessions building.*

Action: *Develop a program to restore habitat structure and diversity to the forest in partnership with volunteers and local non-profit stewardship groups.*

Efforts by volunteers in the park have been successful at removing English ivy from trees, but the effort has not expanded to removing the presence of the ivy and groundcover and ongoing threat to native plant community health. The action aims to broaden the effort to more community and non-profit groups so that a more comprehensive removal and replanting effort can be launched and sustained. Two models for this program are the Green Seattle and Green Tacoma Partnerships that focus on restoring urban greenbelt forests. These efforts have been led by the Cascade Land Conservancy.

Action: *Develop interpretive trails to allow viewing of spawning salmon in the park in ways that better protect riparian habitat and spawning salmon.*

In conjunction with expanding and restoring the McSorely Creek floodplain and riparian habitat, new and appropriate access facilities for visitors are needed. These interpretive trails and viewpoints will need railings and in some cases will need to be elevated to allow flood events to pass below them. Point access to view salmon spawning is recommended over continuous access paralleling the creek and in close proximity to it. This type of access significantly reduces disruption to both fish and wildlife and to the habitats they depend on. Point access could occur in several locations and also be used at other times of the year for bird-watching, environmental education, and general trail access. The railings and raised boardwalk features will also protect riparian vegetation from trampling.

Action: *Sponsor special events, activities, and celebrations at the park*

.Activities and events that focus on fish and wildlife values at Saltwater Park would enhance public understanding and appreciation of the park's unique and sensitive Puget Sound environment.

GOAL 4

HEALTHY PEOPLE: Promote diverse community and recreational opportunities that enhance Puget Sound health

As its name suggests, Saltwater State Park should be a place where people come to understand and interact with the natural saltwater environment of Puget Sound. The recreational program for the park should be born out of, and capitalize on, the amenities this natural environment offers—saltwater beach access, a salmon-bearing creek, a riparian valley, upland forests, and bluffs. These assets are rare in an urban environment and should be enjoyed through low-impact, passive recreation. Likewise, these delicate features are easily damaged and must be protected from high-intensity, active recreation that is better located in less fragile park environments. The park should also be a place where diverse communities can interact and appreciate their distinct cultural connections with nature.

Strategy 1: Facilitate and encourage community connection to park.

When people have a personal connection to a particular place in the natural environment, they develop a deeper desire to protect it. Strengthening the community connection to Saltwater State Park will instill in residents and visitors a sense of ownership and empower them to appreciate and protect the park, its plant and animal inhabitants, and water features. This will lead to a healthier Puget Sound.

Action: *Link the park to surrounding trail systems.*

Linking the park to surrounding hiking, biking, and kayaking trail systems brings visitors to the park without the pollution and impact that comes with automobiles. Traveling to the park along a trail system provides visitors with an understanding of how the forests, hydrology, and animal habitats extend beyond the park into surrounding neighborhoods, cities, and regions. The following could be pursued to increase connections to local trail systems:

- Link Saltwater State Park to the Cascadia Marine Trail, a 140-mile water route running from the Canada/US border to south Puget Sound which includes campsites for paddlers.
- Link Saltwater State Park to surrounding Des Moines City Parks via trails or greenways along existing streets and walks.

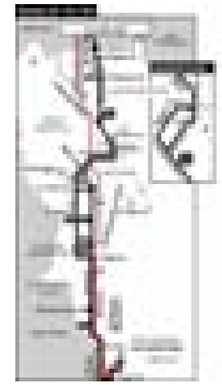
Action: *Access and interpret existing park information at community sources such as Des Moines Historical Society, UW special collections, and Washington Trout.*

Saltwater State Park has a rich history that has been documented in photographs and writing archived by the park and other institutions. In addition, various organizations may be able to partner with or assist the park with specialized studies and documentation of its natural resources. These efforts will help raise public awareness of the park.

- Non-profit organizations such as Washington Trout and other groups prepare studies of fish populations in Puget Sound streams and could be asked to study McSorley Creek.
- Photographs of Saltwater State Park from Washington State Parks, Des Moines Historical Society and the University of Washington Special Collections could be exhibited in the park or another location to foster appreciation for the park.

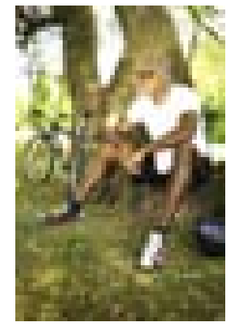
Action: *Review surrounding roads and neighborhoods for the inclusion of bike lanes, pedestrian paths, and bus stops.*

Many of the threats to Saltwater State Park's health and visitor enjoyment are rooted in the impact caused by automobile access and parking. Encouraging bus ridership, bicycling, or walking will reduce the volume of traffic in the park, while providing an enjoyable and healthy means of travel for park visitors.

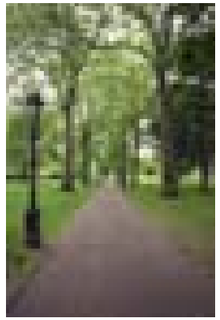


Metro Transit 131 bus route

- Saltwater State Park is currently served by Metro bus routes MT 121-I and MT 131-I which run between Seattle and Highline Community College in Des Moines and can bring visitors from their homes or possibly from remote parking lots.
- The closest Metro Park & Ride lot is at 9005 Olson Place Southwest which may be too distant from Saltwater State Park to entice visitors. However, local businesses and Highline Community College could be further investigated as locations where visitors could park and ride the bus to Saltwater State Park.
- Saltwater Park and its Sound-Friendly messages could be advertised on the bus or at the stops to raise awareness of bus access and the Sound-Friendly benefits of alternative transportation .
- Bicycle access is available on local roads and while the King County bicycle map recommends Marine View Drive as a low traffic route to the park. Washington State Parks should advocate for the road to be improved with bike lanes.



- Bike racks should be conveniently located in Saltwater State Park to provide security to cyclists and to visually encourage others to ride to the park.
- Local bicycle clubs could be asked to host rides to the park.
- The City of Des Moines should be engaged in discussion to ensure that sidewalks are provided and maintained in the surrounding neighborhood to allow pedestrian access to the park.
- Greenways along local streets could connect Saltwater State Park to the community and other destinations such as Highline Community College, Seahurst Park, and Dash Point State Park. These greenways would be characterized by wide walks, bike lanes, planted parkways and/or medians, signage, and site furnishings conducive to pedestrians and cyclists. Creation of these greenways should be coordinated with state and local agencies.



Community greenway connection to park

Strategy 2: Promote active lifestyle.

Action: *Provide outreach and universal access to all constituents (e.g., disabled, children, elderly) while protecting sensitive habitat areas.*

The steep topography that characterizes Saltwater State Park may challenge some visitors, yet universal access to and interpretation of the park's key features should be provided as appropriate for all visitors in a manner that protects sensitive resources.

- Access to key features can be provided through paved walks and boardwalks where needed. At a minimum, universal access should allow all visitors to sample or experience the following environments: beach, top of bluff, stream, and upland forest.
- Interpretation through images, tactile objects, and Braille should be incorporated into all educational efforts within the park. At a minimum these should include the following key park features: tidepools, bluffs, creek, and park history.
- Trail design should strive to include the natural sensory experiences that the park offers such as the sounds of the creek and shoreline, sounds of wind in the forests, scent of flowers, and tactile experiences of water, stones, and plants.

Strategy 3: Promote low-impact recreation and Sound-immersion park activities.

Action: *Provide low-impact comfort camping.*

Camping within the McSorley Creek corridor should be removed from this ecologically sensitive area. The following improvements should be considered:

- Consider removing camping from the park, making it day-use are that focuses one watershed interpretation and experience.

Low-impact cabin camping

- Reduce the number of RV campsites and limit the size of RVs allowed in the park.
- Create new lodging or comfort camping facilities on the bluff in the area of the current administration facilities. Group camping, yurts or cabins, and •expanded picnicking facilities could be constructed in areas already impacted by previous development. Maintenance facilities and ranger housing would be re-located out this upper area to create a welcome center and comfort camping facilities.

Action: *Promote Sound-Friendly recreation uses such as diving, biking, fishing, hiking, kayaking, windsurfing, picnicking, birding, tide-pooling, water trails, etc.*

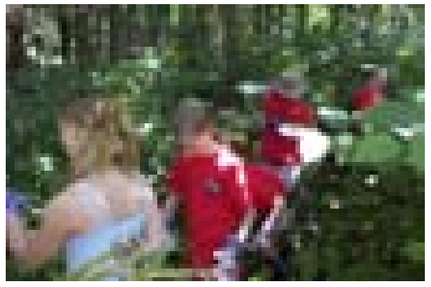
Recreation programming for the park should focus on activities that capitalize on the park's natural features while minimizing impact to them. Sound-Friendly recreational activities that are dependent upon or enhanced by the natural features of the park can encourage users to care for and protect the natural environment.

Recreation at Saltwater State Park includes:

- Diving—snorkel or scuba
- Swimming
- Tidepooling
- Bicycling
- Fishing
- Hiking
- Kayaking
- Windsurfing
- Picnicking
- Low-impact camping
- Education-interpretation
- Bird/wildlife viewing
- Low-impact group gathering—wedding pictures, fire ring gathering

Action: *Promote underwater park/scuba/snorkeling/tidepooling to foster appreciation of Puget Sound.*

In keeping with its name, Saltwater State Park should capitalize on the experience of its unique saltwater environment. Interpretation programs and signage should make visitors aware of the tidepools and freshwater delta that can be accessed from the park, while educating guests about proper exploration etiquette. Expanded diving facilities such as a staging area and rinse station should be provided. Schedules for high and low tides could be posted or be available through a link on the park's website, and volunteer docents could educate the public about the fascinating ecology that characterizes Saltwater State Park.



Community volunteers removing invasive plant species

Strategy 4: Promote community stewardship of park.

Action: *Partner with community groups in efforts to remove invasive vegetation.*

Several extremely generous park neighbors have taken it upon themselves to remove ivy from many of the park's finest trees, but there is much more that needs to be done. The City of Des Moines and the Seattle and Tacoma metropolitan region have a number of organizations that could help with the removal of invasive vegetation. These organizations frequently invite local businesses, school groups, and community clubs to attend volunteer work parties. Some organizations that could be helpful:

- Washington Native Plant Society
- Friends of Des Moines Creek
- Sierra Club South King County Group
- EarthCorps
- Cascade Land Conservancy
- Other groups (based on park staff input)

Action: *Foster stewardship with entire community; including watershed residents, non-profit groups, and municipalities and agencies.*

Watershed interpretive information

As the place where a large urban watershed meets the sea, Saltwater State Park could be a touchstone that unites diverse community and government entities. Agencies and environmental groups could invite neighbors from throughout the watershed, as well as seniors from centers such as Landmark on the Sound and students from schools such as Highline Community College, into dialog about shared environmental issues. Suggested topics could include discussions of watershed health and habitat connections along urban creeks and shorelines.

Strategy 5: Inform and educate public about park stewardship and Sound-friendly recreational opportunities.

Action: *Host workshops or "introduction days" to introduce people to low-impact recreation such as kayaking or bird-watching.*

Recreational instruction and classes

As discussed in Strategy 3 above, those who interact with Puget Sound through low-impact recreation are likely to develop an appreciation for and desire to protect the Sound. However, many of the recreational programs suggested may seem foreign or even daunting to some. By offering introductions to alternative camping, kayaking or bird watching, the park, its staff, and volunteers from recreational clubs or environmental organizations will share activities they enjoy while recruiting others to embrace and care for the Sound.

Cultural interpretation and education

Interactive group learning

Action: *Investigate and interpret cultural significance of McSorley Creek.*

In addition to important work that should be done to interpret the water quality and habitat issues along McSorley Creek, consideration should also be given to the potential presence of archaeological resources that might exist along the creek. Coast Salish groups used creeks like this one for trail connections and would certainly have fished salmon on its banks. Archaeological surveys should be conducted prior to any improvements to the park to uncover evidence of indigenous use of the area, especially near the mouth of the creek. Siting and development should be done with sensitivity to these cultural resources as evidenced by investigations, and interpretive opportunities should be explored in collaboration with local tribes.

Action: *Provide interactive learning and hands-on interpretation activities.*

One of the most powerful ways to engage people in a landscape is to give them opportunities to participate in its care and stewardship. Strategy 4 discusses opportunities to engage visitors in invasive plant removal and watershed-scale planning, but there are many great opportunities to give visitors hands-on participation with environmental studies in the park. Some examples include shore and terrestrial bird counts, returning salmon counts, stream water quality monitoring, endangered species protection, docent training (as at Discovery Park in Seattle), school group environmental field trips, and even an environmental summer day camp for area children (like the one operated by the Pacific Science Center at Mercer Slough Nature Park).

Interpretive facilities or a small conference center could be developed using existing Civilian Conservation Corps buildings in the upper park area.

GOAL 5
HEALTHY STRUCTURES: SUSTAINABLE DESIGN AND LOW-IMPACT DEVELOPMENT

Strategy 1: Promote energy-efficient and energy-producing design, and reduce resource and energy consumption.

Action: *Implement low flush fixtures, greywater re-use, and other water conservation techniques.*

At comfort stations, install low-flush fixtures and no-flush urinals to minimize water consumption. Consider capturing roof runoff in a cistern or rain barrel for re-use as greywater to flush those fixtures, rather than consuming potable water. Other greywater uses can also include "rain gardens" at building perimeters or rinse stations for Park service vehicles, for example.

Action: *Improve energy-efficiency of all applicable historic park structures during planned rehabilitation.*

Stopping air-infiltration with the introduction of weatherstripping at openings or caulking sheathing gaps can be a fairly non-intrusive means to increase heating efficiency. Adding insulation as needed in attic or roof plenum spaces and sub-floors can also improve efficiency. All improvements must be carefully executed to prevent impacts to the historical integrity of the buildings.

Action: *Implement elements of Low-Impact Design (green roofs, rain barrels, etc.).*

Among the typical Low Impact Development approaches outlined in Hinman, 2005 (e.g., vegetated roofs, rain barrels, permeable paving, etc.), consider park-specific interventions and improvements to non-historic structures or new buildings. Design guidelines for the appropriate treatment of both historic and non-historic structures should be developed so that Low Impact Design strategies are appropriately applied within the historic landscape context.

An example is the challenge of the flood-prone concession/meeting structure (a flooding problem which will only increase in severity and frequency as global sea levels rise). This structure could be removed from its current, low-elevation location altogether, and replaced with compatibly programmed space elsewhere in the park (possibly rebuilt farther inland in the current campground area, or on the bluff above). Another alternative would be to renovate the building to allow occasional flooding (remove the walls and create a protected but unconditioned building on piered columns). Replacement space for the lost conditioned meeting space would have to be considered for elsewhere in the park. These interventions assume (pending) non-historic status of the structure, to be verified by Parks.

Strategy 2: Use sustainably harvested, local, non-toxic materials and finishes in building design and maintenance.

Action: *Employ green materials in new construction such as proposed cabins.*

In addition to using recycled-content building materials (fly-ash concrete, steel, plastics, etc.) and sustainably harvested, FSC-certified wood, consider utilizing locally harvested or recycled materials, such as wind-downed trees or removed riprap for building purposes when possible.

Strategy 3: Site and design new park structures in a way that achieves the Sound-Friendly Vision.

Action: *Apply LEED and other green design criteria.*

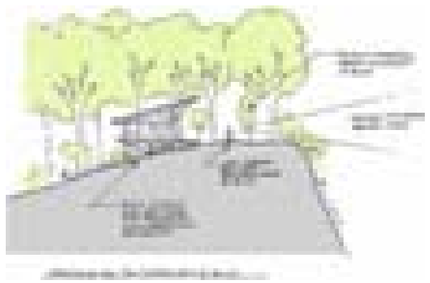
In addition to maximizing energy-efficiency by careful design of roofs, walls, and glazing, new construction can contribute to a Sound-friendly approach by minimizing resource consumption (strategic programming and engineering, use of recycled materials), non-toxic finishes, and local procurement.

Action: *Rehabilitate historic structures on bluff (e.g., remove non-historic elements).*

Emphasize the historic as well as the intrinsic sustainable value of the Ranger structures (longevity, respectful use of local materials) by restoring them to their original form and aesthetic beauty, and removing and re-locating the added, non-historic utility sheds and maintenance facilities.

Action: *Re-locate maintenance facilities away from bluff.*

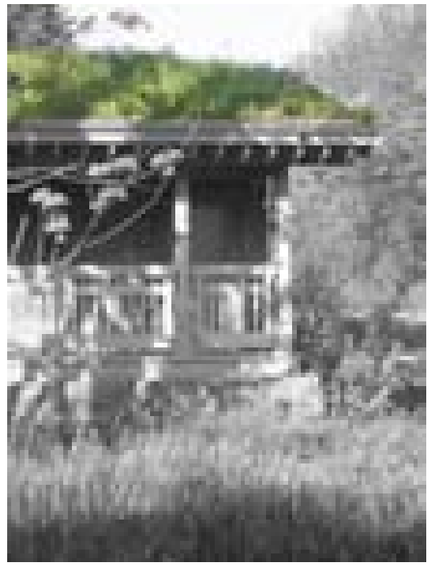
Remove the maintenance facilities away from the historic structures cluster located near the park entry. Relocate facility to less prominent site, for example, near the developed camping area if camping is pulled out of the riparian valley. This action will provide flexibility for creating a small cabin complex or comfort camping in a spectacular setting, while protecting the bluff and enhancing visitors' park entry experience.



Action: *Create new low-impact campus or cabin complex on developed areas on bluff.*

Protect bluff vegetation and soils by not placing new built facilities across the forested head of the bluff. Protect and manage views through building siting and master planning to protect historic structures and cultural landscapes. If the construction of new comfort cabins is clustered in pods away from the fragile bluff edge, for instance, not only is the natural balance of erosion and sediment flow preserved, but the recreational use of the park is maximized with minimal impact to the upland forest. Directed and limited foot and vehicular traffic protects delicate forest understory and tree roots from excessive compaction and abrasion. Designing buildings with small footprints and with minimal impact to surface water flow and plant growth around them are the beginnings of an effective strategy for architecture to "sit lightly on the landscape."

Strategy 4: Improve "green design" education.



Action: *Add green roofs to non-historic buildings in a manner that does not compromise cultural landscape.*

While perhaps not as quantitatively significant to the park's improved natural hydrologic cycle as other landscape-scale interventions, the implementation of green roofs on non-historic buildings would provide powerful embodied educational "signage" and is visually arresting to visitors. The importance of replacing habitat, stormwater infiltration area, and minimizing heat-island effects, and healing the disruptions to hydrology and ecology caused by building footprints can be made apparent, and represents many aspects of sustainable design.

Action: *Demonstrate energy resource management.*

Interpret the implementation of low-impact and sustainable design with signage, interactive exhibits, and educational workshops/camps for students and visitors (e.g., distribute a pamphlet or host a weekend class for homeowners on how to design and build a rain barrel catchment system or small rain garden).

Action: *Interpret sustainable retrofits to buildings (green roofs, low-flow fixtures, greywater recycling, sustainable materials, etc.).*

Twanoh State Park

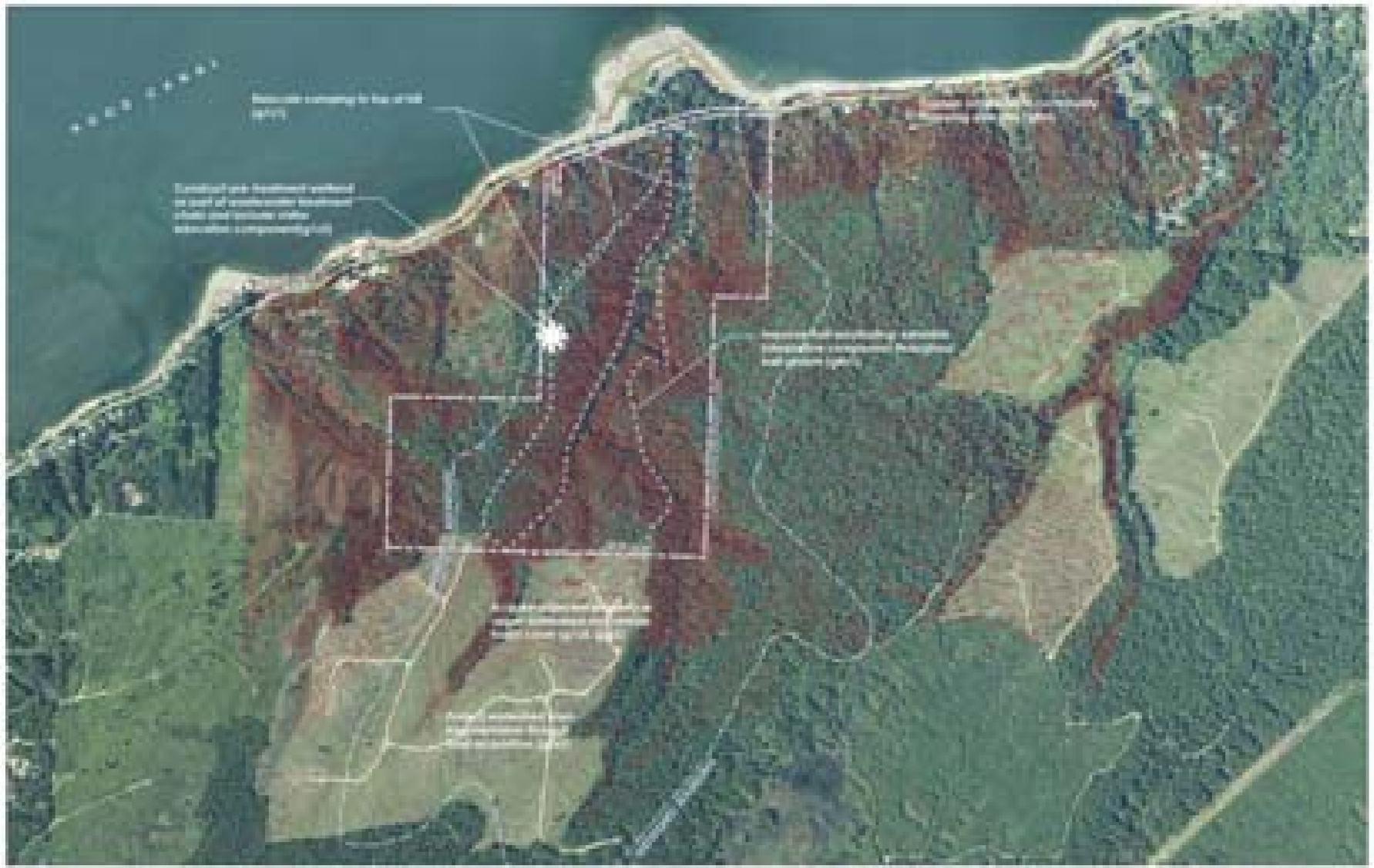
The development of Twanoh State Park began as a private resort and was later incorporated into the Washington State Park system. The Civilian Conservation Corps (CCC) built the majority of existing structures and facilities at Twanoh in the 1930s. Along with the existing park buildings, the CCC facilities include the day-use parking area along State Route 106, the split-rail fencing, the restrooms near the beach, the tennis courts, and the picnic shelters. The layout, materials, and siting are all consistent with a CCC cultural landscape.

The park limits comprise almost the entire Twanoh Creek Basin with a landcover of densely forested upland and shoreline area. Key habitat features of the park include Twanoh Creek, approximately one-half mile of shoreline along Hood Canal, and a large forested area. In this watershed, the only habitat modification occurring outside the park boundary has been logging in the upper watershed, occurring as recently as 2004. Overall, the watershed is in relatively good condition in terms of having a low percentage of roads, and other impervious surfaces. On the other hand, camping and trail systems within the riparian corridor of the upper reaches do impact the lower reaches of Twanoh Creek. Further, in the lower reaches of the watershed Twanoh Creek is diverted into a culvert to pass below State Route 106 before discharging into Hood Canal.

In this portion of Hood Canal, eelgrass is abundant in the shallow water along the shoreline. Pacific herring spawn throughout this area, and their eggs stick to eelgrass and other aquatic vegetation. Pacific oysters are abundant, and WDFW seeds the park shoreline to promote oyster production. Within Twanoh State Park however, the armoring at the mouth of Twanoh Creek and the beach shoreline greatly reduces the quantity and quality of upper intertidal and backshore habitats. Also, poor water quality in Hood Canal has temporarily closed the park area for shellfishing and has led to multiple fish kills due to low dissolved oxygen levels.

As is typical of a state park located on the shoreline of Puget Sound, visitors use Twanoh State Park for a wide range of active and passive recreation activities: boating, kayaking, dive training, fishing, hiking, picnicking, shellfish harvesting, swimming, tennis, and tent camping. WSPRC advertises the park as a marine camping park, and its primary recreation features are the boat launch, wading pool, pier, and campground. Park rangers describe the boat launch as the most popular one in the lower Hood Canal, because of its proximity to Tacoma and Olympia and the warmth of the water compared to the relative coldness of Puget Sound. Families from all over the United States have been camping at the park for generations, given the wealth of natural environment and the abundance of recreation facilities.

Recreationists access the park by driving their car or RV along State Route 106 parallel to the Canal's shoreline and through the middle of the park before entering one of the day-use parking lots adjacent to the water, or the overnight campground amongst the trees. From a recreational and ecological perspective, the highway and parking infrastructure occupy the most sensitive and significant areas in the park. The configuration of parking lots and highway immediately adjacent to an armored shoreline prevents people from accessing a dynamic shoreline and interacting with the complex land-water ecotone. In addition, the location of the highway through the middle of the park inconveniently forces visitors moving from the campground to the shoreline to cross the state route.



Twanoh State Park - Concept Plan
Washington State Parks Sound-Friendly Vision Plan

April 2007

Twanoh State Park - Concept Plan

Washington State Parks Sound-Friendly Vision Plan

April 2007

GOAL 1

HEALTHY WATER QUALITY: Reduce water and sediment pollution into the Puget Sound

Washington State water quality standards were updated in 2005. Providing stormwater treatment within Twanoh State Park will bring the Park into compliance with current regulations as outlined by Washington State Department of Ecology (updated in 2005). Reducing the amount of impervious surface within the Park by 30 percent will reduce peak flows from the Park by 20–30%. Low-impact development elements that treat stormwater, such as rain gardens, bioswales, porous pavements, and bioretention areas, can also serve as landscape amenities. Native plants should be used wherever possible to provide habitat and create a Pacific Northwest aesthetic throughout the park, in keeping with the park's cultural landscape.

Strategy 1: Reduce effective impervious areas and maximize infiltration.

Action: *Resurface and/or reconfigure existing shoreline parking areas to maximize infiltration (i.e. porous pavement).*

At present, stormwater runoff from the existing parking areas near the shoreline is collected into catch basins and asphalt ditches before discharging directly into Puget Sound. Reconfiguring the current drive aisles and parking spaces to minimize pavement area and using porous pavements will reduce runoff.

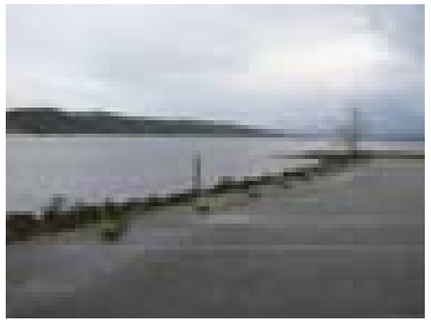
Gravel parking with stormwater treatment in the center

Porous and permeable pavements can improve water quality, especially if the soils beneath the pavement have a higher infiltration rate and the water can percolate down into the soil. Microbes live in the pores of the pavement and remove the pollutants as they filter down through the voids in the pavement.

A bioswale network can be used in combination with porous or permeable pavements, especially if the native soils below the pavement will not infiltrate the water.

Day use and parking area along the shoreline

Action: *Partially remove parking spaces immediately adjacent to the shoreline in both shoreline parking lots and relocate to upland side of highway.*



Proximity of existing parking area to shoreline

All parking areas within the state park should be redesigned to meet current parking standards, including stormwater management requirements.

Action: *Remove shoreline day use parking lot and relocate to existing campground area. Replace parking lot with walk-in camping/picnicking and a restored shoreline.*

Providing parking on the southeast side of the state highway will reduce car-related water pollution near the beach. The parking within the camping area and upper parking areas should be redesigned to narrow the drive aisle and create smaller spaces in order to reduce runoff. The shoreline parking lot could be replaced with Sound-Friendly programming, including walk-in camping/picnicking and a restored shoreline recreation area.

Action: *Provide infiltration trenches, bioswales and rain gardens.*

Infiltration swales or rain gardens within landscaped areas, along parking area perimeters, and between parking stalls will remove pollutants and sediments from stormwater runoff before it discharges into Hood Canal.

Action: *Increase tree cover over all parking areas to reduce surface runoff.*

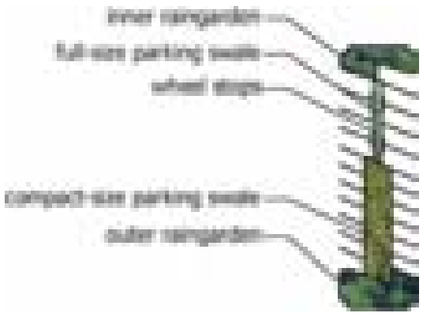
Increasing forest canopy within Twanoh State Park will increase the amount of evapotranspiration that occurs within the watershed, and reduce the amount of precipitation that falls to ground and becomes runoff. Planting more trees around and within the parking area can increase rainwater interception and reduce the amount of rainfall that needs to be managed.

Parking areas where forest canopy could be increased

Strategy 2: Treat stormwater runoff before discharge to the Sound.

Action: *Incorporate low-impact development elements (e.g. infiltration trenches, bioswales, and rain gardens.*

Low-impact development elements can be used in between parking stalls and along the perimeter of the parking areas and roadways to collect and treat stormwater runoff which contains sediments, metals, and oils from the cars and trucks that visit the park. Since all low-impact development elements improve water quality, they should be incorporated throughout the Park, regardless of whether the stormwater is discharging into the creek, Hood Canal, or a piped conveyance system.



Configuration of rain gardens and swales in parking areas

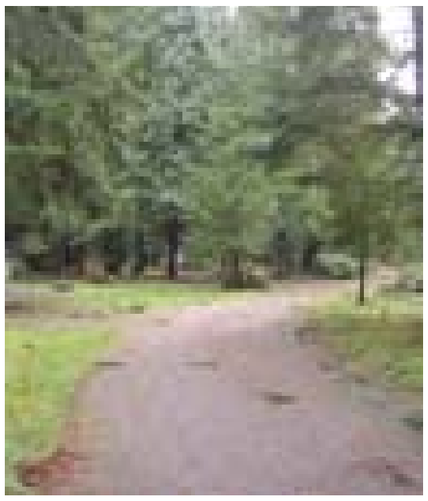
Action: *Increase vegetation buffer between parking areas and water bodies to filter stormwater.*

Stormwater runoff, especially in the upland campground area, can cause erosion and pollution in Twanoh Creek. Increasing the vegetation buffer between the camping areas and the creek will stabilize the adjacent stream bank and reduce bank erosion. Native plantings will slow down the stormwater runoff and filter out pollutants and sediments.

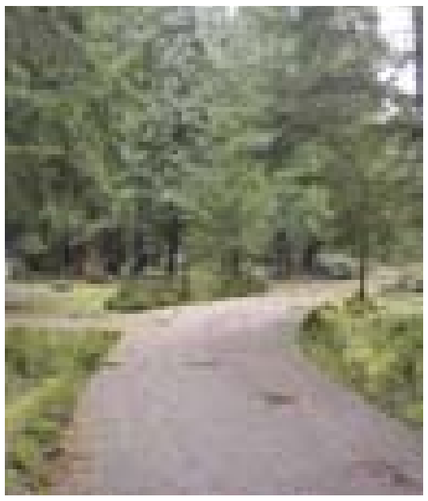
Potential cross section for swales in parking areas

Action: *Treat water from shoreline parking lots and roadways using bioremediation methods (e.g., bioswales).*

Bioremediation methods use the biological and chemical processes of plants and soil microbes to remove pollutants from stormwater. Bioretention methods retain pollutants and sediment within an area, allowing bioremediation methods to be more effective. Bioremediation and bioretention methods can be incorporated into rain gardens, swales, and other low-impact development elements in order to improve the quality of collected stormwater runoff.



Roadway within Twanoh State Park



Roadway within Twanoh with roadside swale

Strategy 3: Improve effectiveness of water use and wastewater treatment.

Action: *Implement water conservation measures, e.g., waterless urinals and water-efficient fixtures.*

Existing comfort station at Twanoh

As comfort stations are upgraded and rebuilt, waterless urinals and water efficient fixtures can be installed to conserve water and reduce the wastewater that is pumped to the drain field in the park's upper area. Water-efficient fixtures, especially showers and toilets, can substantially reduce water use in the busy summer months.

Action: *Add facilities that can use greywater for irrigation.*

Water from outdoor wash off areas and showers near the shoreline can be used to irrigate planting areas, as long as soaps and chemicals are eliminated or biodegradable. Drains from wash off areas can be connected to underground irrigation pipes that water the planting areas' root zones. Diversion of greywater into irrigation will also reduce the amount of wastewater that is pumped to the drain field in the Park's upper area.

Action: *Construct pre-treatment wetland as part of the wastewater treatment chain (polishing). Highlight this demonstration project to the public.*

In addition to the newly constructed drain field, Washington State Parks should consider constructing a pre-treatment wetland. Vegetation planted in gravel would be installed to create biological processes through which plants and microbes will reduce the nutrient levels in the wastewater before it enters the drain field and infiltrates into the ground.

This action is specifically valuable if the campground is replaced in the upper area of the park, and an interpretive trail is constructed that incorporates a pre-treatment wetland as an interpretive element. Pretreatment wetlands can be designed and constructed so there is no standing water. Plantings and signage could be implemented to keep people from contacting wastewater areas.

The pre-treatment wetland could be a powerful demonstration project for Park users and nearby residents who have drain fields along Hood Canal. Such wetlands are easy to install on residential property. Getting local homeowners to install pre-treatment wetlands could provide additional nutrient removal for the wastewater that ultimately filters into Hood Canal.

Existing boat launch area at Twanoh

Strategy 4: Reduce, treat, and/or eliminate sources of toxic chemical pollutants (e.g., pesticides, fertilizers, gasoline, creosote, detergents).

Action: *Designate boat rinse-off area.*

Many visitors and local residents come to the park to use the boat launch. Boat hulls accumulate sediment and oils when towed long distances on state highways. State Parks could build a centralized facility for boat washing before boats enter the water that would collect the rinse water and either treat it or hold it until it could be pumped elsewhere. This would be an opportunity for State Parks to provide a facility (a vault or tank) that could treat boat wash water prior to discharging into Hood Canal. People could also pay for this facility to offset the costs. This strategy would reduce input of pollutants to Puget Sound resulting from highway travel.

Action: *Eliminate or reduce use of cleaning chemicals (e.g., restroom maintenance) and pesticides.*

Reducing the use of hazardous cleaning products that are used to clean the parks buildings and facilities can reduce the impacts of pollutants in wastewater. Toxic chemicals can harm not only the environment but parks staff and visitors as well. Where cleaning products and pesticides cannot be eliminated, use environmentally-safe cleaning chemicals and pesticides.

Existing limited vegetation along between parking area and shoreline

Action: *Create more natural filtration systems, e.g., oyster beds and vegetative buffers to help improve Puget Sound water quality.*

This action entails expanding the distribution of habitat resources that also act as natural filtration systems that would help improve water quality. Vegetative buffers and marsh vegetation help slow the transport of water into the sound and effectively act as sponges in the uptake of contaminants. Oysters are filter feeders that clean the water. These shellfish filter large volumes of water and can significantly influence water quality.

Strategy 5: Reduce erosion and fine sediment loads in streams and other water bodies.

Action: *Discuss road design opportunities with WSDOT to incorporate Sound-Friendly ideas.*

Washington State Route 106 bisects Twanoh State Park. Stormwater runoff from the highway is currently not controlled or treated before discharge into Twanoh Creek and Hood Canal. Any highway redevelopment will have to meet current Washington State stormwater management standards. State Parks should work with WSDOT to coordinate highway and Park stormwater management facilities if the highway through the Park is redeveloped.

Action: *Control pedestrian access to specific areas of the creek edge while protecting other sensitive creek areas.*

Vegetation along Twanoh Creek provides nutrients and food for stream organisms, as well as shade, which helps regulate the stream's temperature. Providing park visitors with controlled access and view points along and over Twanoh Creek will allow the park to better manage the riparian corridor and restore vegetation where previous pedestrian access has degraded the stream bank.

Action: *Move camping and other high-impact uses away from creek edge.*

Camping and trails along the riparian corridor draw park users to the streambed. Clustering campground spaces closer together and further away from the creek will reduce campers' impact on Twanoh Creek, as will re-establishing the creek's riparian vegetative buffer. The seven or eight sites adjacent to the creek could be relocated to the top of the hill on state park property. Park users should be guided to points along the stream bank where it is appropriate to be in the stream.

Action: *Acquire adjacent property or easements in upper watershed and restore forest cover.*

Some of the upland areas of Twanoh Creek Basin are owned by a private timber company and are not within the park's current boundary. Washington State Parks should include this property in its long-term property acquisition plan and revegetation plan. In addition, there are opportunities to create a connection between Twanoh State Park and a proposed Mason County trail system.

Strategy 6: Improve water quality education.

Action: *Provide hydrology interpretation.*

Signage about the Twanoh Creek Basin that discusses upland and shoreline hydrology should be located throughout the park along the trail system and stream.

Action: *Model low-impact development and watershed health. Demonstrate upstream stormwater impacts to the park and ecosystem.*

The park's low-impact development elements should demonstrate affordable practices that residents and businesses can easily use on their own properties, such as reducing impervious surfaces and installing rain gardens. For example, State Parks could install demonstration rain gardens within the Park with interpretive signage that describes the stormwater management process and the benefit to Hood Canal. The park could provide visitors with diagrams and instructions on how to install similar rain gardens on their own properties.

Action: *Provide signage that explains the new wastewater treatment system*

Because Twanoh State Park was closed for the last year due to the failure of its wastewater system, signage about the new wastewater treatment facility should explain the reason for the closure, as well as the new system's benefit to Twanoh Creek and Hood Canal.

Action: *Partner with citizen scientists engaged in monitoring.*

There are many community groups who are interested in the health of Hood Canal. Schoolchildren and community members could be engaged to help monitor the benefits of the park's new stormwater management practices, such as through water quality sampling initiatives along the shoreline and within Twanoh Creek.

Action: *Provide demonstration rain garden on existing downspouts.*

The park could install demonstration rain gardens and provide visitors with diagrams and instructions on how to install similar rain gardens on their own properties. A series of rain gardens in the residential neighborhoods surrounding the park would be easy for homeowners to install and could reduce high flows into Hood Canal.

The demonstration rain gardens should be placed in high use areas within the park, such as existing comfort stations and administration buildings. Impacts to the historic landscape would need to be evaluated to determine the appropriate application of this action

. Action: *Provide interpretive information about how Twanoh State Park is leading efforts to eliminate pollutants in maintenance and operation practices.*

The park's maintenance practices can easily be transferred over to residential and business applications. Using environmentally friendly cleaning products and maintenance practices will contribute to cleaning up Hood Canal. Providing interpretive signage regarding these practices will encourage park visitors and local residents and businesses to implement these practices on their own properties.

Action: *Provide interpretive information about Sound-Friendly boat washing.*

If Washington State Parks decides to install a boat rinsing facility, interpretive signage should be installed to let users know how the park is managing boat wash runoff and why it is important for the health of Hood Canal.

GOAL 2

HEALTHY WATER QUANTITY: Address water quantity (e.g., flooding, sea level rise)

Global warming is changing weather patterns, causing higher temperatures, rising sea levels, and more frequent severe storm events. The sea level rise predicted for the Seattle area is 2.8 feet by the year 2100 (UW Climate Impacts Group website). Different amounts of sea level rise will occur in different locations around Puget Sound, based on several factors including tectonic activity, such as subsidence and uplift (Puget Sound Action Team, 2005). To preserve the precious shoreline access in Washington, State Parks must take measures to preserve the facilities and natural amenities within Twanoh State Park.

Strategy 1: Identify areas and facilities at risk of sea level rise and re-design or re-locate them.

Action: *Prepare for sea-level rise by moving programmed spaces to higher ground and replacing with natural beach materials/slopes and less-intensive programming that can move with sea level changes.*

This action entails mapping the extent of the projected rise (between two to three feet) in mean sea level, accounting for storm and high tide events, and moving facilities at risk of damage, such as buildings and emergency access routes, out of these areas. It is recommended that relocation occur in a phased approach where facilities at most immediate risk (affected currently or within 25 years) would addressed first, facilities at risk in 25 to 50 years second, etc.

The impact of the sea-level rise on Twanoh State Park could be modeled graphically to communicate the anticipated shoreline changes.

Action: *Protect existing historical structures by relocating them away from the stream and the shoreline.*

Depending on the extent of sea level rise, historic structures may need to be protected by moving them out of flood zones. Effects to the historic resources and landscape would need to be evaluated prior to determining the best course of action for protecting these historic structures.

Existing campsite along Twanoh Creek

Strategy 2: Address watershed-wide hydrology.

Action: *Acquire adjacent property in upper watershed and restore forest cover.*

Washington State Parks should seek to acquire the entire creek basin in order to ensure protection of the watershed's upland areas. For example, reforesting the entire basin would reduce current erosion along the trails near the Park's upper boundary. Creating a forest canopy with a diversity of mature and younger vegetation would preserve the riparian corridor's longevity and improve shoreline health.

Action: *Protect and restore sediment sources in watershed and within drift cell.*

The park provides the only unarmored shorelines in the drift cells it occurs within. Protection of these park shorelines and removal of riprap along other portions of the park shoreline would protect and restore the park's contribution to sediment supply and transport processes.

Strategy 3: Manage floodplain to accommodate high flows within the park.

Action: *Relocate developed park facilities outside/above Twanoh Creek floodplain.*

Action: *Allow for channel migration in floodplain by relocating adjacent campsites.*

Relocating campsites that are adjacent to Twanoh Creek would provide a wider area for the creek to meander and connect with its floodplain. Widening the creek corridor to restore natural stream meander will increase habitat by making the creek longer and enhance habitat quality by restoring processes leading to added beneficial instream habitat structure.

Existing riparian condition along Twanoh Creek

Action: *Increase riparian vegetative buffer along creek*

Increasing buffer vegetation along the stream will contribute more beneficial nutrients and organic matter to the stream, prevent erosion, reduce sediment loading, increase shade in the riparian corridor, and increase riparian habitat and improve in-stream habitat.

Strategy 4: Improve water quantity education.

Action: *Interpret human impacts on upland and estuary environment.*

State Parks has the opportunity to educate the park users on how development along shorelines affects the health of the watershed. Cutting down trees and building lawns, roads, and houses changes the way that water moves over the land. Incorporating these interpretive elements with a campaign to increase Twanoh State Park to include the entire creek basin will be a great opportunity to connect current events at the park with the health of Hood Canal.

Action: *Create demonstration low-impact development elements that are replicable for residents and businesses.*

As low-impact development elements are added to Twanoh State Park, the park can educate the park users on the reasons for the changes to park as well as the benefits to Hood Canal. Low-impact development options, including reducing impervious surfaces and disconnecting roof downspouts from stormwater pipes, are simple ways to improve the hydrology in residential and commercial applications.

GOAL 3

HEALTHY HABITAT: Create healthy habitat and populations of fish and wildlife species

Twanoh State Park contains a diverse range of aquatic and terrestrial habitats whose function for fish and wildlife species can be significantly enhanced through a variety of actions. Twanoh Creek is a salmon-bearing stream that flows through the park before entering into Puget Sound. The in-water and riparian habitats along the creek's route and Puget Sound marine nearshore offer opportunities to improve the quality and quantity of habitat for the park's fish and wildlife species. The park's shoreline also contains the only "soft" (not bulkheaded) beaches within the drift cells east and west of the park.

Strategy 1: Protect and restore natural shoreline and marine nearshore processes.

Action: *Protect and restore sediment sources in watershed and within drift cell.*

The park provides the only unarmored shorelines in the drift cells it occurs within. Protection of these park shorelines and removal of riprap along other portions of the park shoreline would protect and restore the park's contribution to sediment supply and transport processes.

Action: *Bridge intertidal beach with an elevated boat launching ramp that allows sediment to pass below.*

The park's boat ramp currently forms a solid structure that extends into the intertidal zone and impedes sediment movement along the shoreline. Replacing the concrete foundation and fill with an elevated structure over the intertidal zone would allow sediment to move freely and would not impact the ramp's capacity. There are examples around Puget Sound of how to successfully design an elevated ramp.

Example of bridged boat ramp to prevent interruption of sediment transport. Source: D. Small, WDFW

Lagoon with extensive marsh

Action: *Remove shoreline riprap and fill prism for shoreline parking/lawn area to restore natural beach slope and substrate.*

The riprap revetment and fill material used to form the parking areas along the shoreline reduce the amount of high functioning intertidal habitat. These structures also alter important habitat forming and sustaining processes such as sediment input, sediment transport, and energy dissipation.

This action would remove the riprap revetment and fill material to create a natural beach. The natural beach would have beach slopes identical to those found in nearby unmodified shorelines and a mix of sand, gravel, and cobble substrates. A natural beach would also recruit large drift logs into the high intertidal and backshore areas. The restored beach would provide improved migratory and rearing conditions for juvenile salmon and high intertidal spawning habitat for surf smelt, an important prey item for juvenile salmon and other fishes. Shorebirds would also benefit from the added intertidal areas habitat and associated prey resources.

Action: *Restore lagoon to an estuarine tidal marsh in the vicinity of wading pool and provide direct connection to Hood Canal.*

This action would restore a lagoon that existed historically at the park. The lagoon would be restored by removing the wading pool and opening the lagoon mouth near the point. Lagoons support marsh vegetation and provide high functioning rearing habitats for juvenile salmon. Evaluation of the impacts to this historic landscape feature would need to be documented to determine the appropriateness of this action in the context of the park's historic landscape.

Action: *Redesign pier and floats to meet new aquatic habitat guidelines.*

The dock and floats would be redesigned to provide more light penetration into the water. The added light would improve conditions supporting macroalgae growth and reduce potential behavior impacts on fish movements under the structures. Creosote piers can be replaced to eliminate this source of pollutants to the Sound.

Strategy 2: Protect and restore freshwater systems.

Action: *Widen creek mouth to form an estuary.*

The riprap bounding both banks of the creek narrows the creek mouth and impairs its function. Removing the riprap to expand the creek mouth would allow creek flows to disperse more widely across the delta and provide a broader area over which salinities transition from freshwater to saltwater. This is beneficial for juvenile salmon outmigrating from Twanoh Creek as the transition between these habitats is physiologically demanding.

In addition, the expanded estuary would support a larger and more diverse estuarine community of plants and animals. The expanded creek mouth would provide additional habitat to support marsh vegetation. Marsh vegetation provides high-functioning habitat for juvenile salmon by providing structure and cover as well as contributing to the food base supporting the fish.

Action: *Add instream habitat structures, such as large woody debris, to create more pools and riffles for fish.*

This action can provide immediate improvements to instream habitat structure in Twanoh Creek. A series of engineered log jams could provide pools that would provide habitat for juvenile salmon and reduce stream velocities which would allow more gravel and cobble substrate to remain in the creek for spawning salmon. The added habitat structure could improve habitat until more natural large wood recruitment processes, such as those through enhanced riparian vegetation (Strategy 3), begin to provide wood.

Added large woody debris in stream

Example of restored beach shoreline

Action: *Allow natural stream meanders within defined floodplain.*

Remove or pull back the bank armoring that occurs along Twanoh Creek. Widening the creek corridor to restore natural stream meander will add habitat by making the creek longer and enhance habitat quality by restoring processes leading to added beneficial instream habitat structure. The addition of instream habitat structure could be accelerated through the action described below that entails adding log jams. Recent climate change research suggests additional rainfall and increased flows in small creeks in the winter throughout the Sound. Placement of instream habitat structure will have the added benefit of reducing the impact of these increased flows.

Action: *Move adjacent campsites to enhance and increase large stream meander and vegetative buffers.*

Provide more space for stream and riparian habitat improvements by creating more separation between camping areas and Twanoh Creek. This would be particularly beneficial to stream habitat function because the additional space would allow the stream to meander and support wider vegetative buffers.

Strategy 3: Protect and restore native plant communities.

Action: *Restore riparian buffer with native species.*

Restoring the riparian buffer with native species will enhance the habitat and water quality of the creek. Native riparian vegetation can provide shade, slow stormwater runoff, and contribute organic matter to fuel the base of the food web. With time, the vegetation can also provide small and large woody debris to form instream habitat structure.

Action: *Restore estuarine marsh formation at creek mouth and the neighboring marine shoreline.*

The removal of riprap at the mouth of Twanoh Creek creates habitat to support additional estuarine marsh than is currently growing there. Marsh vegetation would provide high functioning habitat for juvenile salmon by providing structure and cover, as well as supporting a community of macroinvertebrate prey for salmon and contributing organic matter to support the base of the food web. Restoration of the marine shoreline would have all the benefits of the restored riparian buffer, with the additional benefit of providing habitat for foraging fish.

Action: *Plant native species in campground to replenish understory and provide bird habitat.*

Control trampling of vegetation by directing visitor access to designated viewpoints and trails. Reduce cutting or removal of native vegetation within the campground. Replenish understory native vegetation throughout the campground area as needed. This enhanced understory would provide habitat for birds and help reduce surface stormwater runoff.

Example of replanted marsh vegetation along widened estuary

Action: *Restore upper intertidal beach and backshore if rock armoring and parking is removed or relocated.*

The removal of riprap and fill material associated with removing or relocating the parking area would allow for restoration of the upper intertidal beach and backshore. The restored beach would have natural beach slopes and contain a mix of sand, gravel, and cobble substrates. The natural beach would also recruit large drift logs to the beach and provide backshore habitat to support native beachgrass.

The restored beach would provide improved migratory and rearing conditions for juvenile salmon and high intertidal spawning habitat for surf smelt, an important prey item for juvenile salmon and other fishes. Shorebirds would also benefit from the added intertidal areas habitat and associated prey resources. Restoring the upper beach and removing rock armoring also makes the shoreline more accessible for recreation.

Action: *Promote forest duff contribution, allowing organic matter to accumulate on forest floor, especially in the campground area.*

Leaf litter accumulation on the forest floor in the campground will support the production of rich soil and the inputs of organic material into the stream system.

Strategy 4: Enhance native fish and wildlife species/communities.

Action: *Re-establish native Olympia oysters.*

The intertidal and shallow subtidal habitats of the park could support native Olympia oysters. Currently, the park is seeded with non-native Pacific oysters.

Action: *Restore sand lance and surf smelt spawning habitat in restored beach mid to upper intertidal beach areas.*

The removal of riprap described in Goal 3, Strategy 1, would provide important spawning habitat for forage fish. Forage fish are major prey items for juvenile salmon. These fish spawn in sand and gravel in the upper intertidal zone. Currently the riprap shoreline between the boat ramp and the point does not provide suitable spawning habitat for forage fish. The removal of riprap and the restoration of a natural beach would support forage fish spawning.

Action: *Restore plant species to enhance bird habitat in uplands and at estuary.*

The addition of understory native plants and marsh vegetation would provide habitat for birds, including shorebirds.

Strategy 5: Identify and reconnect fish and wildlife habitat connectivity.

Action: *Reconfigure campsites to allow for wider corridor of native riparian vegetation along creek.*

This action would provide more space for stream and riparian habitat improvements by creating more separation between camping areas and Twanoh Creek. Restoring a wider riparian corridor of native species will enhance fish and bird habitat as well as re-establish a vegetated corridor connecting the upstream park habitats with the downstream park habitats. The reconfigured layout of the campsite should closely follow historic CCC-style campground configurations.

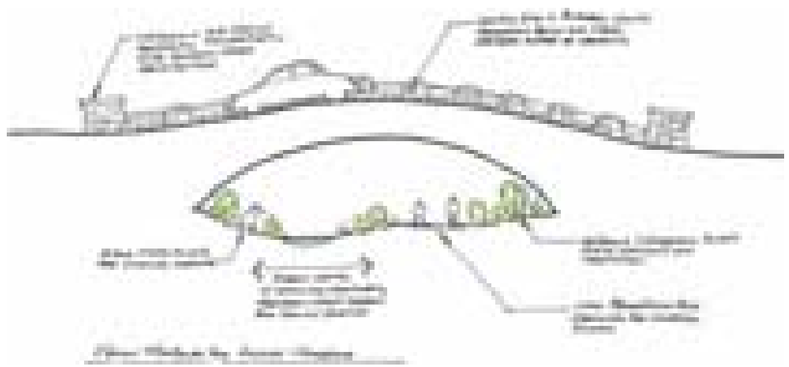
Action: *Protect watershed from fragmentation caused by road-building, land-clearing, and residential development through land acquisition.*

Acquire or protect watershed lands to prevent habitat modification in the undeveloped, but partially logged, Twanoh Creek watershed. Acquisition of additional property in the watershed would protect the Twanoh watershed by preventing future development. The concept of expanding the protected land ownership to include the entire watershed could be a model for park habitat stewardship, and would help educate visitors on how their actions impact the watershed.

The recent logging of the upper watershed may present a good opportunity to acquire the property. The current owner, Green Diamond Company, may be willing to sell the land at this time since it is likely several years away from generating additional revenue for the company.

Action: *Provide a wildlife crossing structure under Highway 106 that also serves as a safe pedestrian trail.*

A crossing under Highway 106 would enhance the ability of wildlife to move from the upper park areas to the lower park areas. Such a crossing could also serve as a safer pedestrian crossing than is currently in place.



Wildlife undercrossings can include creek passage and pedestrian access

Strategy 6: Improve public education and interface with fish, wildlife, streams, and critical habitats.

Action: *Provide education on habitat processes.*

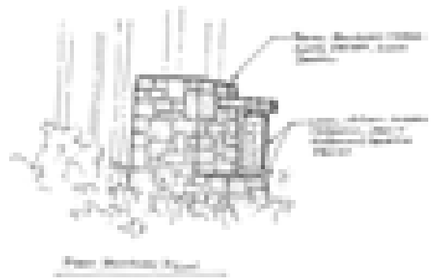
Interpretation and education should accompany each habitat restoration component of improvements to the park. Education in the form of volunteer restoration training, bird watching groups, ecology talks led by park staff and interpretive signs would provide a solid base of knowledge for park visitors, improving their stewardship of restored habitat areas.

Action: *Provide boardwalk with adequate span across creek/expanded delta.*

Replace the existing pedestrian bridge with a wood boardwalk/bridge that spans the flood zone of the creek. The new boardwalk/bridge should use peeled logs and other characteristics of CCC-era design. Designers should ensure the location of the bridge is far enough away from the restored delta/mouth of the creek to avoid impairing critical habitat, but close enough so that visitors can observe salmon migrating and other wildlife using the creek mouth. The deck of the boardwalk/bridge should let light in (using a grill or grate) so that plants can grow along the banks underneath the bridge. Potential impacts to the cultural landscape would need to be evaluated.

Action: *Work with adjacent landowners to manage public access to natural systems.*

Adjacent landowners can form a stewardship group to both monitor public activity along the network of trails and identify areas needing attention (e.g., eroded banks). The landowners may want to connect adjacent land to trails in the park, or to keep public park users away from their land. Either way, landowners can work to ensure the public avoids sensitive areas and does not impact wildlife habitat.



Idea for park boundary locator or trailhead marker

Indigenous people harvesting clams in Puget Sound

Meaning "people of the river" in Coastal Salish

The existing wading pool has water quality problems

GOAL 4

HEALTHY PEOPLE: Promote diverse community and recreational opportunities that enhance Puget Sound health

Integral to the continued health of Twanoh State Park is the health of the people who visit and live in the area. This communal health takes two forms: the physical health of the visitors enhanced by the parks recreational facilities, and a human connection or stewardship of the park where local residents take ownership of the park's maintenance and success. Each of the preceding goals is critical to the health of Puget Sound but will not be successful without community support, volunteering, and stewardship. Key community members, such as neighboring residents, adjacent landowners, the Skokomish Tribe, the City of Belfair, and local environmental organizations, must be included in guiding partnerships as the park improves.

Strategy 1: Facilitate and encourage community connection to park.

Action: *Collaborate with Skokomish Tribe.*

In planning for new features or remodeling of the existing park, State Park staff and consultants should collaborate with representatives of the Skokomish Tribe. The collaboration should include co-developing specific site design concepts using traditional knowledge and experience of place and implementing interpretive stories of the Skokomish people.

Action: *Use Coastal Salish language and interpretive messages on park signs.*

To increase awareness of the historical use of Twanoh State Park by the Skokomish, place text in the Coastal Salish language on interpretive signs that focus on Native American use of the park (i.e. harvesting of shellfish). Text should be provided by the Tribe's cultural preservation office.

Action: *Improve equipment and facilities to enhance visitor experience and potentially increase park revenue.*

The primary motivation for improving the park's equipment and facilities should be the visitor's experience, especially where the improvements would lead to increased visitation in the off-season and increased revenue generation. Fewer, quality facilities are preferred over a multitude of facilities that cannot be maintained.

Action: *Improve trailhead visibility, wayfinding, and cohesive trail system across County lines.*

The current trailhead to the extensive forest trail system is difficult for visitors to see and locate. By promoting trail use, we can increase visitor's immersive experience in the forest ecosystem that makes up the majority of the park, and draw some visitors away from the high-impact but sensitive shoreline. The trailhead and wayfinding could be improved in several ways:

a. Increase the size of the trailhead by widening the opening and placing a bench or kiosk immediately inside the fence.

b. Create a more dramatic entry with a rustic gate.

c. Use small colored flags or signs to highlight different trail loops that feature a unique ecological learning opportunity, as part of the larger interpretive network.

Rip rap may prevent people from reaching the water

The trail could be connected to regional trails in the County to extend the reach of the system and provide alternative means of arriving at the park. Impacts to the cultural landscape would need to be evaluated prior to redesigning the park's trail system.

Action: *Include local businesses, planners, and developers in planning process.*

Sound-Friendly strategies and practices should be shared with businesses and the local development community to maximize participation in the Sound-Friendly model across the entire watershed. Furthermore,
these stakeholders' knowledge of local business practices, community values, and connections to real estate will lead to smoother implementation of green strategies in the park and may generate more creative ideas for revenue generation.

Action: *Increase year-round use of park by attracting visitors during the off-season with a variety of events and uses.*

To off-set the increased visitation in the summer, more efforts can be made to increase visitation in the winter by sponsoring outdoor-oriented events that make use of the State Park's facilities. The historic buildings can be rented out to local organizations. Fishing and shellfishing gatherings could make use of the shoreline area, while cultural outdoor events could occur under tents or in the structures. This would increase revenue and provide additional community connections with the park.

Trails and highway crossing should be improved to be accessible to all visitors

Strategy 2: Promote active lifestyle.

Action: *Provide universal access to all constituents (e.g., disabled, children, elderly) while protecting sensitive habitat areas and the park's cultural landscape.*

Ensure that trails, roads, and parking lots can meet the needs of all constituents who would like to enjoy the park. Accessibility should not interfere with ecological processes that occur within the park (e.g., paved trails should not be located in the riparian corridor) or with historic CCC-era facilities.

Action: *Relocate kayak water trail site to central shoreline location in conjunction with rock riprap removal and beach restoration.*

Water trail sites have been proposed along the Hood Canal: pleasant places for kayakers to take their kayaks out of the water and picnic or use the facilities. Currently, Twanoh's water trail site is proposed for the beach to the south of the boat launch. Ideally, this area will be restored. The water trail site should be moved to the central beach area near the day use area of the park to better accommodate kayakers and immerse them in the park facilities.

Strategy 3: Promote low-impact recreation and Sound-immersion park activities.

Action: *Increase day usage area for passive recreation.*

Passive recreation, including walking, picnicking, and sunbathing, should also be encouraged by increasing the size of the picnicking area, the grassy lawn, and the playground equipment, where these facilities do not compromise the integrity of the park's forest and aquatic ecosystems, and cultural landscape.

Action: *Provide better access to shoreline by removing riprap.*

As part of the shoreline restoration effort, riprap will be removed. This provides an excellent opportunity to concentrate water/beach access in several accessible locations. Access should be at a low gradient without major debris in the way while maintaining the natural character of the beach.

Action: *Engage diverse community or interest groups (e.g., kayakers, birders) with year-round events.*

Events and programs that focus on Sound-Friendly issues and strategies at Twanoh State Park can engage visitors with the Puget Sound in a low-impact way, teach them the value of Sound-Friendly mission, and promote greater appreciation of Twanoh State Park's unique fish, wildlife, habitat, and water resources. Year-round events such as salmon returns, shrimp fest, Salish Days, CCC-inspired events, could spread use at the park across the year, and enhance visitor enjoyment of the park during all seasons.

Twanoh State Park has ideal facilities for outdoor recreation gatherings

Strategy 4: Promote community stewardship of park.

Action: *Protect tribal fisheries and shellfish harvesting and promote traditional ecological knowledge and practices.*

Continue to protect tribal harvesting practices of oysters and clams at the State Park and educate visitors on traditional harvesting methods and tools.

Action: *Enhance existing stewardship programs at Twanoh State Park and strengthen partnership connections with other stewardship groups..*

Link activities and volunteer efforts at Twanoh State Park with the watershed steward program at the Theler Center in Belfair. Twanoh shore stewards can earn rewards for volunteering at the park and by applying green strategies found in the park at their businesses and residences. Shore stewards could also be local schoolchildren, and the current program of children from the Belfair School District doing environmental monitoring could be expanded.

Action: *Initiate a community mapping exercise to engage the park's neighbors in documenting the park values and resources.*

Engage the local community in several events or charrettes in which they map the landscape features of Twanoh State Park they consider most valuable. This community mapping exercise or series of exercises can be part of a broader green strategy design and implementation effort, so that people's ideas and values get translated into dynamic changes of the park.

Action: *Restore the park using volunteer work parties of kids or local organizations.*

Restoration of the aquatic, riparian or forest ecosystem should involve volunteers under the supervision of park staff. Volunteers can plant native vegetation, at a minimum, but can also spread mulch, salvage plants, and monitor restoration success. Active community involvement through volunteers leads to closer connections with the local community and more awareness of restored ecosystems.

Example of a neighborhood planting day at a low-impact development

Strategy 5: Inform and educate public about park stewardship and Sound-Friendly recreational opportunities.

Action: *Provide education opportunities to improve Hood Canal.*

In the actions of Strategy 4, restoration, community mapping, and stewardship program that involve the community provide education and training for participants in which Sound-Friendly practices are shown and demonstrated. Ideally, education about park stewardship is participatory within the framework of a green landscape; that is, the ecological processes of the park are visible and interactive. One educational message is that visitors can learn lessons from the past by contrasting early park design and management practices with Sound-Friendly strategies.

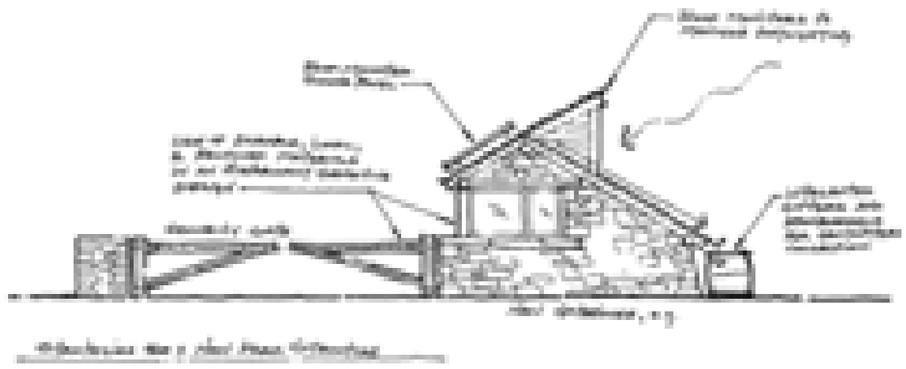
Action: *Inform and educate campers about Sound-Friendly ideas and Twanoh application.*

Education and training can be a part of campfire programs and large gatherings and events. Develop a "Sound-Friendly campers" program for the parks system that could educate this major user group. Visitors who become knowledgeable in Sound-Friendly camping practices can disseminate Sound-friendly ideas to other campers and campgrounds.

GOAL 5

HEALTHY STRUCTURES: Sustainable Design and Low-Impact Development

Twanoh State Park is the home to a wide variety of structures, of both historic Depression-era and more recent construction, which comprise a valuable built infrastructure for both park recreation and maintenance. Each building offers a set of needs and opportunities in terms of its continued utility and contribution to the park's impact upon the health of the Puget Sound: for instance, some are threatened by rising sea levels due to global climate change, while others would greatly benefit from increased energy and water consumption efficiency. In addition to retrofitting existing buildings, there is the potential that new structures will be built to meet growing park needs in the coming years. The thoughtful design of this new architecture provides a fertile ground for creating an agency-wide precedent for progressive and low-impact design to both shelter and educate the park's visitors and employees alike.



Strategy 1: Promote energy-efficient and energy-producing design, and reduce resource and energy consumption.

Action: *When adding new facilities, use renewable energy, green building practices, and gray water management.*

Design new structures to be highly energy-efficient. This can be achieved through a variety of measures, including ensuring a rigorous insulating standard for new construction that meets or exceeds LEED certification through the use of thermally-efficient glazing, generous wall, roof, and sub-grade insulation. Install highly-efficient mechanical systems, and consider the use of alternative systems such as heat pumps, heat exchangers, designs which utilize passive heating and cooling, and automated shutoffs and timers, while preserving historic integrity.

Thoughtful building siting, glazing, and shading design can maximize natural daylighting and winter heat gains in the structure while minimizing unwanted heat gain and glare in the summer months. Reconstructed buildings need to balance sustainable shading and retrofitting practices with the need to be historically sensitive and accurate in terms of the original structures' materials and location.

Design guidelines for creating new Sound-Friendly development within the park's cultural landscape context need to be developed before implementing this action.

Existing buildings, like this restroom, can be maintained sustainably

Action: *Treat and maintain historic buildings and cultural landscapes.*

The CCC-era structures at Twanoh represent a significant cultural legacy and are living examples of historic sustainable design. These structures utilized locally-procured, natural materials, they have endured as well-loved and serviceable structures for almost 80 years, and they were sited sensitively in the landscape with respect to stream buffers and flood plains. They are embodied interpretive elements advocating the value of sustainable design; their care and maintenance represent more than simply investments in park infrastructure or historic preservation successes.

Strategy 2: Use sustainably harvested, local, non-toxic materials and finishes in building design and maintenance.

Action: *Use non-toxic, sustainable building materials in any remodel, new construction.*

Use safe and Sound-friendly materials and substances. For wood products, use locally-harvested or small diameter engineered products, and encourage the use of sustainably harvested Forest Steward Council (FSC) certified wood. Specify non-toxic architectural finishes such as low-VOC paints, and recycled content products wherever possible, such as in fly-ash concrete and recycled post-consumer steel products.

Strategy 3: Site and design new park structures in a way that achieves the Sound-Friendly Vision.

Action: *Apply LEED and other green design criteria.*

In addition to following LEED and Low-Impact Development guidelines for energy-efficient and Sound-friendly new construction, utilize thoughtful master-planning to preserve Park historical landscapes and structures as well as the local ecological health at a larger scale. Issues such as rising sea levels, damaged watershed health, endangered salmon habitat, excessive stormwater runoff, and surface water pollutants are all impacting the park currently.

The park could be redesigned to locate day-use and camping along the sensitive shore-side of the highway and parking and hiking on the valley-side, connected by a wide pedestrian- and wildlife-friendly underpass. Such a layout, with thoughtful use of materials and progressive utility implementation would be a valid approach to improve habitat and human connectivity.

Strategy 4: Improve "green design" education.

Action: *Decrease visitors' freshwater consumption, and interpret these practices where appropriate.*

The implementation of rain barrels and greywater recycling, low-flow and waterless urinals are all common ways to decrease fresh water use. Employ greywater rather than potable water for uses such as a new boat rinse station, and provide appropriate signage.

Action: *Use historic buildings as example of green structures that use local building materials.*

Through interpretive elements or as built examples, underscore the sustainable aspects of the historic structures (see Strategy 1, Action 2, for elaboration).

Action: *Interpret CCC building and historic development practices that enhance the park.*

Interpretation and education will be consistent with the environmental strategies described above (Goal 5, Strategy 1). The interpretive component may take the form of interpretive panels and signs around or inside the historic structures, informational meetings regarding the rental and current use of the structures, or workshops on sustainable and historic building techniques.

5. Cost Benefit Analysis

In December 2005, the Governor and Legislature directed Washington State Parks and Recreation Commission (WSPRC) to provide model projects to Puget Sound residents on how to care for Puget Sound. Washington State Parks selected Fort Casey, Saltwater, and Twanoh State Parks to model sustainable design and low-impact development practices. WSPRC hired the Jones & Jones consultant team to develop Green Vision Plans for the three parks.

The Jones & Jones team completed the Green Vision Planning Concept Report in May 2007. The Green Vision Plans are intended to demonstrate the latest concepts in best management practices, low-impact development, and necessary facility renovations.

Part of the consultant team's scope of work was to conduct a cost-benefit analysis of the concept plan. This chapter is that analysis.

This chapter is organized in six sections. Section 1 is an Evaluation Framework, which presents a framework for evaluating the impacts associated with Flood Control Plan. Quantifying and understanding the impacts is complicated because of the many different interactions and tradeoffs. This section describes some basic principles of analysis that should be addressed, and the data ECO used in preparing this report. Sections 2 through 6 discuss the costs and benefits of Goals 1 though 5.

1. Evaluation Framework

This section discusses principles fundamental to the evaluation of any large public-investment decision, with a focus on those that directly affect the analysis of the economic impacts of implementing a plan for "greening" state parks.

Just the identification of the potential effects of a large project is difficult. Estimating the direction of its effects (positive or negative, and on whom?) compounds the analytical challenge; estimating the magnitude of those effects (how big is that positive or negative impact?) is beyond the scope of this evaluation for many types of impacts. The consolidation of all those many effects into a summary measure of net impacts is beyond the capabilities of almost any impact analysis (though that fact is sometimes not recognized in the analysis that gets provided).

The point is not that a decision on the Green Vision Plan cannot be made without the type of evaluation this report presents: the evidence is clear that big policy decisions like the one addressed here are routinely made without the kind of information provided in this report. Rather, the point is that if a community is serious about its decision on an assessment of the likely impacts of that decision, then it should accept some basic and well-supported principles about how such an impact analysis should be structured.

This framework has two sections:

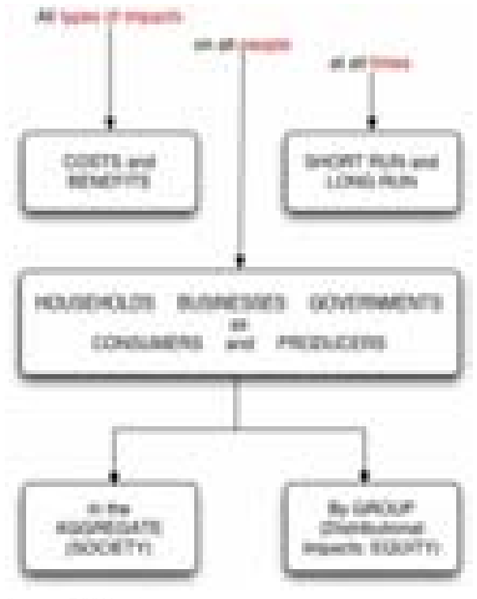
- Goals of Evaluation discusses the broad goals of any evaluation of the full costs of a large public investment decision.
- Key Issues Affecting this Analysis discusses the key issues that affect this analysis of the costs and benefits of the Green Vision Plan.

Goals of Evaluation

To estimate the net benefits of a large public investment, one must compare its benefits and costs to whatever the benefits and costs would be without the investment. That "different future" is often referred to as "the base case," "the trend," or "the status quo" scenario or alternative. Such an evaluation would begin with historical facts and creates a hypothetical future with and without the Green Vision Plan.

Figure 1 shows the goal of such an evaluation: to be able to describe all types of impacts, on all types of people, over all time periods, for all the relevant areas of impact. Achieving that goal completely is impossible: not only can one not know the future (dozens of possibilities might be possible, given reasonable differences in assumptions), but the number of possible impacts and the data and techniques for estimating them overwhelm any reasonable evaluation budget.

Figure 1. Goals of policy evaluation: what, who, and when



Source: ECONorthwest.

Thus, Figure 1 shows what is desired in concept, though it cannot be achieved in practice. A goal of any policy evaluation is to identify what are the most important impacts to measure, and how approximate but reasonable measures of those impacts can be made cost-effectively and quickly.

Key Issues Affecting This Analysis

Estimated impacts can vary widely with different assumptions, and users of such estimates must take care to fully understand the logic and assumptions those estimates are based on. This section identifies assumptions that affect the analysis of the economic impacts of implementing the Green Vision Plan.

Ecosystem Services

The positive benefits resulting from the Green Vision Plan are associated with improving the health of ecosystem services. In one of the most widely-cited references in the field of environmental science, the author, Gretchen C. Daily, describes ecosystem services and the related benefits to society.

"Ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. The harvest and trade of these goods represent an important and familiar part of the human economy. In addition to the production of goods, ecosystem services are the actual life-supporting functions, such as cleansing, recycling, and renewal, and they confer many intangible aesthetic and cultural benefits as well."

Natural resources provide a range of ecosystem services that benefit society in urban areas including:

- Riparian areas along streams, rivers and wetlands mitigate flooding and help reduce flood-related property damage.
- Riparian areas also filter sediment and toxins from surface runoff, which helps maintain water quality in urban streams and rivers.
- Urban forests absorb air pollutants and help maintain air quality. The shading from urban trees may help reduce the "heat island" effect, which can reduce cooling costs in summer.
- Open space and parklands provide recreational amenities.
- Riparian and wildlife habitat support a range of species with cultural and economic significance.

In the past, most studies of ecosystem services focused on resources found in rural or wilderness areas, such as rain forests, agricultural land and upland watersheds. This focus makes sense because these resources provide significant ecosystem services. More recently, however, researchers have come to recognize that natural ecosystems in urban areas also provide valuable services.

Non-market Impacts

Ecosystem services generally do not have economic measures or values established in a market place. Decisionmakers know the relative value or importance of an acre of land in an urban area, or the earning potential of factory workers because markets exist that established these values in standard units. Not so for ecosystem services. For example, a market does not exist that signals or describes the values of all the ecosystem services provided by a forest. Markets exist for some services, such as lumber production, but not others, such as carbon sequestration, wildlife habitat for species with commercial and cultural significance, or erosion control that maintains water quality.

In general, many ecosystem services suffer from what economists describe as market failure, or the inability to be sold or exchanged in a market (Pearce 1986). Established markets for ecosystem services fail in part because people who have not paid for a service, such as the services available from a clean stream or river, cannot be prevented from enjoying the benefits of the service. Also, those that degrade a service, e.g., by polluting a river, do not suffer economic consequences. A related cause of market failure is that in some cases one person's use or enjoyment of a resource does not prevent or preclude others from enjoying the service. Flood mitigation provided by riparian areas is one example. If one cannot charge users for a service and if there is no limit on the number of people that can enjoy a service, whether they pay or not, it is difficult to establish a market for the service.

The fact that most ecosystem services are not traded in markets makes more challenging the task of characterizing the economic importance of these services. Economists, however, have developed a number of techniques that provide insights into the economic importance of ecosystem services. Established markets exist for some ecosystem services in cases where those benefiting from the service can be identified and participation in the market can be limited to those paying for the service. In other cases, economists calculate the value of an ecosystem service based on the cost of providing a comparable service using engineered techniques or projects. Another method relies on individuals' opinions of, and preferences for, ecosystem services.

The Base Case

To estimate the net benefits of the Green Vision Plan, one must compare the benefits and costs of one possible future (e.g., with improved water quality) to the benefits and costs that would occur in a different future (without the improvement). Such evaluation usually occurs by taking the future in which no new action occurs (no changes in the management of the three parks) as 'the base case.' This base case describes what is expected to happen in the absence of implementing the Green Vision Plan.

Such an evaluation begins with historical facts (trends) and an assessment of the forces that might cause those trends to change in the future. It then describes a future with and without the implemented Green Vision Plan. The differences in impacts between the base case and the alternative are the net impacts of implementing the Plan.

In this analysis, the 'base case' assumes that the three parks are managed in the future as they are today.

Attribution Of Credit

Establishing a base case affects an analyst's ability to properly identify cause-and-effect relationships. Attributing effects to causes, and of doing so only once (i.e., avoiding double counts), is essential to an evaluation of net impacts.

In this analysis, properly attributed causality is not possible. For example, removing a parking lot and re-establishing native plants in an area will improve water infiltration and reduce peak flows associated with stormwater. We do not have precise information about the degree of water quality or quantity improvements. We are not able to say that the water quality in Puget Sound will improve in a specific measurable way.

The proposed actions in the Green Vision Plan will positively effect habitat and water systems, but the plan does not provide measures of the amount of improvement.

Double Counting

Double counting of economic values may occur when a given ecosystem function supplies multiple services. For example, an action that positively affects water quality is likely to positively affect salmon habitat. One method of avoiding double counting services and values is to develop dynamic models that account for the interrelationships among ecosystem functions, services and values. At this time, ECO knows of no such model for the Puget Sound.

Geographic Scope

Different types of impacts affect different geographies. Or, the corollary: the impacts of an action will differ depending on how the area being evaluated is defined. The focus of this impact analysis is on Puget Sound. Some of the impacts may be affect a very small area, but others may have impacts that reach well beyond the Sound. This analysis identifies the affected geography for each type of impact.

Long Run Vs Short Run

Economic impacts occur over time. The costs associated with the actions will occur in the short term. Changes in maintenance costs will occur in the short term and last through the long term. The impacts to water and habitat may occur in the short term, but some may take years for full impacts to materialize. The impacts will continue well into the future. In our analysis, we work to distinguish between the short-term and long-term impacts.

2. GOAL 1: HEALTHY WATER QUALITY

This section describes the costs and benefits associated with the Goal 1, Healthy Water Quality. It is organized into two parts:

- Costs summarizes the costs provided to ECO by Jones & Jones for Goal 1.
- Benefits summarizes the benefits associated with the Green Vision Plans for Goal 1.

Costs

Jones & Jones provided ECO with "opinions of probable costs" for each goal at each park. The cost shown here are only estimates. Actual costs are likely to vary from the estimates. This section summarizes the estimated expected costs provided to ECO by Jones & Jones. These costs were divided by the five goals associated with this project.

The format of the information provided to ECO for each of the three parks was organized by goal, by action within the goal, and then for each action, the cost per item and the number of items were specified. In many cases, the estimated cost per item was provided to ECO, but the number of items necessary to complete the task was not. ECO lacks the information to make assumptions about the number of items required for each action. Because the number of items drastically impacts the total cost to complete the actions for each goal, as detailed in the examples below, a summary of actual costs for modifications to these three parks was not possible.

ECO summarized instead the known costs, with the understanding that as the number of items becomes known, these costs will change. ECO's summary, therefore, underestimates the costs required to complete each goal for each of the three parks. The detailed cost estimate tables in Appendix A break down the cost information for each individual action.

It appeared that the healthy habitat, healthy people, and healthy structures goals (Goals 3, 4, and 5) were somewhat more complete than healthy water quality and quantity (Goals 1 and 2).

The Fort Casey estimate show the variation in costs that could be possible as the number of items necessary to make each modification in the three parks becomes known. For example, Action 1.1.1, Resurface or reconfigure parking, shows a per square yard cost for removing asphalt, creating rain gardens, and installing porous concrete. The total cost for each of these items is between $15 and $100 per yard. Currently, the table indicates no number of square yards to be resurfaced or reconfigured and a subtotal cost of $0. Clearly, this would not be the case; if 100 yards were resurfaced and 100 yards of rain garden created, the total cost would exceed $20,000.

Table 1 shows the summary of estimated expected costs for Goal 1. Because many of these cost estimates do not include the number of items or person hours required to complete the specified tasks, this is an underestimate of the total costs.

Table 1. Summary of estimated expected costs, Goal 1

Park	Minimum cost	Moderate cost	Most cost
Fort Casey	$1,475,009	$1,475,009	$1,475,009
Saltwater	$257,000	$257,000	$257,000
Twanoh	$445,000	$445,000	$445,000

Source: Jones & Jones, table by ECONorthwest.

Benefits

The Jones & Jones team developed a rating system to score the ecological impacts of the actions for Goals 1, 2, and 3. Tables 2 through 4 show the scores for the actions for the three parks for Goal 1.

Table 2. Ecological ratings, Fort Casey, Goal 1

Action	Minimal Option	Moderate Option	Most Option
1.1.2 Resurface and/or reconfigure parking area and provide stormwater treatment	2	4	5
1.1.4 Relocate existing shoreline camping area	1	3	4
1.2.2 Treat water from parking lots using rain gardens and bioswales	3	4	4
1.3.2 Move wastewater drain fields away from the shoreline	0	4	5
1.3.3 Install composting toilets	5	5	5
1.4.1 Provide a designate boat rinse-off area	0	4	5
1.5.1 Create RV rinse-off and pump out stations.	0	4	5
1.5.5 Investigate presence of toxic materials at boat launchÕs wave attenuator	5	5	5
1.5.6 Partner with agencies regarding treatment of runoff from WSF holding areas	3	3	5
1.5.7 Partner with agencies regarding the potential relocation of the WSF dock facility	1	1	5
áÊÊ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**20**	**37**	**96**
1.1.1 Rehabilitate lighthouse cistern		2	
1.1.3 Relocate non-historic parking area from open field		3	
1.2.1 Create a park-wide natural drainage system		4	
1.3.1 Establish a park-wide wastewater treatment system		4	
1.3.4 Construct pre-treatment wetlands		3	
1.3.5 Participate in an assessment of regional wastewater needs		4	
1.5.2 Eliminate use of cleaning products		4	
1.5.3 Partner with DNR about creosote logs		4	
1.5.4 Investigate the Quarter Master Wharf		3	
Total Score for Goal	**51**	**68**	**127**

Source: SVR Design Company.

Table 3. Ecological ratings, Saltwater, Goal 1

Action	Minimal Option	Moderate Option	Most Option
1.1.1 Resurface and/or reconfigure parking area and provide stormwater treatment	1	3	5
1.1.2 Change the configuration of parking lots	1	3	5
1.1.3 Relocate parking further from shoreline and creek	1	3	5
1.2.1 Incorporate Low Impact Development along parking areas and roads	2	3	4
1.2.2 Increase vegetation buffer between parking areas and water bodies	2	3	4
1.4.1 Provide a designate boat rinse-off area	4	4	4
1.4.2 Treat water from shoreline parking areas with rain gardens and bioswales	4	4	4
1.5.1 Limit pedestrian access to specially designed viewpoints along the shoreline	2	4	4
1.5.2 Move campground away from creek	1	2	5
1.5.4 Increase vegetation buffer along shoreline	2	3	4
1.5.5 Plant native vegetation in sediment source areas	2	3	4
áÊÊ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**22**	**35**	**96**
1.1.4 Provide overflow parking off-site		5	
1.1.5 Direct runoff to a recharge facility		1	
1.1.6 Manage year-round parking to address seasons		0	
1.3.1 Reduce or eliminate chemical discharge from RV pumping station		4	
1.3.2 Implement water conservation measures		1	
1.3.3 Add facilities that can use gray water for irrigation		1	
1.3.4 Add dishwashing stations at campground		1	
1.4.1 Evaluate pollution management at landfill to benefit McSorley Creek		3	
1.4.2 Develop a program to reduce sources of chemicals		3	
1.4.3 Eliminate use of cleaning chemicals		3	
1.4.4 Provide effective program for Park visitors to clean up pet waste		4	
1.5.3 Trap sediments in creek tributaries		3	
1.6.1-7 Improve water quality education		4	
Total Score for Goal	**55**	**68**	**129**

Source: SVR Design Company.

Table 4. Ecological ratings, Twanoh Goal 1

Action	Minimal Option	Moderate Option	Most Option
1.1.1 Resurface and/or reconfigure parking area and provide stormwater treatment	1	3	5
1.1.2 Partially remove parking areas from shoreline	1	3	5
1.1.3 Remove shoreline day use parking lot	0	2	5
1.1.4 Provide infiltration infiltration trenches, bioswales, and rain gardens.	1	2	5
1.2.1 Incorporate low impact development elements	1	2	5
1.2.2 Increase vegetation buffer between parking areas and water bodies	1	3	5
1.2.3 Treat water from shoreline parking	3	4	5
1.4.1 Provide a designate boat rinse-off area	5	5	5
1.4.3 Create a natural infiltration system with vegetation	3	4	5
1.5.2 Control pedestrian access to specific areas	0	0	0
1.5.3 Move camping and other high impact uses away from the creek edge	1	2	4
áÊÊ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**17**	**30**	**98**
1.1.5 Increase tree cover in all parking areas		3	
1.3.1 Implement water conservation measures		1	
1.3.2 Add facilities that can use gray water		3	
1.3.3 Construct pre-treatment wetlands		3	
1.4.2 Eliminate use of cleaning products		4	
1.5.1 Discuss road design opportunities		3	
1.5.4 Acquire adjacent properties within the Twanoh Creek Watershed		5	
1.6.1-7 Improve water quality education		4	
Total Score for Goal	**43**	**56**	**124**

Source: SVR Design Company.

Estimating actual economic value of improved water quality is beyond the scope of this study. Table 5 provides values estimated in economic analyses in different parts of the US. The table shows that improved water quality can lead to reduced water filtration costs. The values are based on wetlands, and show the value generated by an acre of healthy wetland per year. The table provides a rough guide to the real value of improving water quality in Puget Sound. The values are annualized. It is important to note that the values of these services will continue well into the future.

Table 5: Values of Water-Quality Services

Impact of Project	Per Year Economic Value (2007$)	Description	Source
Improved water quality	$615	per wetland acre per year based on the avoided costs of water filtration	Woodward and Wui (2001), meta-analysis, nationwide
Runoff filtration	$5,153	per wetland acre per year for nutrient filtering/retention (waste assimilation)	Thibodeau and Ostro (1981), freshwater wetlands - MA
Pollution Reduction	$5,157	Annualized avoided cost—per acre of wetland—of adding tertiary treatment to existing water treatment plant.	Thibodeau and Ostro (1981), freshwater wetlands - MA

Sources: As listed, with calculations by ECONorthwest.

It is important to note that wetland and coastal ecosystems are not direct substitutes. These figures only provide a rough estimate. Coastal systems are more linear than wetlands, so per-acre valuations may underestimate the importance of nearshore ecosystems. The coastal marine environment is different than terrestrial ecosystems, but costal environments in Puget Sound have not been the subject of valuation studies. A summary of ecosystem services in Puget Sound found that the coastal ecosystem in Water Resource Inventory Area 9 (WRIA 9) provides annual services valued between $5.5 million and $29.4 million (in 2005 dollars). All the services the coastal system provides have not been valued, and are not included in those figures.

Summary

Table 6 shows total estimated costs and total benefits score for Goal 1 for each park. Given that the benefits scores are relatively similar, the WSPRC would get better value to achieve improved water quality by investing in the identified improvements at Saltwater State Park.

Table 6: Summary of Costs and Benefits, Goal 1

	Costs			Benefits Score		
Park	Minimum cost	Moderate cost	Most cost	Minimum cost	Moderate cost	Most cost
Fort Casey	$1,475,009	$1,475,009	$1,475,009	51	68	127
Saltwater	$257,000	$257,000	$257,000	55	68	129
Twanoh	$445,000	$445,000	$445,000	43	56	124

Source: Jones & Jones consulting team.

3. GOAL 2: HEALTHY WATER QUANTITY

This section describes the costs and benefits associated with the Goal 2, Healthy Water Quantity. It is organized into two parts:

- Costs summarizes the costs provided to ECO by Jones & Jones for Goal 2.
- Benefits summarizes the benefits associated with the Green Vision Plans for Goal 2.

Costs

Jones & Jones provided ECO with "opinions of probable costs" for each goal at each park. The cost shown here are only estimates. Actual costs are likely to vary from the estimates. This section summarizes the estimated expected costs provided to ECO by Jones & Jones. These costs were divided by the five goals associated with this project.

The format of the information provided to ECO for each of the three parks was organized by goal, by action within the goal, and then for each action, the cost per item and the number of items were specified. In many cases, the estimated cost per item was provided to ECO, but the number of items necessary to complete the task was not. ECO lacks the information to make assumptions about the number of items required for each action. Because the number of items drastically impacts the total cost to complete the actions for each goal, as detailed in the examples below, a summary of actual costs for modifications to these three parks was not possible.

ECO summarized instead the known costs, with the understanding that as the number of items becomes known, these costs will change. ECO's summary, therefore, underestimates the costs required to complete each goal for each of the three parks. The detailed cost estimate tables in Appendix A break down the cost information for each individual action.

It appeared that the healthy habitat, healthy people, and healthy structures goals (Goals 3, 4, and 5) were somewhat more complete than healthy water quality and quantity (Goals 1 and 2).

The Fort Casey estimate show the variation in costs that could be possible as the number of items necessary to make each modification in the three parks becomes known. For example, Action 2.1.2, Model and interpret changes to spit morphology, requires an unspecified number of staff hours. We estimate that a park ranger costs the Parks system roughly $30 an hour, but we were unable to estimate how many hours such a task would require.

Table 7 shows the summary of estimated expected costs for Goal 2. Because many of these cost estimates do not include the number of items or person hours required to complete the specified tasks, this is an underestimate of the total costs.

Table 7. Summary of estimated expected costs, Goal 2

Park	Minimum cost	Moderate cost	Most cost
Fort Casey	$500,000	$500,000	$500,000
Saltwater	$70,000	$70,000	$70,000
Twanoh	$20,000	$20,000	$20,000

Source: Jones & Jones, table by ECONorthwest.

Benefits

The Jones & Jones team developed a rating system to score the ecological impacts of the actions for Goals 1, 2, and 3. Tables 8 through 10 show the scores for the actions for the three parks for Goal 2.

Table 8. Ecological ratings, Fort Casey, Goal 2

Action	Minimal Option	Moderate Option	Most Option
2.1.1 Relocate facilities at risk for sea level rise	0	0	2
2.2.3 Restore natural hydrology of Crockett Lake based on results of NPS biological study	5	5	5
Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**5**	**5**	**14**
2.1.2 Model and interpret changes to spit morphology associated with sea level rise		2	
2.2.1 Address watershed-wide hydrology		1	
2.2.2 Remove fire road along bluff		4	
2.2.4 Implement long-term boundary plan		2	
2.4.1-3 Improve water quantity education		4	
Total Score for Goal	**18**	**18**	**27**

Source: SVR Design Company.

Table 9. Ecological ratings, Saltwater, Goal 2

Action	Minimal Option	Moderate Option	Most Option
1.1.2 Resurface and/or reconfigure parking area and provide stormwater treatment	1	3	5
1.1.4 Relocate existing shoreline camping area	1	3	5
1.2.2 Treat water from parking lots using rain gardens and bioswales	2	3	4
1.3.1 Restore an expanded natural floodplain	2	3	4
1.3.2 Relocate campground outside of riparian valley	1	3	5
1.3.4 Address lower level parking lot flooding	1	3	5
1.3.5 Widen stream corridor to expand capacity	1	3	5
æ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**9**	**21**	**66**
1.1.1 Move concessions building out of flood zone		3	
1.1.2 Review and adapt existing concessions building for sea level rise		3	
1.1.3 Relocate all facilities and upland areas at risk for sea level rise		3	
1.2.1 Protect headwater wetlands by including area in park long-term boundary plan		5	
1.2.2 Address primary sources effecting watershed hydrology		5	
1.3.3 Re-establish surface water connection between freshwater seeps near parking lot		2	
1.4.1-3 Improve water quantity education		4	
Total Score for Goal	**34**	**46**	**91**

Source: SVR Design Company.

Table 10. Ecological ratings, Twanoh, Goal 2

Action	Minimal Option	Moderate Option	Most Option
1.1.1 Prepare for sea-level rise by moving facilities or redesigning them	1	1	1
1.1.2 Protect existing historical structures along creek and shoreline	1	1	1
1.2.2 Protect and restore sediment sources within drift cell	2	3	4
1.3.1 Relocate developed facilities outside of Twanoh Creek floodplain	2	3	4
1.3.2 Allow for channel migration in floodplain	2	3	4
1.3.3 Increase riparian vegetation buffer	2	3	4
æ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**10**	**14**	**36**
1.2.1 Acquire adjacent properties within the Twanoh Creek Watershed		5	
1.4.1-2 Improve water quantity education		4	
Total Score for Goal	**19**	**23**	**45**

Source: SVR Design Company.

A key economic value associated with water quantity is reduced flooding. It was beyond the scope of this study to determine the relationship between improvements to the parks and how that would affect flooding in the Puget Sound region. To the extent that the improvements do reduce flooding, the economic values in Puget Sound include the value of structures in the floodplain. A flood event is likely to negatively affect businesses in the floodplain, and the employees in those business would not earn their salaries if the businesses were unable to operate. The indirect economic impacts of those firms and their workers are very large.

Summary

Table 11 shows total estimated costs and total benefits score for Goal 2 for each park. Given that the benefits scores are relatively similar, the WSPRC would get better value to achieve improved water quantity by investing in the identified improvements at Saltwater State Park. For very low cost, the WSPRC could invest in Twanoh, and get moderate positive impacts.

Table 11: Summary of Costs and Benefits, Goal 2

	Costs			Benefits Score		
Park	Minimum cost	Moderate cost	Most cost	Minimum cost	Moderate cost	Most cost
Fort Casey	$500,000	$500,000	$500,000	18	18	27
Saltwater	$70,000	$70,000	$70,000	34	46	91
Twanoh	$20,000	$20,000	$20,000	19	23	45

Source: Jones & Jones consulting team.

4. GOAL 3: HEALTHY HABITAT

This section describes the costs and benefits associated with the Goal 3, Healthy Habitat. It is organized into two parts:

- Costs summarizes the costs provided to ECO by Jones & Jones for Goal 3.
- Benefits summarizes the benefits associated with the Green Vision Plans for Goal 3.

Costs

Jones & Jones provided ECO with "opinions of probable costs" for each goal at each park. The cost shown here are only estimates. Actual costs are likely to vary from the estimates. This section summarizes the estimated expected costs provided to ECO by Jones & Jones. These costs were divided by the five goals associated with this project.

The format of the information provided to ECO for each of the three parks was organized by goal, by action within the goal, and then for each action, the cost per item and the number of items were specified. In many cases, the estimated cost per item was provided to ECO, but the number of items necessary to complete the task was not. ECO lacks the information to make assumptions about the number of items required for each action. Because the number of items drastically impacts the total cost to complete the actions for each goal, as detailed in the examples below, a summary of actual costs for modifications to these three parks was not possible.

ECO summarized instead the known costs, with the understanding that as the number of items becomes known, these costs will change. ECO's summary, therefore, underestimates the costs required to complete each goal for each of the three parks. The detailed cost estimate tables in Appendix A break down the cost information for each individual action.

It appeared that the healthy habitat, healthy people, and healthy structures goals (Goals 3, 4, and 5) were somewhat more complete than healthy water quality and quantity (Goals 1 and 2).

Table 12 shows the summary of estimated expected costs for Goal 3. The summarized costs shown in the table are a close estimate of projected costs.

Table 12. Summary of estimated expected costs, Goal 3

Park	Minimum cost	Moderate cost	Most cost
Fort Casey	$2,472,000	$3,620,000	$5,550,000
Saltwater	$3,130,000	$3,560,000	$4,385,000
Twanoh	$4,355,000	$4,355,000	$4,355,000

Source: Jones & Jones, table by ECONorthwest.

Benefits

The Jones & Jones team developed a rating system to score the ecological impacts of the actions for Goals 1, 2, and 3. Tables 13 through 15 show the scores for the actions for the three parks for Goal 3.

Table 13. Ecological ratings, Fort Casey, Goal 3

Action	Minimal Option	Moderate Option	Most Option
3.1.3 Relocate Campsites and Restore Shoreline			
áÊÊÊ Removal of some/all campsites	3	5	5
áÊÊÊ Replace wave attenuator	1	1	1
áÊÊÊ Shoreline revegetation	2	2	5
áÊÊÊ Jetty modifications	0	2	5
áÊÊÊ Elevated boat ramp	0	0	1
áÊÊÊ Weighting factors*	x1	x1	X2
Subtotal for Actions with Options	**6**	**10**	**34**
3.2.1 Enhance Vegetation Buffer Between Crockett Lake and Puget Sound		2	
3.2.2 Restore Natural Hydrology at Crockett Lake Outlet**		5	
3.3.1 Remove Invasive Plants		2	
3.3.2 Continue Golden Paintbrush Restoration		5	
3.3.3 Restore Native Upland Vegetation and Reduce Lawns		2	
3.3.4 Restore Bluff Vegetation and Reduce Social Trails		2	
3.3.7 Restore Beach Backshore at Campground and along Spit		2	
3.4.4 Fill ditches and move culvert along Fort Casey Road to Improve Habitat in Crockett Lake		2	
Total Score for Goal	**28**	**32**	**56**

Source: SVR Design Company.

Notes:

* A weighting factor of 2 was assigned to shoreline enhancement scores of the "most" option because it entails restoration of the nearshore sediment transport and estuarine processes at the site. Process-based restoration can be expected to function at a higher level and is more sustainable.

** The historic hydrology of Crockett Lake is currently being investigated. A score of 5 only applies if the investigation determines that historically there was an outlet connection between Crockett Lake and Puget Sound. If not, a score of 0 is assigned.

Table 14. Ecological ratings, Saltwater, Goal 3

Action	Minimal Option	Moderate Option	Most Option
3.1.1 (Minimal) Remove Rip-Rap at Creek Mouth and Restore Delta 3.1.2 (Moderate) Restore Delta, Restore 50% of Beach North of Delta 3.1.3 (Most) Restore Delta, Restore 90% of Beach North of Delta			
áÊÊÊ Expand creek mouth and delta	4	5	5
áÊÊÊ Restore natural beach	0	3	5
áEEE Shoreline revegetation (3.3.3 estuarine marsh, marine riparian vegetation, and 3.3.4 beach backshore vegetation)	2	4	5
áÊÊÊ Weighting Factor*	x1	x1	X2
Total Score for Action	**6**	**12**	**30**
3.2.1 Widen Stream Reaches to Restore Meander**		5	
3.2.2 Reconnect Floodplain to Valley Bottom Wetlands		2	
3.2.5 Add Large Woody Debris to Add Habitat Structure to McSorley Creek		3	
3.3.1 Restore Upland Forest Understory Using Volunteers		2	
3.3.2 Restore Riparian Buffer along Creek		4	
Total Score for Goal	**22**	**28**	**46**

Source: SVR Design Company.

Notes:

* A weighting factor of 2 was assigned to shoreline enhancement scores of the "most" option because it entails restoration of the nearshore sediment supply and transport processes by reconnecting the bluff and beach. Process-based restoration can be expected to function at a higher level and is more sustainable.

** Widening the stream to restore meander is a prerequisite action for the other actions along the stream route. The ability to implement other stream actions and to realize their potential ecological benefits requires that the stream corridor is widened.

Table 15. Ecological ratings, Twanoh, Goal 3

Action	Minimal Option	Moderate Option	Most Option
3.1.2 Elevated Boat Ramp	2	2	2
3.1.3 Remove Shoreline Rip-Rap and Fill to restore Natural Beach Slope and Substrate	0	0	5
3.1.4 Restore Lagoon to Estuarine Marsh with Direct Connection to Hood Canal	0	0	5
3.1.5 Redesign Pier and Floats to Meet New Aquatic Habitat Guidelines	1	1	1
3.2.1 Widen Creek Mouth	0	4	5
3.3.4 Restore Backshore Vegetation	0	2	3
áÊÊÊ Weighting Factor*	x1	x1	x2
Total Score for Action	**3**	**9**	**42**
3.2.2 Add Instream Habitat Structures Ð Large Woody Debris		3	
3.2.3 Allow Natural Stream Meanders Ð Pull back banks**		5	
3.3.1 Restore Upland Forest Understory Using Volunteers		2	
3.3.2 Restore Riparian Buffer along Creek		4	
3.3.3 Restore Native Vegetation Understory at Campground		2	
Total Score for Goal	**19**	**25**	**58**

Source: SVR Design Company.

Notes:

* A weighting factor of 2 was assigned to shoreline enhancement scores of the "most" option because it entails restoration of the nearshore sediment transport and estuarine marsh ecology processes. Process-based restoration can be expected to function at a higher level and is more sustainable.

** Widening the stream to restore meander is a prerequisite action for the other actions along the stream route. The ability to implement other stream actions and to realize their potential ecological benefits requires that the stream corridor is widened.

The economic value of habitat includes the values people place on being close to wildlife within an urban area, and also the market values of salmon. Table 16 provides a rough estimate of values of wildlife and fish. The figures are based on studies conducted in Oregon and the entire US, but they provide a reasonable proxy for comparable values in Puget Sound. The fish and salmon habitat are the amount individuals have reported in surveys that they are willing to pay for improved habitat. The figure should be multiplied by the total population in the Puget Sound.

Table 16: Values of Wildlife & Fish Habitat

Impact of Project	Economic Value (2007$)	Description	Source
Improved fish habitat	$3.92	Willingness to pay for an additional fish caught on the Willamette and Clackamas rivers	Berrens, Bergland, Adams (1993), Portland, Oregon
Improved avian habitat	$451	Per acre per year value of wetland for avian habitat	Woodward & Wui (2001) meta-analysis, nationwide
Improve Salmon Habitat	$3.42	WTP per month by Oregonians to improve water quality and habitat in order to help improve salmon runs in Oregon.	Helvoigt & Montgomery (2003 unpublished draft)

Sources: As listed, with calculations by ECONorthwest

Summary

Table 17 shows total estimated costs and total benefits score for Goal 3 for each park. For this goal, the benefits for the minimum, moderate, and most options are relatively close across the three parks. The costs are more difficult to interpret. The costs for improvements at Twanoh are the same for each option. Thus, for Twanoh State Park, it makes senses to do the "most" option. The cost is the same but the benefits are much greater. At Fort Casey and Saltwater, the lower cost is associated with lower benefits and higher costs are associated with higher benefits.

Table 17: Summary of Costs and Benefits, Goal 3

	Costs			Benefits Score		
Park	Minimum cost	Moderate cost	Most cost	Minimum cost	Moderate cost	Most cost
Fort Casey	$2,472,000	$3,620,000	$5,550,000	28	32	56
Saltwater	$3,130,000	$3,560,000	$4,385,000	22	28	46
Twanoh	$4,355,000	$4,355,000	$4,355,000	19	25	58

Source: Jones & Jones consulting team.

5. GOAL 4: HEALTHY PEOPLE

This section describes the costs and benefits associated with the Goal 4, Healthy People. It is organized into two parts:

- Costs summarizes the costs provided to ECO by Jones & Jones for Goal 4.
- Benefits summarizes the benefits associated with the Green Vision Plans for Goal 4.

Costs

Jones & Jones provided ECO with "opinions of probable costs" for each goal at each park. The cost shown here are only estimates. Actual costs are likely to vary from the estimates. This section summarizes the estimated expected costs provided to ECO by Jones & Jones. These costs were divided by the five goals associated with this project.

The format of the information provided to ECO for each of the three parks was organized by goal, by action within the goal, and then for each action, the cost per item and the number of items were specified. In many cases, the estimated cost per item was provided to ECO, but the number of items necessary to complete the task was not. ECO lacks the information to make assumptions about the number of items required for each action. Because the number of items drastically impacts the total cost to complete the actions for each goal, as detailed in the examples below, a summary of actual costs for modifications to these three parks was not possible.

ECO summarized instead the known costs, with the understanding that as the number of items becomes known, these costs will change. ECO's summary, therefore, underestimates the costs required to complete each goal for each of the three parks. The detailed cost estimate tables in Appendix A break down the cost information for each individual action.

It appeared that the healthy habitat, healthy people, and healthy structures goals (Goals 3, 4, and 5) were somewhat more complete than healthy water quality and quantity (Goals 1 and 2).

The Fort Casey estimate show the variation in costs that could be possible as the number of items necessary to make each modification in the three parks becomes known. For example, Action 4.1.3, Review surrounding roads for bike lanes, paths, and bus stops, shows a lump sum cost for performing an access study and creating a master plan, as well as the provision of 6 bike racks, but does not estimate the cost or the number of staff hours necessary to complete this task. Therefore the total cost of $56,000 for this task is an underestimate.

Many of the actions benefit multiple goals. The costs were assigned to an action under one goal, and some costs were not assigned to all the goals that benefited. For example, costs associated with Goal 4, Healthy People: Action 4.3.2 "Provide better access to shoreline by removing riprap wall at campground shoreline" are identified under Goals 1, 2, and 3. No cost appears in Goal 4, because the action is cost is covered in the other goals.

Table 18 shows the summary of estimated expected costs for Goal 4. The summarized costs shown in the table are a close estimate of projected costs.

Table 18. Summary of estimated expected costs, Goal 4

Park	Minimum cost	Moderate cost	Most cost
Fort Casey	$47,050	$47,050	$47,050
Saltwater	$5,183,000	$6,363,000	$6,363,000
Twanoh	$1,113,000	$1,113,000	$1,113,000

Source: Jones & Jones, table by ECONorthwest.

Benefits

The consulting team did not attempt to quantify the benefits directly associated with Goal 4.

Table 19 summarizes economic research on the economic value of parks and open space. These numbers do not capture the full value of improved access to healthy ecosystems, but it provides a rough understanding of the how the parks affect the people living near the parks.

Table 19: Amenity Values of Parks and Open space

Impact of Project	Economic Value (2002$)	Description	Source
Increased property values	$1,671	per property within 1,500' of urban park (present value).	Lutzenhiser & Netusil (2001), Portland, Oregon
Increased property values	$37	per property per additional acre of wetland within 1,500 feet (present value)	Mahan, Polasky, Adams (2000), Portland, Oregon
Increased property values	$30	per property per additional acre of "nearest" wetland (present value)	Mahan, Polasky, Adams (2000), Portland, Oregon
Willingness to pay, voter approval of park bond	$58	per house per year for five years	Vossler et al. (2003), Corvallis, Oregon
Recreation value	$4	per unit day of recreation	Tetra Tech (no date)
Willingness to pay, contingent valuation	$80 - $313	per wetland acre for recreation (present value)	Costanza, et al. (1998), Louisiana

Sources: As listed, with calculations by ECONorthwest

Improved ecosystems at the three parks may also positively affect air quality. It is beyond the scope of this study to estimate the degree that air quality would be affected, but we do have some information about the economic value of improved air quality from urban forests.

The first source is the CITYgreen 5.0 model developed by American Forests. . The CITYgreen model calculates the amount of air pollutants removed per unit of forested area in urban centers throughout the US.

CITYgreen calculates the value of improved air quality provided by urban trees in the Seattle airshed based on the tons of pollutants removed by the trees and the avoided health-care costs of treating respiratory diseases caused by the pollutants. The CITYgreen calculated values of improved air quality include (in 2007 dollars):

- $1,086 per ton of carbon monoxide.
- $1,851 per ton of SO2.
- $5,061 per ton of particulate matter (PM10).
- $7,580 per ton for volatile organic compounds and ozone.

6. GOAL 5: HEALTHY STRUCTURES

This section describes the costs and benefits associated with the Goal 5, Healthy Structures. It is organized into two parts:

- Costs summarizes the costs provided to ECO by Jones & Jones for Goal 5.
- Benefits summarizes the benefits associated with the Green Vision Plans for Goal 5.

Costs

Jones & Jones provided ECO with "opinions of probable costs" for each goal at each park. The cost shown here are only estimates. Actual costs are likely to vary from the estimates. This section summarizes the estimated expected costs provided to ECO by Jones & Jones. These costs were divided by the five goals associated with this project.

The format of the information provided to ECO for each of the three parks was organized by goal, by action within the goal, and then for each action, the cost per item and the number of items were specified. In many cases, the estimated cost per item was provided to ECO, but the number of items necessary to complete the task was not. ECO lacks the information to make assumptions about the number of items required for each action. Because the number of items drastically impacts the total cost to complete the actions for each goal, as detailed in the examples below, a summary of actual costs for modifications to these three parks was not possible.

ECO summarized instead the known costs, with the understanding that as the number of items becomes known, these costs will change. ECO's summary, therefore, underestimates the costs required to complete each goal for each of the three parks. The detailed cost estimate tables in Appendix A break down the cost information for each individual action.

It appeared that the healthy habitat, healthy people, and healthy structures goals (Goals 3, 4, and 5) were somewhat more complete than healthy water quality and quantity (Goals 1 and 2).

Table 20 shows the summary of estimated expected costs for Goal 5. Table 20 shows the two alternate summaries of the estimated expected costs for the proposed renovations at Twanoh. Goal 5 indicates various possibilities for achieving the objective, and these different possibilities—in this case, unlike the other goals, the possibilities are actually entirely different actions—are reflected in the two different summaries shown in Table 20.

Table 20. Summary of estimated expected costs, Goal 4

Park	Minimum cost	Moderate cost	Most cost
Fort Casey	$47,050	$47,050	$47,050
Saltwater	$901,000	$901,000	$901,000
Twanoh- Alt 1	$308,000	$308,000	$308,000
Twanoh-Alt 2	$161,000	$161,000	$161,000

Source: Jones & Jones, table by ECONorthwest.

Benefits

ECO interviewed staff at Twanoh State Park to understand how operating and maintenance (O&M) costs would change if the Green Vision Plan were implemented. Staff reported that the Green Vision Plan would affect O&M costs both positively and negatively. The Plan would reduce O&M costs for these reasons:

- Lawn maintenance. We estimate that Twanoh State Park spends roughly $1,600 per summer season mowing lawns.
- Boat launch. Staff put in and take out the floats once per year. We estimate the Park spends about $500 a year on this task.

Park staff expects maintenance of the pervious pavement to be more labor-intensive than maintenance of existing pavement. Staff was not able to project expected hours associated with the new surface, and amount of new surface is not known.

Due to time constraints, ECO was not able to contact staff at the other two parks. We expect that savings at Saltwater and Fort Casey for O&M would be comparable to Twanoh.

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7. Public Comment

Public Surveys

Overview Survey

Tell us about yourself

Are you a Washington State Parks employee, a park user, or an interested member of the public?

If you are a park user, how often per year do you visit a Washington State Park?

How often do you stay over in a Washington State Park?

Which park do you visit most often?

What do you value the most about Twanoh, Saltwater, or Fort Casey State Parks?

Overview Survey

1) In general, do you support the five Sound-Friendly goals described in the Concept Report? Healthy Water Quality, Healthy Water Quantity, Healthy Habitat, Healthy People, and Healthy Structures?

2) Which strategies and/or actions would you be inclined to support the most? Why?

3) Do any of the strategies and/or actions raise concerns for you? If so, what are they and why?

4) Do you have any green vision ideas you believe should be included in the Sound Friendly Green Vision Report?

5) Do you have any additional comments or questions about the report?

Provide Comments

Thank you for providing your ideas to us today. Please e-mail your completed survey to Chris Regan, Environmental Program Manager, Washington State Parks and Recreation Commission at Chris.Regan@parks.wa.gov.

You may also provide comments on the Green Vision Planning Process by contacting:

Project lead: Chris Regan
E-mail: Chris.Regan@parks.wa.gov
Phone: (360) 902-8632
Fax: (360) 902-8040
Mail: P.O. Box 42650, Olympia, WA 98504-2650

Fort Casey Park Survey

Tell us about yourself

Are you a Washington State Parks employee, a park user, or an interested member of the public?

If you are a park user, how often per year do you visit a Washington State Park?

How often do you stay over in a Washington State Park?

Which park do you visit most often?

What do you value the most about Twanoh, Saltwater, or Fort Casey State Parks?

Give us your ideas!

Survey for Fort Casey State Park

1) Which strategies and/or actions are you most enthusiastic about? Why?

2) Do any of the strategies and/or actions raise concerns for you? If so, which ones – and why?

3) Do you support the idea of reconfiguring or relocating the parking away from the shoreline? How do you feel about replacing the shoreline camping and parking lot with walk-in picnicking sites and a restored shoreline recreation area, and moving the camping to the spit?

4) What do you think about the potential re-location of the Washington State Ferries dock facility to a location that better serves ferry traffic while providing an opportunity to restore the cove?

5) What do you think about moving programmed spaces such as the campground upland to prepare for sea-level rise?

6) What do you think about redesigning the shoreline area of the park to provide an improved shoreline for fish, bird, and animal habitat? Would you prefer to access the water by crossing rip-rap or a more natural shoreline edge?

7) If Fort Casey created a full interpretive center that showcased the park's history and ecology, Ebey's Landing National Historical Reserve, and Sound-Friendly technologies, would this interest you?

8) Do you have any other Sound-Friendly ideas for Fort Casey State Park?

9) Do you have any additional comments or questions for us about Fort Casey State Park?

Provide Comments

Thank you for providing your ideas to us today. Please e-mail your completed survey to Chris Regan, Environmental Program Manager, Washington State Parks and Recreation Commission at Chris.Regan@parks.wa.gov.

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Saltwater Park Survey

Tell us about yourself

Are you a Washington State Parks employee, a park user, or an interested member of the public?

If you are a park user, how often per year do you visit a Washington State Park?

How often do you stay over in a Washington State Park?

Which park do you visit most often?

What do you value the most about Twanoh, Saltwater, or Fort Casey State Parks?

Give us your ideas!

Survey for Saltwater State Park

1) Which of the strategies and/or actions are you most enthusiastic about? Why?

2) Do any of the strategies and/or actions raise concerns for you? If so, which ones – and why?

3) Do you support the idea of reconfiguring or relocating the parking away from the shoreline and creek to improve shoreline processes, reduce pollution, and improve habitat for fish, animals, and birds? Would you use a shuttle if overflow parking was moved off-site?

4) Do you support the idea of relocating the concessions building and other programmed facilities at risk of sea level rise?

5) What do you think about relocating or expanding camping to a nearby state park to improve McSorley Creek for salmon and other plant, animal, and fish species?

6) What do you think about removing the existing creek-side campsites and creating a new camping village on the bluff that contains yurts or cabins, group camping, and expanded picnicking opportunities as well as a welcome campus for visitor orientation?

7) What do you think about redesigning the shoreline area of the park to improve Saltwater's shoreline and Puget Sound health? Would you still use the shoreline if some of the formal picnic areas and lawn were replaced with natural beach, yet some formal recreation facilities remained?

8) Do you have any other Sound-Friendly ideas for Saltwater State Park?

9) Do you have any additional comments or questions for us about Saltwater State Park?

Provide Comments

Thank you for providing your ideas to us today. Please e-mail your completed survey to Chris Regan, Environmental Program Manager, Washington State Parks and Recreation Commission at Chris.Regan@parks.wa.gov.

You may also provide comments on the Green Vision Planning Process by contacting:

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Phone: (360) 902-8632
Fax: (360) 902-8040
Mail: P.O. Box 42650, Olympia, WA 98504-2650

Twanoh Park Survey

Tell us about yourself

Are you a Washington State Parks employee, a park user, or an interested member of the public?

If you are a park user, how often per year do you visit a Washington State Park?

How often do you stay over in a Washington State Park?

Which park do you visit most often?

What do you value the most about Twanoh, Saltwater, or Fort Casey State Parks?

Give us your ideas!

Survey for Saltwater State Park

1) Which of the strategies and/or actions are you most enthusiastic about? Why?

2) Do any of the strategies and/or actions raise concerns for you? If so, which ones – and why?

3) Do you support the idea of reconfiguring or relocating the parking away from the shoreline and creek to improve shoreline processes, reduce pollution, and improve habitat for fish, animals, and birds? Would you use a shuttle if overflow parking was moved off-site?

4) Do you support the idea of relocating the concessions building and other programmed facilities at risk of sea level rise?

5) What do you think about relocating or expanding camping to a nearby state park to improve McSorley Creek for salmon and other plant, animal, and fish species?

6) What do you think about removing the existing creek-side campsites and creating a new camping village on the bluff that contains yurts or cabins, group camping, and expanded picnicking opportunities as well as a welcome campus for visitor orientation?

7) What do you think about redesigning the shoreline area of the park to improve Saltwater's shoreline and Puget Sound health? Would you still use the shoreline if some of the formal picnic areas and lawn were replaced with natural beach, yet some formal recreation facilities remained?

8) Do you have any other Sound-Friendly ideas for Saltwater State Park?

9) Do you have any additional comments or questions for us about Saltwater State Park?

Provide Comments

Thank you for providing your ideas to us today. Please e-mail your completed survey to Chris Regan, Environmental Program Manager, Washington State Parks and Recreation Commission at Chris.Regan@parks.wa.gov.

You may also provide comments on the Green Vision Planning Process by contacting:

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PSI Comment Summary

Summary Statistics:

Days available for review:	12, 7 business days
Number of comments received:	9
Number of agencies commenting:	5
State Parks:	3 (one written on manuscript)
Other State Agency:	1
Local Government:	2
LEG:	1
Other:	2 (one written on manuscript)

From: Fitzsimmons, Troy (PARKS)
Sent: Friday, May 25, 2007 8:55 AM
To: Regan, Chris (PARKS); Farber, Daniel (PARKS); Fields, Nikki (PARKS); Pillers, Joel (PARKS); Saltwater State Park
Subject: Green Vision Plan Review.

Chris,

I have reviewed the Twanoh and Saltwater Green Vision Plans and have the following comments for each below. As a general note, the product has improved greatly from the last submission. I would also suggest that Jones and Jones look at each plan again and determine which actions can be incorporated into every plan. For example, Saltwater's plan noted that they would limit and use only environmentally friendly vegetation control chemicals. This was not in the Twanoh plan, but should be. There are universal actions such as this one that should be incorporated into all the plans.

Twanoh:

1.1. I am concerned about the use of pervious concrete for parking areas. First, it is costly to install. Second, it is costly to maintain as it needs to be vacuumed periodically to keep the pores from filling in and making it impervious. Third, I'm concerned that if the water penetrates the pavement and then disperses into the soil it will take with it various pollutants such as oil, antifreeze, gasoline, etc. Eventually this will migrate into the water table or the Canal. Fourth, from a cost effectiveness stand point I think bioswales with a forebay for capturing pollutants would be economical and safer for the environment.

1.2. It sounds like we're proposing to reuse gray water without any treatment for irrigation purposes. Can we do this without any treatment?

A pre-treatment wetland is proposed as a pretreatment for our waste water up at the drainfield. Based upon the concentrated waste strength going into the wetland will we need to fence the wetland to keep people out. If so, I think this would greatly diminish the interpretive value of the site as people will need to keep out due to hazardous conditions. This would send a mixed message.

1.4. I think the boat rinse off area will add a negligible benefit to the water quality in Hood Canal. They're taking a boat out of the canal and then rinsing off the same water and sediment that came out of the canal to start with. Also, how many folks will actually use the station as they always seem to be in a hurry to load up and get home when they get off the water. I'm all for providing interpretation telling folks how to be environmentally sensitive when cleaning their boats, but I don't think the rinse off station would provide much benefit.

I don't think we can eliminate cleaning chemicals, but we sure can use more environmentally safe chemicals. We should also add in language for vegetation and pest control chemicals that are more environmentally sensitive.

1.5. I'm all for moving camping away from the creek provided we have no net loss of camp sites.

1.6. Demonstration projects should be affordable for the typical homeowner so that there is a realistic opportunity for them to employ these measures.

2.2. Removal of the armorment is a serious issue and must be carefully evaluated with the appropriate engineering studies to ensure that we will not lose too much valuable land. I am all for the removal of rip-rap provided we can be reasonably assured that we will have adequate amounts of upland available for visitors.

3.1. We should reference the fact that redesigning the pier and floats will not only meet new aquatic guideline, but also remove creosoted timber and piles with more environmentally friendly building materials like recycled plastic reinforced piles.

3.5. I believe the wildlife tunnel will be cost prohibitive and provide minimal wildlife enhancement. Most of the wildlife will be crossing at night when the highway has very limited traffic anyway. I don't think this suggestions will provide much benefit.

4.1. We need to ensure that whatever Native American design concepts we employ works within the context of the historic fabric of the site.

4.3. Same comment as 2.2 above.

Saltwater:

1.1. I am concerned about the use of pervious concrete for parking areas. First, it is costly to install. Second, it is costly to maintain as it needs to be vacuumed periodically to keep the pores from filling in and making it impervious. Third, I'm concerned that is the water penetrates the pavement and then disperses into the soil it will take with it various pollutants such as oil, antifreeze, gasoline, etc. Eventually this will migrate into the water table or the Canal. Fourth, from a cost effectiveness stand point I think bioswales with a forebay for capturing pollutants would be economical and safer for the environment.

We should be able to reduce parking surface area without eliminating parking spaces as the lot appears to be oversized and could be more efficiently laid out.

We need to do further evaluation to determine if providing shuttle service from remote parking will work from an economical standpoint as well as a practical standpoint. Will people use it?

1.3. Do RV's have the capacity to separate their gray and black water?

It sounds like we're proposing to reuse gray water without any treatment for irrigation purposes. Can we do this without any treatment?

1.5. I'm all for moving camping away from the creek provided we are relocating camping to another nearby park. However, if we are keeping camping we need to have no net loss of camp sites.

1.6. Demonstration projects should be affordable for the typical homeowner so that there is a realistic opportunity for them to employ these measures.

We should be a partner in any campaign to inform the public about upstream impacts to the park and basin, but I think the Puget Sound Partnerships would be a more suitable agency to lead any effort where multiple jurisdictions need to collaborate to save the Sound.

2.3. We need a cost benefits analysis on reconnecting the fresh water seeps and McSorley Creek. It appears as though a significant portion of our parking lot would be jeopardized in order to do so. We need to thoroughly evaluate this option to determine if the benefit outweighs the cost.

3.1. Removal of the armorment is a serious issue and must be carefully evaluated with the appropriate engineering studies to ensure that we will not lose too much valuable land. I am all for the removal of rip-rap provided we can be reasonably assured that we will have adequate amounts of upland available for visitors.

3.2. We need to determine the operational impacts of removing existing camping, but provide new cabin rentals along the bluff to determine if it is economically palatable. By having just a handful of cabins with no other overnight accommodations the operational costs for managing such a small overnight facility may greatly outstrip the revenue generated from it.

I agree with leaving fallen trees over the creek provided they are not a hazard to park visitors.

3.5. The Green River Community College has a small marine learning center in Redondo. For State Parks to build one as well may be redundant. Perhaps State Parks could partner with GRCC to build a new facility at Saltwater as their facility in Redondo is somewhat small or have the students come out to Saltwater to provide programming.

5.3. We need to determine the operational impacts of removing existing camping, but provide new cabin rentals along the bluff to determine if it is economically palatable. By having just a handful of cabins with no other overnight accommodations the operational costs for managing such a small overnight facility may greatly outstrip the revenue generated from it.

From: Mike Vandeman [mailto:mjvande@pacbell.net]
Sent: Monday, May 28, 2007 9:50 AM
To: Regan, Chris (PARKS)
Subject: Green Vision Plans

One of the greatest tragedies of the park system in the last couple of decades is the unthinking acceptance of mountain biking. Mountain biking accelerates erosion (sending silt into the bay), creates V-shaped ruts that make walking difficult and dangerous, kills countless small animals and plants on and next to the trail, drives hikers and equestrians off the trails and out of the parks, and teaches children that the rough treatment of nature is okay. Of course it's NOT. For the science on mountain biking impacts, see http://home.pacbell.net/mjvande/scb7.

Bicycles are inanimate objects without rights. They don't belong in any natural areas. A federal court averred in 1994 that there is no right to mountain bike. See http://home.pacbell.net/mjvande/mtb10. Mountain bikers claim to be excluded from the trails, but in fact they have the same access as everyone else: ON FOOT!

Sincerely,

Mike Vandeman, Ph.D.

I am working on creating wildlife habitat that is off-limits to humans ("pure habitat"). Want to help? (I spent the previous 8 years fighting auto dependence and road construction.)

Please don't put a cell phone next to any part of your body that you are fond of!

Hi Chris,

I've read and reviewed the material produced for Twanoh and over all am pretty impressed with the detailed assessment and recommendations. I have two broad comments though. First, I could only find one place that connected riparian area discussions with the marine shoreline in addition to the creek. I'd have an entire strategy (or was it substrategy, I can't remember the organization now..) section that focused on marine shoreline vegetation restoration and interpretation. All the same benefits for freshwater areas would apply of course (water quality, organic inputs, etc.), with the added benefit of helping forage fish which are documented in this area.

Second, you did address climate change in your plans here, but I didn't see any focus on freshwater changes. In watersheds with high elevation it is pretty clear we'll see larger floods due to less snow and more rain on snow events. In these smaller watersheds there is much less certainty, but most of the models supposedly suggest increased rain in general in the winter, meaning we'll see increased flows in winter and thus increased hydraulics, water depth, shear stress, and thus scour and deposition of sediments. To counter this I'd suggest we add a section under climate change referring back to adding instream complexity through wood to slow water down and stabilize sediments and give more refuge areas for macroinvertebrates and juvenile fish. Adding wood, slowing water, and decreasing sediment size also has the potential benefit of improving water quality. We are currently replicating some studies out of north Carolina that show these mechanisms actually help denitrify freshwaters, thus keeping it out of nutrient-sensitive Hood Canal. It's an unproven link until we have this site specific data this summer, but worthy to note it here regardless.

Thanks for the review opportunity,

Richard
Richard Brocksmith, Lead Entity Coordinator

Chris I hope we are not seriously planning to pull out the bulk head (rock on the bank). That is a huge historical marker for Saltwater. I was not at any of the meetings so I believe I am getting info third hand. A move of this magnitude would affect the entire lawn area and the neighbors to the south of the park. I believe I sent you an outline of the historical events that have taken place with Saltwater and I hope it shed some light on this subject. I will call.

Johnny Acting Area Manager

From: Myers, Doug [mailto:DMyers@PSAT.WA.GOV]
Sent: Thu 5/31/2007 5:43 PM
To: Regan, Chris (PARKS)
Subject: RE: Puget Sound Initiative - Modeling "Sound-friendly" Development

Chris,

Obviously you caught Bruce and I in the final freaky throes of the biennium. We were both too busy to comment on the plans but feel like our engagement early on was the most appropriate. I'm looking forward to seeing the final plans with incorporated public review. My initial reaction to Parks staff comments is that they seem to support status quo rather than taking bold action. I'm not too surprised. If removing armoring will be viewed as a "loss of valuable land" rather than a gain in natural ecological structure and function, then the commitment isn't there for doing this work. If no net loss of parking spaces and campsites is an overarching principle, then few of the recommended actions are likely to take place.

Saltwater Park survey

Tell us about yourself

Are you a Washington State Parks employee, a park user, or an interested member of the public?
Yes

If you are a park user, how often per year do you visit a Washington State Park?
3-4 time/year

How often do you stay over in a Washington State Park?
1 per year

Which park do you visit most often?

What do you value the most about Twanoh, Saltwater, or Fort Casey State Parks?
Marine nearshore. McSorely Ck.

Give us your ideas!
Survey for Saltwater State Park

1) Which of the strategies and/or actions are you most enthusiastic about? Why?
Removal of seawall to restore nearshore habitat. Estuarine restoration at McSorely Ck. Identified in WRIA 9 Habitat Plan as project NS-15.

2) Do any of the strategies and/or actions raise concerns for you? If so, which ones – and why?
No.

3) Do you support the idea of reconfiguring or relocating the parking away from the shoreline and creek to improve shoreline processes, reduce pollution, and improve habitat for fish, animals, and birds? Would you use a shuttle if overflow parking was moved off-site?

Yes

4) Do you support the idea of relocating the concessions building and other programmed facilities at risk of sea level rise?

Yes

5) What do you think about relocating or expanding camping to a nearby state park to improve McSorley Creek for salmon and other plant, animal, and fish species?

Great idea.

6) What do you think about removing the existing creek-side campsites and creating a new camping village on the bluff that contains yurts or cabins, group camping, and expanded picnicking opportunities as well as a welcome campus for visitor orientation?

Great idea.

7) What do you think about redesigning the shoreline area of the park to improve Saltwater's shoreline and Puget Sound health? Would you still use the shoreline if some of the formal picnic areas and lawn were replaced with natural beach, yet some formal recreation facilities remained?

Great idea. Yes.

8) Do you have any other Sound-Friendly ideas for Saltwater State Park?

Restoration of marine near shore habitat is a priority for the WRIA 9 Salmon Habitat Plan and for the newly formed Puget Sound Partnership. State Parks and other public lands with nearshore access provide a tremendous opportunity to turning the tide on shoreline armoring and the destruction of nearshore rearing habitat for juvenile salmon.

9) Do you have any additional comments or questions for us about Saltwater State Park?

Thanks for you efforts. Please contact me if you have any questions re: the WRIA 9 Salmon Habitat Plan.

Gordon Thomson
WRIA 9 Habitat Plan Manager
King County Department of Natural Resources
201 S. Jackson Street, #600
Seattle, WA 98104
(206) 296-8013

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