

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.

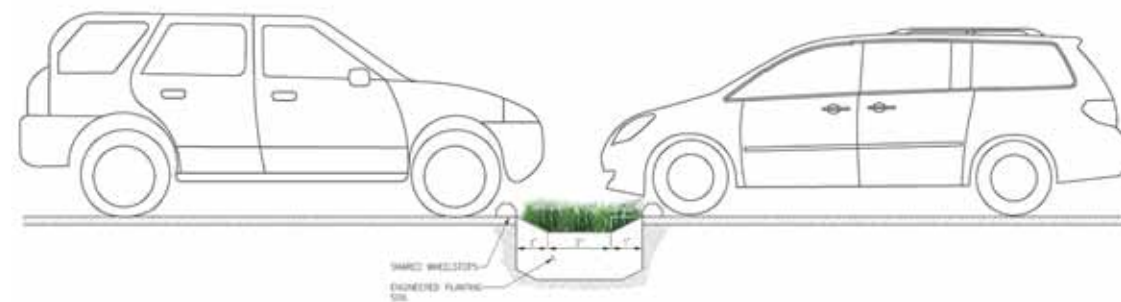
Strategy 1: Reduce effective impervious areas and maximize infiltration.

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 run-off 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



Example of bioswales along parking areas—After



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.*

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. 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.



Existing Quartermaster wharf structure

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.

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 1/3 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 (Cephus 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 dock 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 run-off 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: *Discuss 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: *Convert historic fire control station to 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.

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.



View of spit and low elevation of Highway 20



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 yellow 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.



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



Dune swale wetland and dune grass

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 harbor's 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.

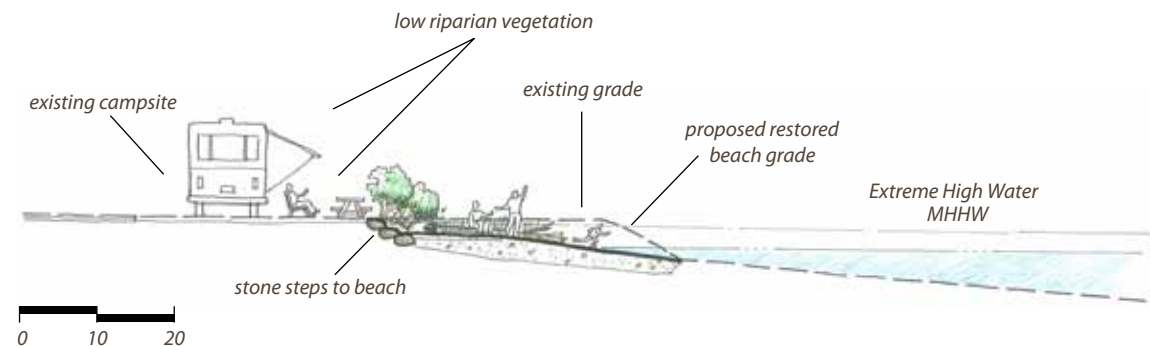


View showing sparse vegetation on spit

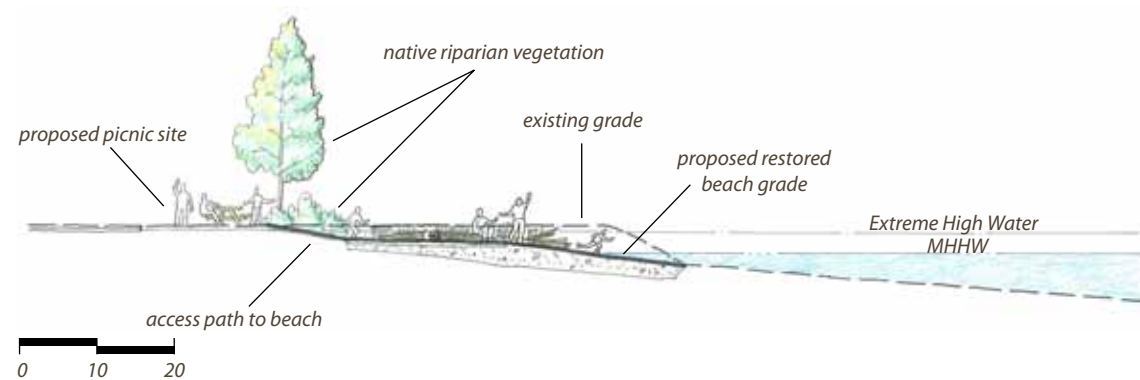
Action: *Re-locate some of the campsites to other areas away from the shoreline. Replace riprap and some upland with natural beach and backshore, native riparian vegetation, and access points to the beach.*

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 run-off, 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 run-off, and uptake pollutants.

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.*

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.

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.*



Crockett Lake vegetation

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 run-off 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 run-off, 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.

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

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.

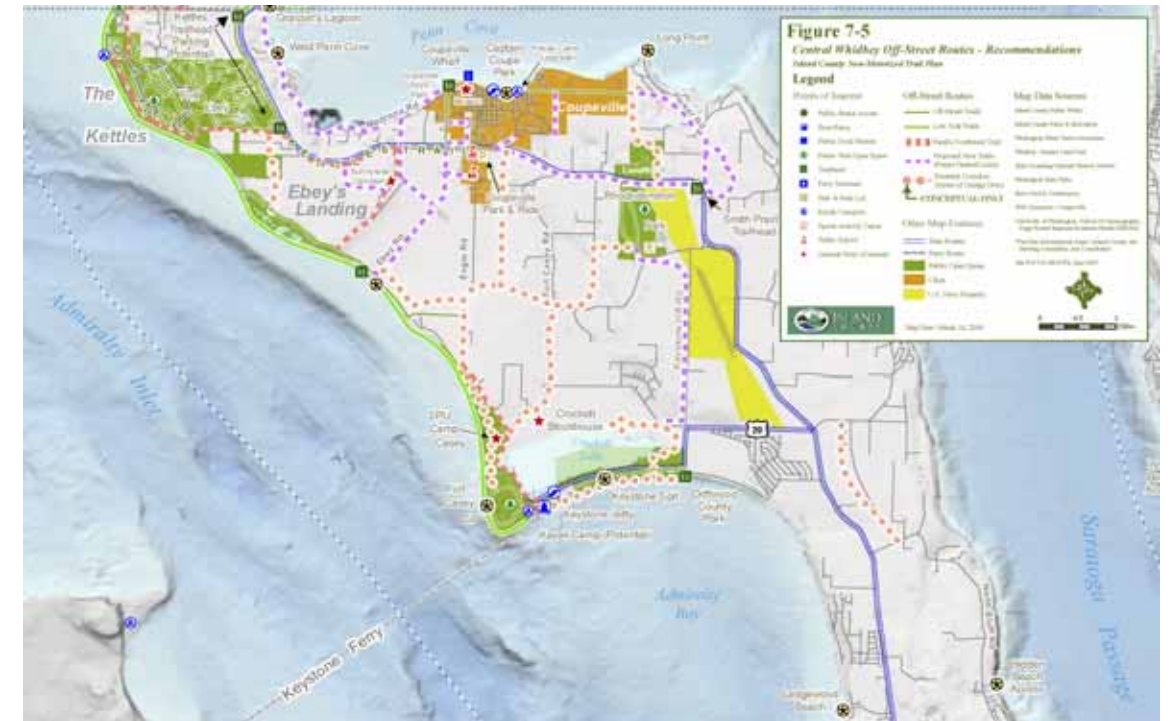
Action: *Increase riparian vegetation buffer around Keystone Harbor edge to enhance fish habitat.*

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.



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

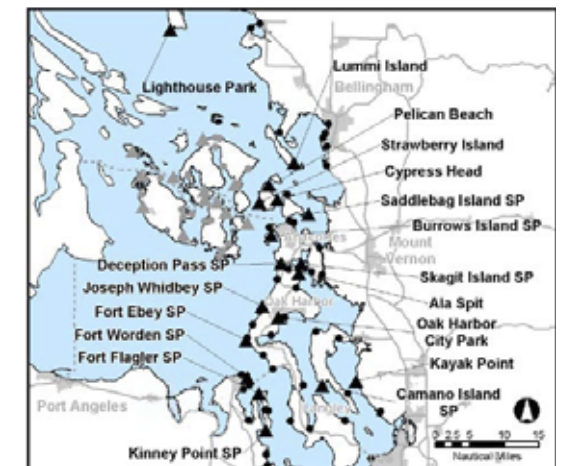
GOAL 4

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.



Cascade Marine Trail Campsites - North Sound Section

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.

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.

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

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.

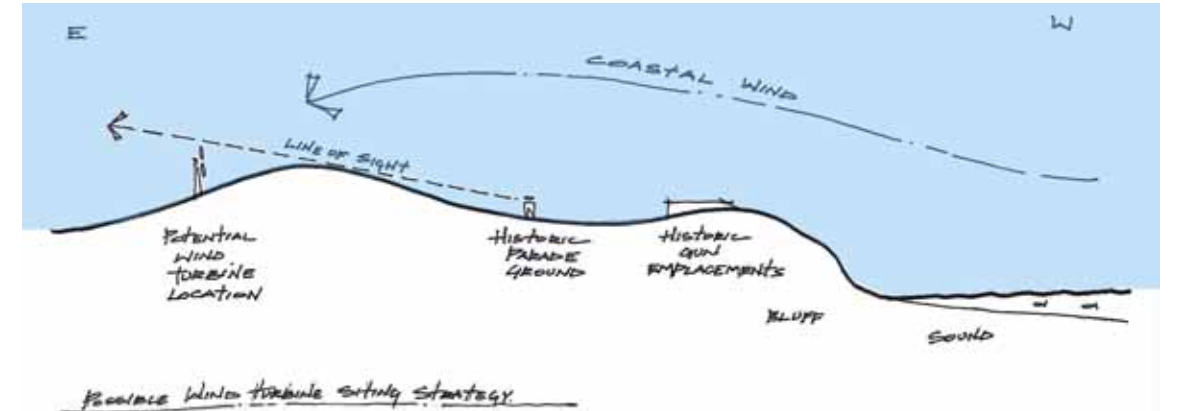
Strategy 1: Promote energy-efficient and energy-producing design, and reduce resource and energy consumption.

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 in the form of batts or blown-in cellulose 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 run-off to irrigate the historic planting area. Interpret this system and its historic context for park visitors.

