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.

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

Strategy 1: Reduce effective impervious areas and maximize infiltration.

Action: *Re-surface and/or reconfigure parking, and treat stormwater by using 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.

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.*

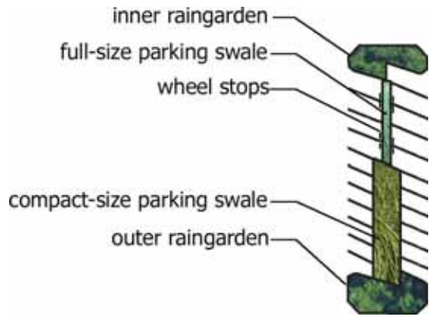
Existing paved parking lots could be removed and/or replaced with pervious paving. Grass or permeable pavers could be used in the upper areas of the park that are closed during the winter in order to create overflow parking for the peak summer months. Pervious surfaces could also be used in the upper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

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

Strategy 2: Treat storm water run-off before discharge to the Sound.

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

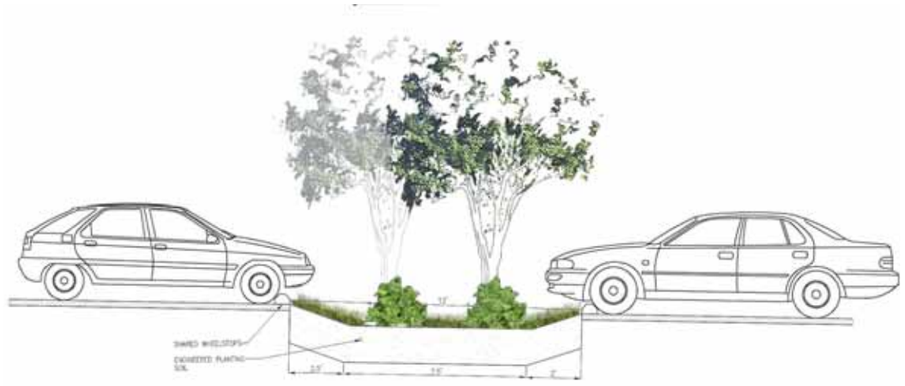
Low-impact development elements can be used between parking stalls and along the perimeter of parking areas and roadways to collect and treat stormwater runoff that contains sediments, metals, and oils from cars and trucks. Since all low-impact development elements improve water quality, they should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



Components of LID stormwater treatment elements in a parking area

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.



Example of bioswales cross sections that could be installed along 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.

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. In addition to providing information on appropriate cleaning methods and chemicals that are safe for the Midway Sewer District, the state park can educate RV users on methods to reduce their waste by separating gray and black waste.

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 in the busy summer months.

Existing comfort station at Saltwater State Park

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

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.

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.*

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.

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

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.

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.

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

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.

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.

Existing seasonal park access located along the riparian corridor.

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. Intepretation 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.

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.

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

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.

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

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.

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.*

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 run-off, 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," 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.

Metro Transit 131 bus route

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.

- 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 .

Community greenway connection to park

- 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.

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.

Low-impact cabin camping

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. • 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)

Watershed interpretive information

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

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.

Interactive group learning

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

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 associated with any improvements to the park may 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, 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 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 ranger housing structure is an example of a conditioned historic structure that might benefit from these measures.

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

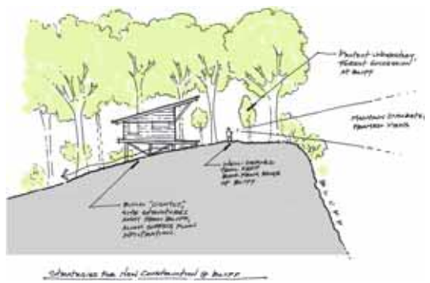
Among the typical Low Impact Development approaches outlined in Hinman, 2005 (e.g., vegetated roofs, rain barrels, permeable paving, etc.), consider park-specific interventions and improvements to non-historic structures or new buildings. Design guidelines for the appropriate treatment of both historic 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. Thoughtful building siting and master planning to protect historic structures and cultural landscapes, as well as. 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.*

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.).*