



STRATEGIES AND ACTIONS TO RECOVER  
PUGET SOUND TO HEALTH

# B: MARINE AND NEARSHORE

# Protect and Restore **MM**arine and **NN**earshore Ecosystems

The protection and restoration of marine and nearshore ecosystems is vital to the long-term health of Puget Sound and the quality of life of its residents. Historical human activities have dramatically affected and damaged many of these systems, and in order to successfully protect and restore our marine and nearshore ecosystems we need to ensure that priority restoration and protection efforts are carried out; working waterfronts remain economically viable; citizens can easily access Puget Sound; eelgrass beds are able to flourish; marine and nearshore habitats continue to sustain diverse species and food webs; and non-native species do not impair the complex functions of the Puget Sound ecosystem.

This chapter describes six overarching strategies that are essential to the protection and restoration of nearshore and marine systems:

- **B1** – Focus development away from ecologically important and sensitive nearshore areas and estuaries;
- **B2** – Protect and restore nearshore and estuary ecosystems;
- **B3** – Protect and restore marine ecosystems;
- **B4** – Protect and steward working waterfronts and improve public access to Puget Sound;
- **B5** – Protect and restore the native diversity and abundance of Puget Sound species;
- **B6** – Prevent and respond to the introduction of invasive species.

The 2020 ecosystem recovery targets most related to protection and restoration of marine and nearshore ecosystems are: shoreline armoring; estuaries; eelgrass; Pacific herring; orcas; and Chinook salmon.

## B1-3 Local Priorities

Protection and restoration of marine shorelines and estuaries is a priority for all Local Integrating Organizations. The agreed upon strategies, or example ideas under discussion, are presented below. Some LIOs also have associated near-term actions that are listed with the related Soundwide sub-strategy.

LIO/Area	Priorities
San Juan Islands	<i>Tier 1 Strategies</i> <ul style="list-style-type: none"><li>• Provide information and work with landowners regarding the importance of retaining and restoring native vegetation, trees and ground cover and geologic processes.</li><li>• Improve on compliance and enforcement capacity</li><li>• Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights.</li></ul>

LIO/Area	Priorities
	<p><i>Tier 2 Strategies</i></p> <ul style="list-style-type: none"> <li>• Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights. (Same as Tier 1 above)</li> <li>• Provide convenient landowner access to technical assistance for maintaining views, shoreline access, and ecological function of the shoreline.</li> <li>• Shoreline regulatory strategy (update CAO and SMP).</li> <li>• Implement San Juan Marine Stewardship Area Monitoring Plan.</li> </ul>
<b>Strait of Juan de Fuca</b>	<p><i>From High Priority Strategy list</i></p> <ul style="list-style-type: none"> <li>• Shoreline Master Program updates, implementation, and intergovernmental coordination (Jefferson County, Clallam County, and cities of Port Townsend, Sequim, and Port Angeles).</li> </ul> <p><i>From additional 19 Strategic priorities</i></p> <ul style="list-style-type: none"> <li>• Aquatic Resources Habitat Conservation Plans - Develop and implement Aquatic Resources Habitat Conservation Plans (HCP)</li> <li>• Marine Resource Plans (Clallam and Jefferson MRCs) - Implement Marine Resources Committee's Action Plan for Clallam and Jefferson counties and Northwest Strait Commission Regional Projects</li> </ul>
<b>South Central Puget Sound</b>	<p><i>From High Priority Strategy list</i></p> <ul style="list-style-type: none"> <li>• Change Shoreline Management Act (SMA) statutes and regulations to limit residential shoreline armoring and overwater coverage, and promote "green" shoreline replacements:</li> <li>• Seek better alignment of state standards for stormwater, Shoreline Master Programs, and floodplain development regulations with Soundwide targets and Action Agenda priorities</li> <li>• Implement "green" shoreline replacements: Promote green shoreline BMPs, incentives, fund/implement shoreline restoration plans</li> <li>• Work with local governments to develop and implement policies and regulations that advance Action Agenda implementation</li> </ul>
<b>South Sound</b>	<p><i>From South Sound Strategic Initiative: Habitat Acquisition and Protection</i></p> <ul style="list-style-type: none"> <li>• Secure perpetual public ownership of McNeil Island</li> <li>• Implement Conservation Plans (McLane Creek, Goldsborough Creek, Skookum Creek, Nisqually Protection (and Restoration) Plan</li> <li>• Bayshore Acquisition at Oakland Bay</li> <li>• Protect existing, functioning drift cells in South Sound</li> </ul> <p><i>From South Sound Strategic Initiative: Salmon Recovery/Habitat Restoration</i></p> <ul style="list-style-type: none"> <li>• Restore Chambers Creek and Sequelitchew Creek Estuaries</li> <li>• Restore Deschutes Estuary</li> <li>• Implement all South Sound nearshore projects described by the PSNERP process</li> <li>• Restore function to drift cells in South Sound with a focus on BNR ownership</li> </ul>
<b>Hood Canal</b>	<p><i>From general priorities under development</i></p> <ul style="list-style-type: none"> <li>• Implement and enforce existing regulatory programs of the counties (SMP, CAO, County Comp.) and states (RCW's and WAC's)</li> <li>• Improve financial and technical assistance programs aimed at fostering voluntary stewardship and improving re/development standards</li> <li>• Complete and begin to implement county SMP restoration plans and MRC plans</li> <li>• Consult with landowners and public about potential high priority PSNERP projects;</li> </ul>

LIO/Area	Priorities
	advocate for funding for high priority projects with landowner support <ul style="list-style-type: none"> <li>Restore estuaries by removing infrastructure and setting back levees/revetments where feasible</li> </ul>
<b>West Sound</b>	<i>Draft Strategies under development</i> <ul style="list-style-type: none"> <li>Prioritize and protect marine and nearshore ecosystems by improving shoreline permitting compliance monitoring and enforcement</li> <li>Align regulatory programs across cities/counties for better coordination on development, and address publicly owned shoreline; Improve communication, planning, and integration between County and City SMPs and Navy INRMPs</li> <li>Identify priority areas that are compromised by armoring, and encourage armoring removal and erosion control alternatives that better protect and restore nearshore ecosystem processes</li> </ul>
<b>Whatcom, Stillaguamish &amp; Snohomish Watersheds, Island Watershed, Skagit Watershed</b>	<i>These areas are still developing strategies and actions. The types of strategies under discussion include, for example:</i> <ul style="list-style-type: none"> <li>Continue implementing local CAO, GMA, and SMP plans</li> <li>Complete a nearshore and estuary strategic plan for assessment, restoration, and protection projects that is coordinated with other planning efforts (e.g., Salmon Recovery, Shoreline Management)</li> <li>Evaluate need to protect ecosystem processes and quality of life needs when considering tidal energy projects</li> <li>Protect high value habitat: unique spawning areas, juvenile rearing areas, eelgrass beds, and bird habitats</li> <li>Complete large scale estuary restoration projects</li> <li>Implement projects to remove bank armoring where appropriate and/or use "green" armoring techniques,</li> <li>Update Fish and Wildlife Habitat Conservation Areas of the Critical Area Ordinances</li> <li>Create incentive program for landowners to remove existing bulkheads or replace them with soft shore armoring.</li> <li>Complete and implement Shoreline Master Program updates on schedule; implement restoration components of shoreline management plans</li> </ul>

## B1. Focus development away from ecologically important and sensitive nearshore areas and estuaries

### The Challenge

There is perhaps no better vantage point from which to appraise the health of Puget Sound than in the region's marine waters and nearshore habitats. There is near-universal agreement that the estuary's recovery depends foremost on protecting and restoring the areas, species and ecosystem processes that are most essential for ecological function. To that end, many entities have set separate priorities for habitat protection and restoration efforts in the region, from the local level to the entire basin. Similarly, other entities have championed the need to better protect certain species or key members of the food web through recovery plans or other associated efforts (see Section B5 for further details). The challenge facing the planning community (and this section of the Action Agenda) is to consolidate

independent assessments into a more cohesive and coordinated policy directive that articulates where and how, in the face of pressures associated with human population and economic growth, we will direct shoreline and marine development and which places we will strive to recover or set aside.

The Growth Management Act (GMA) and the Shoreline Management Act (SMA) direct local jurisdictions to plan for growth and development while ensuring no net loss of critical areas and their associated ecosystems (wetlands, streams, slopes, etc.) or of shoreline ecosystem functions and processes. Development regulations, borne out of those plans, are not always effective in achieving environmental objectives. An integrated approach to planning and permitting that involves all levels of government and the private sector is needed.

## Climate Change

Sea level rise and storm surge will increase the frequency and severity of flooding, erosion, and seawater intrusion – increasing risks to vulnerable communities, infrastructure, and coastal ecosystems. Combined with increased ocean acidity and warmer marine temperatures, climate change will have profound effects on marine nearshore and estuaries.

Sea level in the Puget Sound region is expected to increase 6 inches (range of 3 to 22 inches) by 2050 and by 13 inches (range of 6 to 50 inches) by 2100<sup>19</sup>. Changes at specific locations within Puget Sound will vary from these regional projections. Major impacts associated with sea level rise are likely to be inundation, flooding, erosion and infrastructure damage, with the largest impacts occurring when storm or river flooding events converge with high tides.

Priority Response Strategies identified in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012) related to the marine nearshore and estuaries include:

- **Reducing the risk of damage to buildings, transportation systems and other infrastructure.** This includes supporting local efforts to prepare for coastal flooding and storm surges, as well as considering climate change impacts when new development and infrastructure are sited.
- **Safeguarding fish and wildlife habitat and protecting critical ecosystem services that support human and natural systems.** This includes protecting and restoring habitat and reducing existing stresses on fish, wildlife, and ecosystems.
- **Reducing the vulnerability of coastal communities, habitat and species.** This priority includes protecting people, property, and infrastructure from coastal hazards and avoiding new development in highly vulnerable areas. It also includes preventing coastal degradation and destruction, as well as seeking opportunities for upland habitat creation as sea levels rise.

The state adaptation strategy identifies several coast and ocean adaption strategies with related actions. These strategies are recommended to help:

- Limit new development in highly vulnerable areas;
- Protect the shoreline from rising sea levels using green or “soft” alternatives to traditional “hard” shore armoring, seawalls, and dikes;

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<sup>19</sup> Mote, P.W., A. Petersen, S. Reeder, H. Shipman, and L.C. Whitely Binder. 2008. *Sea Level Rise in the Coastal Waters of Washington State*. Report prepared by the Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington and the Washington Department of Ecology, Lacey, Washington.

- Accommodate rising sea levels through engineering and construction practices or raising the height of piers or buildings;
- Manage retreat from highly vulnerable sites;
- Restore and maintaining wetlands, preserving sediment transport processes, and preserving habitat for vulnerable species; and
- Enhance monitoring and research of ocean chemistry changes and effects on marine ecosystems.

Strategies for implementation include:

- **Leading by example through development of a state framework to guide decision-making and protect people, assets, and natural areas from coastal hazards.**
- **Avoiding development in highly vulnerable areas and promoting sustainable development in appropriate, less vulnerable areas.** Example actions include providing guidance, updating maps and information to help local jurisdictions, identifying incentives and regulatory tools to reduce risk exposure, providing updated guidance, assessing damage costs and removing incentives that encourage rebuilding in at-risk areas.
- **Accelerating efforts to protect and restore nearshore habitat and natural processes.** Example actions include identifying priority conservation and restoration areas that can increase natural resiliency and protect vulnerable communities, developing restoration and protection guidelines, and identifying policy options to avoid or minimize shoreline hardening, especially in Puget Sound to promote green shoreline and landward setback programs.
- **Building local capacity to respond to climate impacts by providing tools to assess vulnerability and advancing research, monitoring and engagement efforts.** Example actions include completion of a sea-level rise and vulnerability assessment that includes Puget Sound, and assisting of coastal planners.

Many of the sub-strategies, ongoing programs and near-term actions in the Action Agenda help implement the state Climate Response Strategy.

## Relationship to Recovery Targets

Protection and restoration of nearshore and marine systems is critical to achieving recovery targets for estuaries, and shoreline armoring. The target for estuaries is that all Chinook natal river deltas meet 10-year salmon recovery goals (or ten percent of restoration need as a proxy for river deltas lacking quantitative acreage goals in salmon recovery plans) and 7,380 quality acres are restored basin-wide by 2020. For shoreline armoring, the recovery target is that from 2011 to 2020 the total amount of armoring removed is greater than the total amount of new armoring, with an emphasis on removing/preventing new armoring at feeder bluffs and use of soft shore techniques for all new and replacement armoring unless it is demonstrably infeasible.

Nearshore and marine protection and restoration also will contribute to other recovery targets including eelgrass recovery, floodplains, orcas, herring, and wild Chinook salmon.

**B1.1 Use complete, accurate, and recent information in shoreline planning and decision making at the site-specific and regional levels.**

Washington’s nearshore science community, through the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), has outlined a comprehensive set of protection and restoration priorities to improve sediment supply and other critical ecosystem processes for the Sound (Cereghino, in progress). These priorities have not yet been reconciled with potentially complementary analyses and efforts by the salmon recovery watersheds as part of the federally-approved Chinook Salmon Recovery Plan, local conservation inventories, and other habitat and natural resource-specific rankings including the Puget Sound Watershed Characterization Project. This sub-strategy seeks to unite and apply the results across disciplines from the basin to local scale. Such consolidation will clarify what areas have the greatest potential to aid recovery and which areas have least—and will help planners, decision-makers and the public to evaluate where best to apply protective measures, restore, and direct development. This sub-strategy is an important part of climate change adaptation.

**Ongoing Programs**

PSNERP, which has become PSP’s nearshore program, is a partnership between the U.S. Army Corps of Engineers (USACE), state, local, and federal government organizations, tribes, industries, and environmental organizations with the goal of guiding the restoration and protection of Puget Sound nearshore ecosystems. The project aims to achieve a shared understanding that can guide and coordinate restoration, including a recommendation to Congress for authorization through the Water Resources Development Act of a comprehensive plan to implement ecosystem restoration throughout the Puget Sound nearshore.

The Chinook Salmon Recovery Plan watershed chapters each contain nearshore and estuary restoration priorities. This program and the salmon recovery three-year work plans are more fully described in Section A6.

The Shoreline Master Programs (SMPs) also identify local protection and restoration priorities. SMPs include:

- Goals for shoreline use, economic development, public access, circulation, recreation, conservation, and historical/cultural values;
- Environmental designations of shorelines based on their physical, biological and development characteristics; and
- Policies and regulations for shoreline uses, shoreline modification activities.

Statewide, 260 local programs must be updated by 2014, including programs in all of the Puget Sound counties.

Northwest Straits Initiative also provides marine nearshore data and information through marine resource committees in a seven counties.

In addition, the strategies and actions in Section B1 which relate to watershed characterization and the Department of Natural Resources’ (DNR) Aquatic Landscape Prioritization will document science-based priorities for protection, restoration, enhancement and managed growth that reconcile sediment supply

priorities with high-value areas for salmon, shellfish, and other natural resources. The product of this effort is likely to be maps or other documents showing the science-based priorities for protection, restoration, enhancement, and managed growth at a drift cell (or smaller) scale.

#### Key Ongoing Program Activity

- DNR is developing and implementing an Aquatic Reserves network wide comprehensive inventory and monitoring program to inform the adaptive management of Aquatic Reserves and the larger Puget Sound recovery effort. This work will inform and support efforts by the Washington Department of Fish and Wildlife (WDFW), the Department of Ecology (Ecology), and PSP to develop a network of marine protected areas in Puget Sound.

#### Near-Term Actions

**B1.1 NTA 1:** Integrated Nearshore Priorities. PSP will lead the integration of existing science-based, geographic priorities for nearshore protection, restoration, enhancement and managed growth by July 2014. This includes identifying areas where local inventories and sediment supply priorities overlap with high-value areas for salmon, shellfish, and other natural resources at the drift-cell scale. The outcome of this effort will be agreed upon maps or other documents showing the science-based priorities for protection, restoration, enhancement, and managed growth at a drift cell (or below) scale, as well as outreach to implementers to consider this information as part of prioritization efforts including capital projects.

*Performance measure: By December 2012, PSP will convene an interagency workgroup and complete scoping for the technical work of integration; Data integration work complete by August 2013 and quality control checks and revisions by December 2013. The integrated product, including data and maps, are presented to all salmon recovery watersheds, LIOs and local governments by June 2014.*

**B1.1 NTA 2:** Human Use Patterns in Marine Areas. Ecology will identify human use patterns for marine areas in Puget Sound by 2013, to support marine spatial planning.

*Performance measure: Human-use mapping completed by June 30, 2013.*

**B1.1 WS 3:** West Sound Eelgrass and Forage Fish Surveys. By 2013, The West Sound Watersheds Council, in coordination with the Suquamish Tribe and others, will develop and implement periodic surveys of eelgrass and forage fish spawning habitat under a scientifically rigorous methodology, and update spawning habitat maps.

*Performance measure: To be developed.*

**B1.2** Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts.

Federal and state resource management agencies and local governments need current best available science to support their decisions for development and redevelopment in nearshore and marine environments. Larger jurisdictions may have the resources to research and develop their own science-based decision-making guidelines, but smaller municipalities rely on state government, non-governmental organizations (NGOs), or collaborative partnerships to provide handbooks and model ordinances. Over time, this sub-strategy will need to focus on climate change adaptation integration.

### Ongoing Programs

Ecology is producing the Shoreline Master Program Handbook, which is designed to assist local government planners in meeting the requirements of the SMA (RCW 90.58) and revised SMP guidance (WAC 173-26, Part III). Handbook chapters provide recommendations for various components of the SMP process and are based on best available science.

The State of Washington Aquatic Habitat Guidelines Program and WDFW developed technical assistance guidance in 2009 for local governments to integrate local land use planning and state salmon recovery efforts. The *Land Use Planning for Salmon, Steelhead and Trout: A land use planner's guide to salmonid habitat protection and recovery* (Knight 2009) contains information on state salmon recovery efforts, sources of best available science, and model policies and development regulations for implementing salmon recovery. The best available science on watershed processes, riparian and wetland management is translated into planning tools, model policies and model regulations that can be incorporated into GMA and SMA planning programs to protect salmonids and prevent further loss or degradation of habitat. The objective of the guidebook is to further the goal of recovering naturally spawning salmon in Puget Sound by incorporating recovery efforts with local land use planning and decision-making.

The Aquatic Habitat Guidelines Program has also endorsed a whitepaper by Washington Sea Grant *Protection of Marine Riparian Functions in Puget Sound, Washington* (Brennan et al., 2008). The whitepaper provides shoreline planners and managers with a summary of current science and management recommendations to inform the protection of ecological functions marine riparian areas. In a broader document that addresses functions of all nearshore habitats, the Aquatic Habitat Guidelines Program, WDFW, and others in the scientific community produced a summary of best available science for the nearshore environment. The document, *Protecting Nearshore Habitat and Functions in Puget Sound: June 2010 Revised Edition*, provides a synthesis of current science on several important nearshore habitats and processes, and directions for where to find data and specific recommendations for moving through the mitigation sequence (EnviroVision et al. 2010). The goal of the document is to help local planners prepare SMP updates and also to assist Ecology in their review to ensure that SMP updates are based on good science.

Finally, city and county governments that are updating their shoreline master programs are required to develop a restoration plan that identifies locations for preservation. Jurisdictions that border Puget Sound and the largest rivers Puget Sound rivers are documenting priority areas for protection and acquisition. Government agencies and some city or county governments support mitigation banking or in-lieu fee mitigation programs. Although these programs are designed to offset development impacts, they can generate funds to help leverage protection and conservation efforts because they involve acquiring property or development rights for conservation purposes. In addition, strategies and actions in B1.1 will help ensure that local governments have complete and accurate information to inform planning.

The Northwest Straits Initiative through its seven marine resource committees also provides information on local shoreline resources.

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### SHORELINE MASTER PROGRAM

The state Shoreline Management Act, adopted by voters in 1972, ensures that all of us – the public, interest groups, local, state and tribal governments – work together to ensure our shorelines:

- Are kept safe and unpolluted;
- Are developed and managed fairly; and
- Give our children and future generations that special “sense of place” we cherish in Washington.

The mechanism for putting new shoreline development regulations and policies in place is called a “shoreline master program.” Over 260 local programs must be updated by 2014, including programs in all of the Puget Sound counties. These updates are a unique opportunity to create a positive future for Washington’s shorelines.

Master programs are defined in the Shoreline Management Act as: “... the comprehensive use plan for a described area, and the use regulations together with maps, diagrams, charts, or other descriptive material and text, a statement of desired goals, and standards...” [RCW 90.58.030(3)(a)] SMPs include: goals for shoreline use, economic development, public access, circulation, recreation, conservation, and historical/cultural values; environmental designations of shorelines based on their physical, biological and development characteristics; and policies and regulations for shoreline uses, shoreline modification activities. Every SMP is unique, and many newer SMPs are integrated to some degree into local comprehensive plans and development regulations.

Ecology oversees the Shoreline Master Program, maintaining review and approval authority, while providing technical assistance and other support for SMP updates. Ecology also tracks the update process and provides information to help residents participate in updates in their community. See [http://www.ecy.wa.gov/programs/sea/sma/st\\_guide/SMP/SMPintro.html](http://www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/SMPintro.html) for more information.

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### Near-Term Actions

**B1.2 NTA 1: Update Local Shoreline Master Programs. Ecology will provide funding and, with WDFW, technical assistance to local jurisdictions to update local shoreline master programs by current deadlines, with all updates complete by 2014. A key deliverable for Ecology and local governments is to implement SMPs in a manner that validates achievement of no net loss of ecological function and guides Puget Sound toward shoreline armoring target.**

*Performance measure: To be developed.*

- B1.2 STRT 4:** Straits Shoreline Master Programs. Shoreline Master Program Updates, Implementation, and Intergovernmental Coordination (Jefferson County, Clallam County and cities of Port Townsend, Sequim, and Port Angeles).
- a. City of Port Townsend SMP – stormwater education
  - b. City of Port Townsend SMP – bulkhead removal
  - c. City of Port Townsend SMP – restore native marine riparian vegetation
  - d. City of Port Angeles SMP Update
  - e. City of Sequim SPM Update
  - f. Jefferson County SMP – Annual Restoration Planning Summit
  - g. Jefferson County SMP – Assess shoreline restoration progress
  - h. Jefferson County SMP – Identify and implement shoreline armoring, riparian enhancement, fill removal and culvert replacement projects
  - i. Jefferson County SMP update
  - j. Clallam County SMP implementation
  - k. Clallam County SMP adaptive management
  - l. Clallam County SMP update
  - m. Ecosystem valuation
  - n. Enhanced shoreline protection
  - o. Finfish aquaculture speaker forum

*Performance measure: Develop the economic baseline (Ecosystem Valuation) for the ecosystem functions that will be monitored by the No Net Loss indicators for all 5 local jurisdictions within the Strait Action Area; Alternative Option: Initiate or complete 30% of the new Priority Actions identified by the Strait ERN for the Strait Action Area.*

- B1.2 WS 2:** West Sound SMP update alternatives to shoreline armoring. During the Shoreline Master Program (SMP) update process for all North Central / West Sound jurisdictions in 2012-13, the West Sound Watersheds Council will ensure that restoration plans for every SMP include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring.

*Performance measure: The goal is for no net gain in shoreline armoring within any West Sound jurisdiction over the next two years.*

### **B1.3 Improve, strengthen, and streamline implementation and enforcement of laws, regulations, and permits that protect the marine and nearshore ecosystems and estuaries.**

Nearshore-related regulatory authorities include Washington State Hydraulic Code, Shoreline Management Act (SMA), Growth Management Act, and the State Environmental Protection Act (SEPA). At the federal level, these regulations include the Clean Water Act (CWA), The Endangered Species Act (ESA), the Coastal Zone Management Act (CZMA), and others.

The Hydraulic Code administered by WDFW and the SMA administered by Ecology are the two principal state regulatory authorities for shoreline armoring in Washington State. Recent data based on the Hydraulic Project Approval (HPA) program issued by WDFW indicate that construction of bulkheads (i.e., shoreline armoring) in Puget Sound is occurring at a brisk pace. Habitat losses and displacement along Puget Sound shorelines continue to occur as a result of bulkheading. Such losses contribute to the degradation of nearshore ecosystem processes and function.

### Ongoing Programs

A number of issues continue to limit the effectiveness of the HPA program at protecting shorelines within the context of shoreline armoring. WDFW currently lacks regulatory authority to (1) address the need for a bulkhead (i.e., perceived need for armoring continues to supersede protection of shoreline functions); (2) require alternatives to traditional bulkheads, even in low-energy environments; and (3) address cumulative impacts or impacts that continue beyond the longevity of the permit, which is typically five years. Under the current regulations, protection of personal property will continue to supersede protection of shoreline processes and function along marine shorelines.

Comprehensive updates of local SMPs are required of all Puget Sound jurisdictions by 2012. New shoreline rules based on the SMA and as outlined in WAC 173-26 are expected to limit the amount of new shoreline armoring. New provisions regarding shoreline stabilization structures and development include: allowing armoring only where it is demonstrated necessary to protect a primary structure; reducing the adverse effects of new shoreline modifications by limiting their number and extent; giving preference to modifications that have a “lesser impact on ecological functions” and requiring mitigation; and, giving priority to “soft” over “hard” shoreline modifications. Provisions for new shoreline development attempt to limit the amount of new or enlarged stabilization and the need for future stabilization during the life of a development. Replacement of erosion control structures must be designed, located, sized, and constructed to ensure no net loss of ecological functions.

### Near-Term Actions

**B1.3 NTA 1:** **HPA Capacity Effectiveness.** By December 2012, WDFW will use the results of a LEAN analysis to apply existing and new HPA capacity to more effectively protect fish life.

*Performance measure: Complete LEAN process and begin to implement recommendations by December 2012.*



**B1.3 NTA 2:** **Hydraulic Code Rules Revision.** By December 2014, WDFW will use best available science to revise Hydraulic Code Rules (chapter 220-110 WAC) and clarify conditions under which hydraulic projects must be conducted to prevent or mitigate the impacts to fish life and habitat.

*Performance measure: Rulemaking complete.*

**B1.3 SJI 7:** **SJI Technical Assistance.** San Juan County Community Development and Planning Department (CDPD) and the Town of Friday Harbor will make ongoing technical assistance (best management practices) available on-site to 100% of permit applicants, with a goal of 75% of customers avoiding hard armoring or otherwise implementing soft armoring techniques by 2014. This work will leverage the effort

underway via EPA grant funding and shoreline workshops coordinated by Friends of the San Juans, San Juan Islands Conservation District, and Washington Sea Grant.

*Performance measure: Technical assistance (best management practices) available on-site to 100% of permit applicants, with a goal of 75% of customers avoiding hard armoring or otherwise implementing soft armoring techniques by 2014.*

**B1.3 SJI 8:** SJI Technical Assistance Capacity. San Juan Community Development and Planning Department (CDPD) and the Town of Friday Harbor will provide capacity for technical assistance related to compliance with environmental regulations by 2013.

*Performance measure: To be determined.*

## **B2. Protect and restore nearshore and estuary ecosystems**

Conserving intact areas can allow for robust and long-lasting protection of nearshore processes, functions, and habitats, and is often described by nearshore restoration practitioners as “protecting the best.” By setting aside areas that are largely intact, we can better maintain ecosystem functioning even in the absence of other restoration or management actions. Furthermore, protection of intact areas complements existing efforts to restore habitats degraded by human activities by both enabling restoration and increasing its effectiveness. Accelerating protection and restoration are specifically identified as part of climate adaptation.

Restoration of nearshore processes, structure and function also plays an important role. Recent research and analyses of Puget Sound marine and nearshore environments such as the *2010 Puget Sound Science Update* have pointed to particular stressors or pressures that need to be addressed in order to recover ecosystem health.

Salmon recovery nearshore and estuary projects are listed in Section A6.1 as part of the salmon recovery three-year work plans for the watersheds, as well as several Soundwide actions.

### **B2.1 Permanently protect priority nearshore physical and ecological processes and habitat, including shorelines, migratory corridors, and vegetation particularly in sensitive areas such as eelgrass beds and bluff backed beaches.**

This sub-strategy seeks to accelerate the implementation of priority projects that address problems identified for Puget Sound nearshore (e.g., shoreline armoring) environments and move acquisition and restoration efforts forward. Specific locations identified by the analysis of Soundwide restoration priorities identified in B1.1 can be applied to targeted protection and conservation activities and programs. The landscape scale prioritization unites goals of multiple programs and disciplines from the basin to the local scale. If the priorities identified in B1.1 are incorporated into local comprehensive plans and zoning ordinances, the prioritization can help planners, restoration practitioners, and decision-makers direct growth away from existing areas of high ecological value and towards areas where resource conservation is not the primary objective.

While the protection of undeveloped lands and shorelines is a well established conservation strategy, the same concept can be applied to the preservation of ecological processes and structures in marine contexts that face pressure from development. Residential and commercial development along shorelines often includes overwater structures such as docks, fixed piers, bridges, floating breakwaters, moored vessels, and pilings. One key impact of overwater structures is the shading of nearshore habitats. Shading affects the growth of eelgrass and other nearshore plants that provide foraging areas and shelter for marine birds, juvenile salmon, forage fish, and shellfish. Shading can therefore impact the distribution, behavior, and survival of fish and other aquatic wildlife that occupy adjacent shoreline habitats. Sharp gradients of light and shadow, such as those that occur near overwater structures, affect feeding behavior and efficiency of visual foragers (e.g., salmon, Dungeness crab) as well as fish schooling and migratory movements. Natural wave energy patterns can be altered by multiple rows of pilings in nearshore waters, which change the distribution and deposition of sediments. Overwater structures also have the potential to introduce contaminants into sensitive areas because older creosote- or copper-treated wood pilings or decks are known to lead toxics such as polycyclic aromatic hydrocarbons and copper arsenate compounds.

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## SALMON RECOVERY

**Protecting and Restoring Nearshore and Marine Habitat – A Salmon Recovery Plan Priority:** A high priority of the Recovery Plans is the protection and restoration of estuaries and the marine nearshore areas. These areas are vitally important for salmon spawning and rearing habitat, as well as prey habitat. Each watershed plan (Volume II) identifies local priority actions, including the need to link with local Shoreline Management Plans. The San Juan Islands prioritization tool, South Sound tool, and other tools are specifically detailed in Volume II.

**How are these priorities integrated:** The Action Agenda strategies and actions emphasize the protection and restoration of these areas although the initial focus was on the PSNERP information for selecting areas of focus rather than the Recovery Plan. While these two approaches are connected and continued effort is needed to maintain the connection and strengths of each as identified in Section B1.1.

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### Ongoing Programs

A variety of programs and mechanisms are used to protect and conserve nearshore habitats in Puget Sound. Acquiring property and development rights is a central mission for land trusts such as the Trust for Public Lands, Forterra, Jefferson Land Trust, and others.

The new provisions of the Shoreline Management Act (SMA) regarding overwater structures (as outlined in WAC 173-26-231) state that structural shoreline modifications must be built to avoid, or if that is not possible, minimize and mitigate impacts to ecological processes and functions and critical areas resources. A variety of measures to reduce impacts are offered, such as using glass inserts, grading or reflective panels on piers and docks; using a north-south orientation; reducing width and increasing height; and locating structures in deeper water.

As part of their Aquatic Leasing Program, the Department of Natural Resources (DNR) has recently updated their leasing policies to better protect nearshore habitat. Among the policies, applicants are required to follow a set of habitat stewardship measures to protect critical aquatic habitats. Measures apply to both the design and use of materials for overwater structures.

The Northwest Straits Initiative and marine resource committees provide education, outreach and conduct restoration projects. These projects are implemented with both private and public landowners.

#### Key Ongoing Program Activity

- Through the habitat stewardship measures of the Aquatic Lands Habitat Conservation Plan, DNR will condition aquatic use authorizations to ensure new or retrofitted over-water structures do not impact eelgrass beds.

#### Near-Term Actions



**B2.1 NTA 1:** Protect 10% of Bluff-Backed Beaches. PSP will promote acquisitions, easements, or other protective covenants and regulatory protections to permanently protect at least 10% of bluff-backed beaches with high sediment supply or other priority nearshore habitats facing potential shoreline development pressure by June 2014.

*Performance measures: By Sept 2012, identify location of bluff-backed beaches with high sediment supply and development pressure or other priority nearshore habitats facing development pressures; By December 2012, PSP conveys the location information to salmon recovery watershed groups and LIOs for consideration; By December 2012, convene-including at least one meeting with each watershed group and LIO; By May 2013, PSP has identifyied candidate locations and local projects, and-are incorporated into salmon recovery three year work plans if appropriate for each area. Capital projects awarded grants by March 2014. By June 2014, Any new regulatory protections are in place by June 2014. By August 2014, 10 % of the bluff-backed beaches with high sediment supply or priority nearshore habitats facing development pressure are protected.*

**B2.1 NTA 2:** Community Use Dock Incentives. For state-owned aquatic lands, DNR, in consultation with WDFW and Ecology, will identify potential permit, economic, and social incentives for encouraging community use docks as an alternative to single family docks by July 2013.

*Performance measure: Done or not.*

**B2.1 NTA 3:** Overwater Structures Design Guidance. DNR, in consultation with the Aquatic Habitat Guidelines Interagency Group, will publish design guidance on construction, repair and rebuilding of overwater structures to increase light by 2013.

*Performance measure: Done or not.*

**B2.1 SJI 10:** San Juan Lead Entity Shoreline Protection. San Juan County Lead Entity for Salmon Recovery will identify priority habitats for acquisition by 2013 in updates to the

Salmon Recovery strategy, and will lead acquisition of, or establishment of conversation easements for 25% of priority habitat shoreline miles with willing sellers/owners by 2014.

*Performance measure: Identify priority habitats for acquisition by 2013 in updates to the Salmon Recovery strategy, lead acquisition of, or establishment of conversation easements for 25% of priority habitat shoreline miles with willing sellers/owners by 2014.*

## **B2.2 Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands.**

Restoration projects for marine and nearshore environments occur through a variety of programs and entities including:

- City and county governments
- Tribal organizations
- State resource agencies (e.g., WDFW's Estuary and Salmon Restoration Program)
- Federal agencies (e.g., EPA, NOAA, USFWS, USACE)
- Congressional appropriations or authorizations (e.g., America Reinvestment and Recovery Act)
- Non-governmental organizations (e.g., People for Puget Sound, Puget Sound Restoration Fund, Northwest Straits Initiative)

Prioritization of restoration projects in Puget Sound occurs at multiple levels as described in Section B1.1. These efforts include the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) at the Soundwide scale, cities and counties through Shoreline Management Plan (SMP) updates, and basin or watershed scales primarily through the local salmon recovery efforts. Program goals range from protecting habitat to restoring water quality and native species. Many organizations also partner to collaboratively secure funding and restore priority areas. Over time, it may be appropriate to continue to investigate more funding opportunities for restoration programs and projects including use of US Army Corps of Engineers authorities.

Some of the Soundwide restoration priority areas occur on local, state, or federally owned land. These public lands provide opportunities for restoration without economic investment for acquisition, landowner negotiation, or access permission. Such projects often can be implemented more quickly than similar projects on private lands and should be the focus of governments across Puget Sound. As governments implement high-visibility restoration projects in publicly used spaces, they provide models for future restoration efforts on public or private lands.

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## SALMON RECOVERY

**Marine and Nearshore Habitat Restoration – A Salmon Recovery Plan Priority:** Habitat Restoration is an integral part of recovery and must be conducted in a way that targets priority areas for ecosystem functions. Restoration priorities for each watershed are identified in Volume II of the Salmon Recovery Plan and then further fleshed out in each of the annual three-year work plans. There are robust river delta restoration plans associated with salmon recovery (e.g. in the Nisqually, Snohomish, Stillaguamish, Skagit, Dungeness, and Elwha chapters).

**How are these priorities integrated:** The Action Agenda strategies incorporate the actions in the three-year work plan as part of what is needed to recover the Puget Sound. Additionally, specific restoration projects are part of priorities of the Local Integrating Organizations. From a salmon recovery perspective, derelict vessel and creosote log removal are lower priorities and should be sequenced as later actions.

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### Ongoing Programs

The PSNERP effort described in B1.1 will include a recommendation to Congress for authorization through the Water Resources Development Act of a comprehensive plan to implement ecosystem restoration throughout the Puget Sound nearshore.

The Estuary and Salmon Restoration Program (ESRP) provides funding and technical assistance to restore Puget Sound. It was established by the Legislature in 2006 and is implemented by the Washington Department of Fish and Wildlife (WDFW). The goal of the program is to use the science-driven strategies of PSNERP to move from opportunistic project funding to strategic ecosystem restoration.

In addition, WDFW tracks nearshore restoration projects funded by the Estuary and Salmon Restoration Program to determine the efficiency and effectiveness of grant projects. The program tracks project activities, provides supplemental funding to exemplary projects, and provides incremental funding to larger projects. The program also includes project-based learning, which is similar to adaptive management in that funding is provided for projects that are meant to resolve technical uncertainty or increase the efficiency or effectiveness of current restoration methods.

DNR operates a statewide Aquatic Restoration Program that funds restoration and enhancement projects in freshwater, saltwater, and estuarine aquatic systems. These projects are on, adjacent to, or have a direct benefit to state-owned aquatic land. The goal of the program is to protect and restore healthy ecological conditions. Funded projects are those that have long-term viability, have a direct benefit to state-owned aquatic land, are based on sound technical knowledge, and are supported by the community.

WDFW also frequently conducts restoration on state lands to restore impaired habitats. State and local parks departments currently conduct smaller scale restoration on publicly-owned lands.

DNR operates the Dredged Material Management Program including oversight of all disposal activities occurring on the public's state-owned aquatic lands. The program is focused on protecting aquatic environments and DNR manages disposal at eight sites around Puget Sound. Recently, some estuary restoration projects have demonstrated the use of clean dredged sediment from these disposal sites (e.g., Fidalgo Bay Habitat Restoration Project).

DNR also manages a Creosote Removal Program to remove creosote-treated debris from marine and nearshore waters. Creosote-treated wood is associated with existing or abandoned overwater structures (i.e., pilings or decks) and is known to lead toxics such as polycyclic aromatic hydrocarbons and copper arsenate compounds. The program was launched in 2004 with funding from a variety of sources. Volunteers from Marine Resources Committees, Washington State University BeachWatchers, People for Puget Sound and local parks staff have inventoried and removed creosote-treated material from Puget Sound beaches and overwater structures.

The salmon recovery watershed three-year work plans and related funding described in Section A6.1 include nearshore and estuary restoration projects.

#### Key Ongoing Program Activity

- DNR, in collaboration with the Department of Ecology (Ecology), WDFW, the Department of Veterans Affairs, and the State Parks Department, will deploy Puget SoundCorps crews on protection and restoration projects on state-owned lands.

#### Near-Term Actions



**B2.2 NTA 1:** Implementation of Projects Identified by PSNERP. By December 2014, WDFW and the Corps will advance implementation of projects identified by Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), including those described in the Strategic Restoration Conceptual Engineering - Final Design Report. Implementation will occur both through Corps programs as anticipated through the General Investigation process, and through other non-Corps federal, state, tribal and local programs by 2013.

*Performance measure: Number of projects funded; number implemented; amount of various nearshore habitats restored; Milestone: Final Feasibility Report for the PSNERP GI is completed by August 31, 2012, advancing projects for construction authorization through the Corps process.*

**B2.2 NTA 2:** State Parks Nearshore Restoration. State Parks will identify opportunities to provide nearshore restoration by December 2012. Based on this assessment, State Parks will refine its performance measures for this action including setting semi-annual estimates of the numbers of projects or linear feet to be restored by March 2013. By December 2015, State Parks will restore nearshore habitat identified, including removal of hard armoring at state parks.

*Performance measure: By December 2012, identify opportunities; By March 2013, identify numbers of projects or linear feet target; By December 2015, complete projects.*

**B2.2 NTA 3:** Prioritizing Restoration on State-Owned Aquatic Lands. DNR will develop a strategy to prioritize restoration projects on state-owned aquatic lands including those within protected landscapes such as Aquatic Reserves to ensure maximum long-term benefit from habitat restoration.

*Performance measure: DNR restoration project prioritization criteria developed by 2013 (done or not), List of near and long-term projects developed by 2014 (done or not).*

**B2.2 NTA 4:** Creosote Piling Inventory and Removal. DNR will complete a derelict creosote piling inventory of Puget Sound. DNR has removed 10,000 pilings since 2007 and will remove an additional 3,000 pilings by 2017, prioritizing removals near important herring spawning beds.

*Performance measure: Inventory completed by 2013 (done or not); 3,000 piling removed by 2017 (done or not).*

### **B2.3 Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment.**

Shoreline property owners are inherently interested in maintaining the quality of their homes, beaches and nearby habitats. Given dynamic erosion process and the exposed nature of beachfronts, over time shoreline property owners must occasionally consider development options to better protect their structures and other investments while limiting adverse impacts to nearshore habitat. Such decisions are not particularly rare. Every year, more than one mile of shoreline in the Puget Sound is newly armored, and an even greater amount of armoring is replaced. Often, the decision to newly armor one stretch of beach has a ripple effect on nearby properties. While some fraction of those hard armoring efforts may be required to safeguard property from imminent harm or risk, the remaining instances present an opportunity to employ better habitat-supporting alternatives, like soft-shore armoring, landward setback of structures at risk and other techniques that the public, contractors and others might be inclined to use, if they were made aware of them and convinced of their effectiveness.

Because bulkhead removal and soft-shore techniques may become more difficult or less effective in the face of sea level rise, other, more assertive techniques like the landward setback of homes and other structures may have greater long-term benefits for shoreline properties and allow for landward migration of beaches, tidelands and associated ecosystems. Such an anticipatory approach (and NTAs) are consistent with the Washington State Integrated Climate Change Response Strategy (2012), which stresses the importance of creating opportunities for coastal habitat creation upslope as sea levels rise.

### **Ongoing Programs**

As described above, the new provisions of the SMA regarding shoreline stabilization structures and development outlined in WAC 173-26 require shoreline jurisdictions to give priority to “soft” over “hard” shoreline modifications. Some local SMPs provide incentives that allow greater flexibility for development and expansion of existing development if bulkheads are removed or replaced with soft-shore techniques, but these approaches have not been widely implemented.

Cities and counties are beginning to provide guidance and incentives to waterfront landowners for soft-shore armoring techniques. In 2009, the City of Seattle's Department of Planning and Development developed the *Green Shorelines* guidebook for lakefront homeowners. The guidebook describes alternatives to conventional shoreline armoring, emphasizing aesthetic and environmental benefits of plants and beaches. In 2010, U.S. EPA, under the Puget Sound Watershed Management Assistance Program, awarded the City of Seattle a four-year grant of more than \$500,000 to research incentives for removing bulkheads and improving the ecological function of residential shorelines along Lake Washington. The city proposed to pilot Green Shores for Homes credits and locally-developed incentives on Lake Washington. San Juan County will participate as a project partner and will pilot Green Shores for Homes in marine coastal locations. The Islands Trust, a federation of local governments within the British Columbia Gulf Islands, has also joined this initiative as a transboundary partner and Washington Sea Grant also is a partner and coordinates this effort. The goal of implementing Green Shores for Homes simultaneously in British Columbia and Washington, as well as in urban freshwater and rural marine shorelines, is to provide models for other jurisdictions within the Salish Sea to protect shoreline ecological function from future impacts of growth.

In addition to revising the existing regulatory structure for redevelopment of existing bulkheads, incentives provide a non-regulatory approach to addressing ecosystem degradation caused by shoreline armoring. Voluntary or incentive programs are those programs that encourage stewardship through rewarding desired behavior. Voluntary programs for shoreline armoring may include grants, property tax reductions, or low interest loans. Such a program requires the development of local outreach and communication strategies.

Finally, the Green Shores for Homes program for the City of Seattle and San Juan County includes funding for the development of incentives. The goal is to invite those homeowners in the areas classified as amendable to the Green Shores for Homes approach and encourage them to participate.

## Near-Term Actions



**B2.3 NTA 1:** **Homeowner Incentives for Landward Setbacks.** PSP will convene a process with partners to develop and recommend incentives that help homeowners permanently remove armoring and encourage setback of houses by June 2014. Incentives could include, but would not be limited to financial, regulatory, low interest loans or grants. This work will help restore nearshore processes, promote landward retreat of homes facing sea level rise, and promote progress toward shoreline armoring target.

*Performance measure: By December 2012, identify the group and complete the scoping process including holding at least two meetings with partners; By June 2013, complete technical steps including identifying where to target the program for highest ecological value; By December 2013, identify draft possible incentive options for discussions; By June 2014, present options and recommendations to ECB and Leadership Council including miles of bulkheads that could be replaced with soft armoring or setbacks and a homeowner outreach plan.*

## **B2.4 Implement a coordinated strategy to achieve the 2020 eelgrass recovery target.**

Eelgrass beds are essential spawning areas and nurseries for herring, other forage fish, and salmon, and generate food consumed throughout the marine food web. The overall acreage of eelgrass beds in Puget Sound is a key indicator for ecosystem health, along with their spatial distribution throughout the areas where salmon, Dungeness crab, and other species migrate and grow. In 2006, there were approximately 50,000 acres of eelgrass beds in Puget Sound. Although the total acreage has been relatively stable for a few years, these eelgrass beds are concentrated into a few areas, and some regions of Puget Sound, such as Hood Canal, have experienced localized losses. Many other Puget Sound habitats have shrunk in size, diminished in quality, fragmented, and the processes that form and sustain them have been disrupted.

In the long-term, climate change is anticipated to lead to greater stress on eelgrass followed by decline. Hardened shorelines will be particularly problematic for eelgrass as sea level rises. Population growth is also likely to increase stressors on eelgrass, nutrient loading that can lead to excessive phytoplankton growth also stresses eelgrass, by limiting light to eelgrass beds, polluted runoff from land and polluted wastewater, or spills, from boats and vessels can damage eelgrass beds as can anchoring of commercial and recreational boats and vessels. Finally, the effects of using of herbicides to control *Zostera japonica* (a Class C noxious weed) on native marine eelgrass beds is not well understood, and should be monitored.

Given the diversity of eelgrass stressors in Puget Sound, the preferred approach is to pursue multiple strategies concurrently that explicitly address improving information, protection, and restoration.

### **Ongoing Programs**

#### **Key Ongoing Program Activities**

DNR carries out a variety of programs to support eelgrass protection and recovery, and will emphasize the following activities:

- Estimate the total area of eelgrass in Puget Sound annually (including assessment of eelgrass bed connectivity and shoot density) and provide feedback on the effectiveness of efforts to protect and restore this critical habitat. This information will track progress toward the Partnership's target to increase eelgrass area by 20% by 2020. Annual sound-wide estimates will be produced within one year of sampling in order to assure that information is delivered in a timely manner to guide management actions.
- Synthesize and publish guidance based on the best available science describing key eelgrass stressors in Puget Sound.
- Through the habitat conservation measures of the Aquatic Lands Habitat Conservation Plan, condition aquatic use authorizations to ensure new or retrofitted over-water structures do not impact important habitats such as eelgrass and kelp beds.
- Research how other estuaries have recovered seagrasses and identify proprietary tools implemented in other successful eelgrass recovery efforts that can be deployed here to prevent further damage to or loss of eelgrass on state-owned aquatic lands.
- The Northwest Straits Initiative is one example of other partners who also participate in eelgrass monitoring and recovery.

## Near-Term Actions

**B2.4 NTA 1:** Eelgrass Recovery Target Strategy. DNR, working in collaboration with PSP, will convene partners in state and local government, tribes, the federal agencies, BC Canada, and non-governmental and business groups to develop a broad-based strategy to achieve the 2020 eelgrass recovery target and track progress.

*Performance measure: Strategy options identified by Dec 2012, Strategy developed by September 2014 (done or not).*

**B2.4 NTA 2:** Identification of Eelgrass Restoration Sites. DNR will identify and recommend sites that are suitable for eelgrass restoration in Puget Sound. Sites will be selected using habitat suitability analysis, hydrodynamic modeling, and eelgrass resilience to local stressors. This will include identification of sites on state-owned aquatic lands with a focus on areas with long-term protections already in place.

*Performance measure: Maps defining potential eelgrass restoration sites; site evaluations; final recommendations – completed by May 2014 (done or not); state aquatic land work complete by July 2014 (done or not).*

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## Target View: Shoreline Armoring

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A functioning, resilient ecosystem requires dynamic shorelines maintained by coastal processes such as shoreline erosion and ecological exchange between terrestrial and aquatic systems. The natural shoreline of Puget Sound is constantly changing due primarily to the action of waves and tides. On unarmored shorelines of the Sound, sand and gravel from bluffs erode into the intertidal areas, are transported by waves and currents and ultimately supply sediment to form and maintain beaches and spits. However, on some shorelines in the Sound, these processes are altered by bulkheads, seawalls and other methods used to prevent erosion. Currently, more than a quarter of all the shoreline around the Sound is armored with bulkheads and seawalls affecting important shoreline processes such as sediment supply and transport. The natural processes that occur on unarmored shorelines are important because they support vital functions like providing habitat for key species such as herring, surf smelt and salmon.

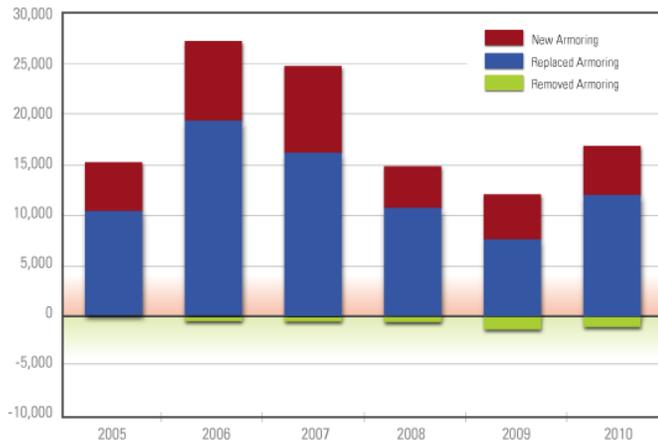
Shoreline armoring in the Sound is frequently associated with residential development as many landowners install armoring to protect their properties. Removing existing armoring is both costly and difficult, and is best accomplished on a scale larger than individual parcels. Public shorelines can provide high potential for removal actions. To reduce the total amount of armoring in the Sound, it will be necessary to minimize the need for new armoring by properly locating new structures and strategically remove existing armoring in key locations. Additionally, using “soft shore” designs for new and replacement armoring will reduce some of the impacts associated with traditional hard armoring.

The 2020 target for shoreline armoring has three parts:

- The amount of armoring removed is greater than the amount of new armoring added, for a net decrease in total armored shoreline;
- Efforts should be focused on feeder bluffs (highly erodible bluffs that supply sediment to beaches), and;
- Jurisdictions should require the use of “soft shore” techniques for all new and replacement armoring wherever feasible.

The graph below shows the extent of shoreline armoring in Puget Sound through 2010.

**Puget Sound Shoreline Armoring Summary**  
in feet, 2005-2010



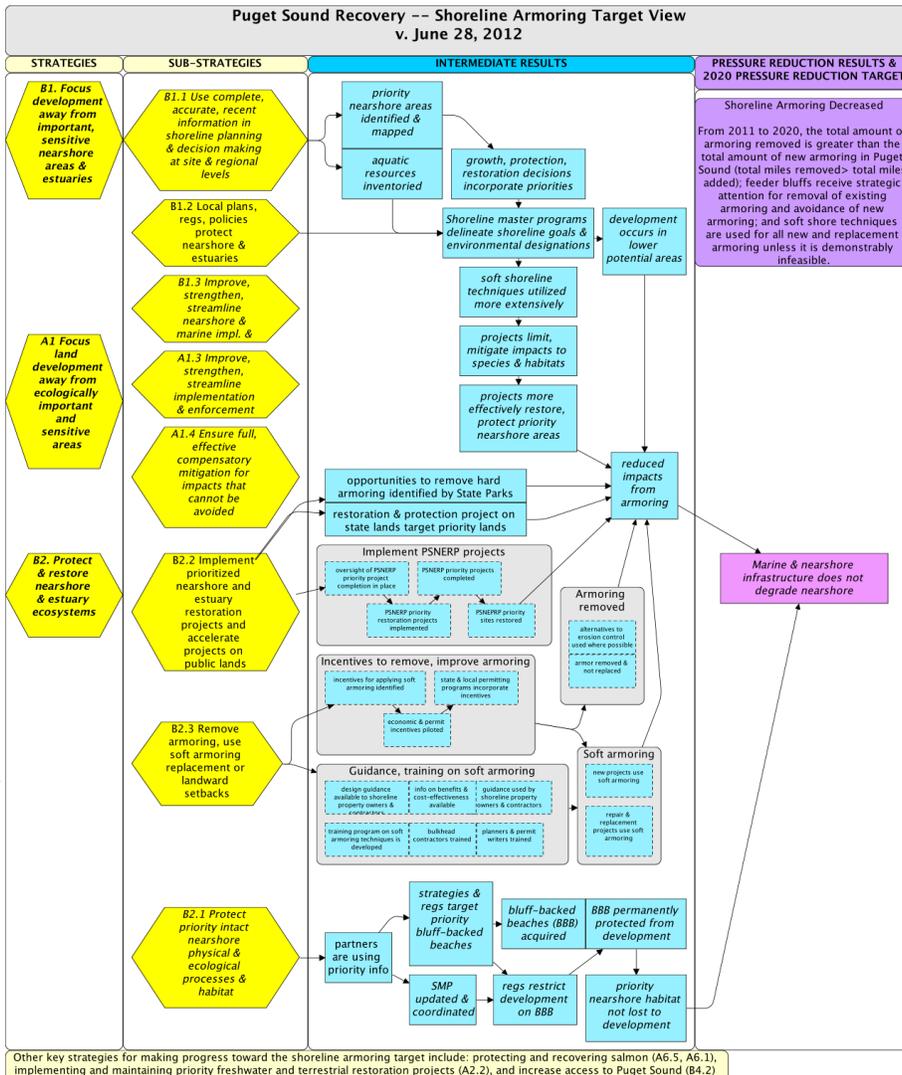
Source: Randy Carman, Washington Dept of Fish and Wildlife

There are several Action Agenda strategies related to the shoreline armoring target:

- Protect and restore nearshore and estuary ecosystems
  - Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment (B2.3)
  - Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands (B2.2)
  - Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Focus land development away from ecologically important and sensitive areas
  - Improve, strengthen, streamline implementation and enforcement to protect marine and nearshore ecosystems and estuaries (B1.3)
  - Improve local government ability to implement plans, regulations, and permits consistent with Puget Sound recovery (A1.3)
  - Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts (B1.2)
  - Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels (B1.1)
  - Ensure full, effective compensatory mitigation for impacts that cannot be avoided (A1.4)
- Protect and recovery salmon by maintaining and enhancing the community infrastructure that supports salmon recovery (A6.5) and implementing high priority projects in three-year work plans (A6.1)
- Increase access to Puget Sound (B4.2)
- Protect and restore nearshore and estuary ecosystems

- Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment (B2.3)
- Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands (B2.2)
- Focus land development away from ecologically important and sensitive nearshore areas and estuaries
  - Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts (B1.2)
  - Use complete, accurate and recent information in shoreline planning and decision making at the site specific and regional levels (B1.1)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets. The ecosystem benefits of meeting the shoreline armoring target are demonstrated in other results chains presented in this document; see especially the targets and strategies related to eelgrass and herring.



## B3. Protect and restore marine ecosystems

### **B3.1** Protect intact marine ecosystems particularly in sensitive areas and for sensitive species.

The conservation of marine environments that provide rare or unique habitats, culturally and historically important sites, recreational and commercial fisheries, and recreational enjoyment in Puget Sound is an important part of conservation and recovery. Marine Protected Areas (MPAs) are one management tool often used by federal, state, and local agencies to provide long term protection for marine resources. They can be effective tools when properly designed, effectively managed, and supported by marine resource users and managers.

Ecological responses to MPA establishment have been documented by numerous scientific studies in Washington and other temperate marine environments. Responses include greater target species densities, biomass, species size, and species richness within the boundaries of the MPA, replenishment of fish stocks in surrounding areas, increased reproductive rates due to larger fish sizes, increased ecosystem resilience, and reduced risk of population collapse. Responses in deep water pelagic and soft sediment habitats remain uncertain though studies are ongoing.

#### **Ongoing Programs**

There are 127 MPAs in the marine waters of Puget Sound and the outer coast. They are managed under a variety of names (e.g., marine reserves, marine sanctuaries, fishery conservation zones, aquatic reserves) with ranging degrees of protection established for diverse purposes. Almost all existing MPAs restrict fishing and shellfish harvest to some degree, and three-quarters of MPAs restrict non-harvest activities to some degree such as vessel anchoring or recreational access.

In 2008, to further a Puget Sound Action Agenda NTA, the Washington State Legislature convened a MPA Work Group to inventory current MPAs in Washington, assess their management, and determine ways to improve the use and effectiveness of MPAs in Washington as a management tool. The work group conducted a performance evaluation of existing MPAs and provided a set of recommendations that address: (1) coordination and consistency regarding goals, criteria for establishment, management practices, terminology, and monitoring practices; (2) integration of science, local governments, and NGOs into establishment and management decisions; and, (3) improvements to MPA effectiveness in Washington. The work group analysis and recommendations are detailed in a 2009 published report by Fish and Wildlife (Van Cleve et al. 2009).

#### **Near-Term Actions**

**B3.1 NTA 1:** Marine Protected Area Effectiveness. By June 2014, PSP, in collaboration with WDFW and DNR will identify the threats, coverage gaps, and conservation concerns addressed by existing Puget Sound marine protected areas and assess the potential effectiveness of these MPAs to protect threatened species and habitats, including rockfish and forage fish.

*Performance measure: Produce a written summary of threats and conservation concerns addressed by current MPAs by September 2012; Complete an assessment of effectiveness and coverage gaps by September 2013. PSP delivers recommendations to managing agencies to improve overall coordination and design of MPA network by June 2014.*



**B3.1 NTA 2:** Outfall Strategy on State-Owned Aquatic Lands. DNR, in collaboration with tribal governments, Ecology, WDFW, and DOH, will develop and implement a strategy to reduce impacts from outfalls on state-owned aquatic lands in Puget Sound.

*Performance measure: Strategy development, including an implementation work plan, will be complete by December 2013.*

### **B3.2 Implement and maintain priority marine restoration projects.**

Priority restoration actions for the marine environment include the removal of derelict fishing gear, vessels, and creosote-treated wood. Derelict fishing gear includes nets, lines, crab and shrimp traps/pots, and other recreational or commercial harvest equipment that has been lost or abandoned in the marine environment. Modern nets and fishing line made of synthetic materials have been in use since the 1940s and take decades, even hundreds of years, to decompose in water. The derelict gear can entangle divers, trap or wound fish, shellfish, birds, and marine mammals, and result in other environmental hazards.

#### **Ongoing Programs**

The Northwest Straits Initiative started a comprehensive program to locate and remove harmful derelict fishing gear from Puget Sound in 2002. In July 2009, the Northwest Straits Initiative received \$4.6 million federal stimulus grant through the American Recovery and Reinvestment Act (ARRA) and the National Oceanic and Atmospheric Administration (NOAA) to work full-time to essentially rid Puget Sound of derelict commercial fishing nets, which had been accumulating for decades. As of September 30, 2011, the Northwest Straits Initiative has removed 4,088 derelict fishing nets and 2,886 crab pots from Puget Sound, restoring 566 acres of marine habitat. It is estimated that about 1,000 derelict fishing nets remain in shallow sub-tidal areas of Puget Sound and the Northwest Straits are continuing removal operations as funding allows. On a separate note, support for continued gear loss-prevention efforts in Washington is strong. In 2012, state law was amended to require more timely reporting of lost or abandoned fishing nets. Despite the success of efforts to remove derelict gear in shallow waters, the development of safe and effective techniques to remove nets in waters deeper than 100 feet is needed to reduce the entanglement risks they pose to rockfish and other deepwater species.

DNR manages a Derelict Vessel Removal Program (DVRP) to address the problem of derelict or abandoned vessels in Washington State's waters. Derelict and abandoned vessels can pollute nearshore and marine waters with fuel and oil spills, threaten human safety as a navigational hazard, and impact aquatic habitats. The goal of the program is to remove high priority vessels that are 200 feet or less and provide funding and expertise to assist public agencies in the removal and disposal of vessels across the state.

## Key Ongoing Program Activities

- DNR will meet Government Management, Accountability, and Performance (GMAP) expectations for derelict vessel removals annually and will apply United States Coast Guard (USCG) Large Derelict Vessel Task Force recommendations to Puget Sound within one year of recommendations being issued.

## Near-Term Actions

**B3.2 NTA 1:** Legacy Net Removal. The Northwest Straits Foundation will work with WDFW, DNR, tribes, fishers and others to remove approximately 500 known remaining legacy nets in shallow sub-tidal waters by December 2013.

*Performance measure: By December 2012, approximately 250 nets will be removed from waters of Island, San Juan, and Kitsap Counties. By August 2013, approximately 170 nets in Whatcom County will be removed. By December 2013, remaining nets in Hood Canal and other counties will be removed.*

**B3.2 NTA 2:** Deep Water Net Removal. The Northwest Straits Foundation will complete development and at least one pilot implementation of a new methodology for deep-water net removal by December 2013. To date, approximately 130 nets are known to exist in Puget Sound in waters deeper than 105'. These nets may be degrading important habitat for listed rockfish species. Pilot removal operations will focus on concentrations of known deep water nets in documented rockfish habitat in the San Juan Islands.

*Performance measure: By December 2012, identify known deep water nets for pilot removal operations. By September 2013, develop up to three possible removal options in partnership with WDFW, DNR, NOAA, tribes, fishers, and others. By December 2013, pilot chosen removal option on identified nets.*

## Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, there are a number of ideas for future work that might be undertaken to address pressures on the nearshore and marine ecosystems in Puget Sound. These ideas should be an ongoing part of the regional discussion about Puget Sound protection and recovery, and may inform future funding decisions, programmatic priorities and guidance, or may become near-term actions in future Action Agenda cycles. They include:

- Whether or not we have effective statutory and regulatory tools in place to meet the shoreline armoring target. In particular, some interests believe that a number of targeted statutory changes are needed to ensure we can adequately support nearshore protections to meet recovery targets. These could include (1) revising RCW 77.55.141 to give WDFW the ability to protect sediment supply and other shoreline processes, and (2) revising RCW 90.58.030 so that all bulkheads must go through the shoreline permitting process.
- Whether or not we have effective set of tools in place to ensure that permit holders will meet permit conditions, particularly those associated with mitigation of shoreline impacts. As

understanding of what is needed to protect nearshore physical and ecological processes continues to expand and planning and permit writing move to incorporate this information, a potential gap remains around permit implementation—checking back and monitoring to ensure that conditions are met and continue to perform over time. In addition to asking for information from permit holders on their ongoing compliance with permit conditions, some have talked about the idea of requiring bond posting for shoreline permits as a way to ensure that permit conditions are met.

- Opportunities may exist for state and local governments to carry out compliance monitoring related to nearshore and marine protection and restoration to identify shared priorities and pool resources—potentially increasing the efficiency of monitoring and allowing for additional monitoring investments.
- Development of no anchor zones in specific areas of Puget Sound as needed.
- Integrate climate change, including sea level rise into nearshore protection and restoration planning and implementation. This will include evaluation of shoreline management laws, integrating sea level rise criteria into project identification, development and funding, evaluating infrastructure at risk, further development of coastal retreat options, and developing policies and information to guide insurers in dealing with properties in vulnerable areas, providing more assistance to coastal planners, and continuing to raise awareness.
- Further identification of feasible state-level policy programs to avoid or minimize shoreline hardening. As called out in the state climate response strategy, options will need to include streamlining local and state permitting processes to provide incentives for green shorelines and soft armoring practices.
- Identification of how to incorporate recovery targets into review of Shoreline Master Plans.

## Target View: Estuaries

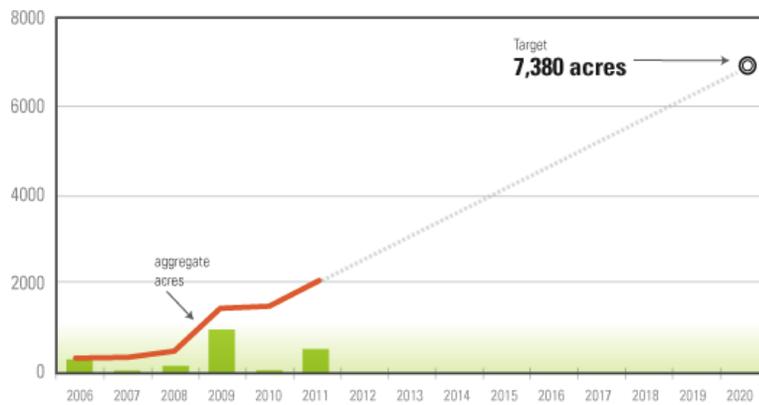
River delta estuaries are where river floodplains meet the sea, creating a uniquely important environment that provides a feeding and resting habitat for young salmon, migratory birds, and many other species. Young salmon that can rear longer in delta estuaries have been observed to grow faster and are more likely to survive their ocean migration.

In Puget Sound there are 16 large river-mouth estuaries: nine larger deltas drain the Cascade Mountains, and seven smaller deltas drain the Olympics. Of the approximately 62,000 acres of mapped historical swamp and marsh, only an estimated 14,640 acres remain. The 'great swamps' of the Skagit and Snohomish once contained over 37,000 acres alone (compared to around 1,620 acres for all the Olympic deltas combined). Across the region, estuaries and tidal wetlands have been diked, drained, or filled, either converted to farms and agriculture, or developed into modern ports and industrial sites. In the most highly developed river mouth estuaries, such as the Duwamish and Puyallup Rivers, estuarine habitat covers only a minute fragment of its original extent, and may never be recovered.

The 2020 target for estuaries is that all Chinook natal river deltas - Nooksack, Skagit, Stillaguamish, Snohomish, Duwamish, Puyallup, Nisqually, Skokomish, Dungeness and Elwha - meet 10 year salmon recovery goals (or 10 percent of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans); and 7,380 quality acres are restored basin wide, which is 20 percent of restoration need. The graph below illustrates the acres of estuarine habitat that need to be restored from 2006 – 2020 to achieve the 2020 recovery target.

### Acres of Estuarine Habitat Restored in 16 Major River Deltas in Puget Sound

Years 2006-2020



Source: National Estuary Program Online Reporting Tool (NEPORT), Environmental Protection Agency

Green columns show acres restored in each year and the orange line represents the cumulative acres restored between 2006 and 2011. The dashed line projects the restoration required to achieve the target of 7,380\* quality acres restored by 2020. The

figure represents restoration projects completed between 2006 and 2011 within the 16 major Puget Sound river mouth estuaries, as defined by the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP).

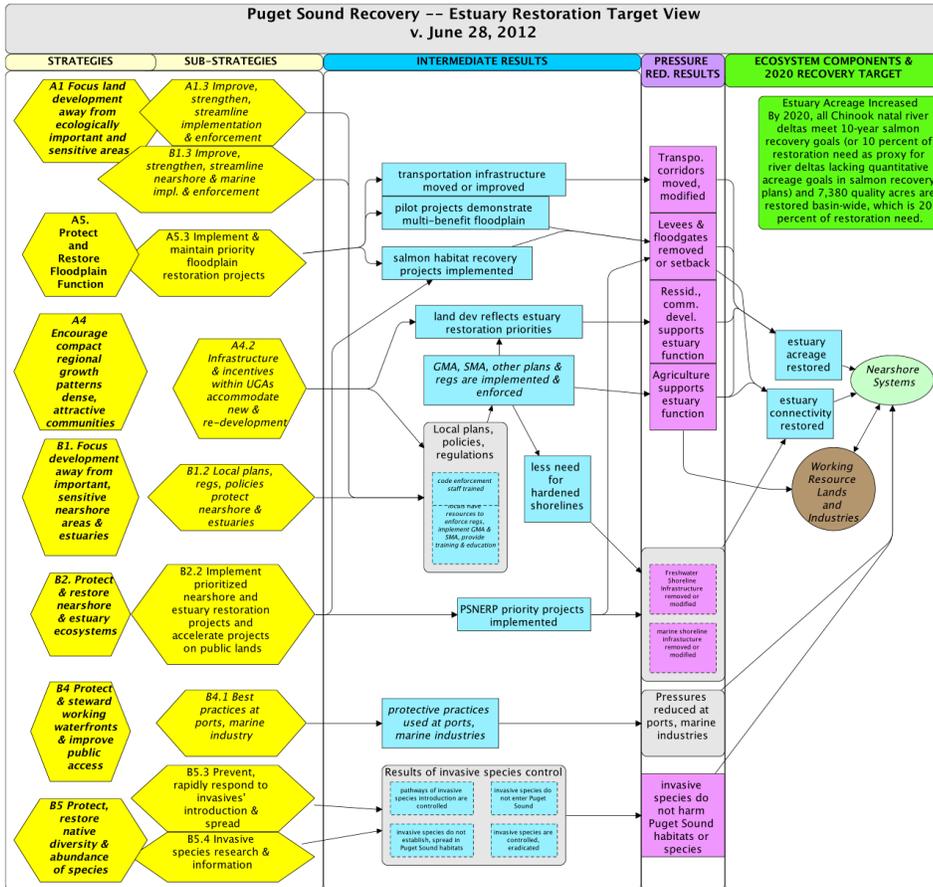
\*The target of 7,380 acres represents only 20 percent of the total estimated estuary restoration needed for a fully functioning, resilient ecosystem.

There are several strategies related to achieving the recovery target for estuaries, including:

- Focus development away from ecologically important and sensitive nearshore areas and estuaries (B1.2, B1.3)
- Prevent and respond to the introduction of terrestrial and aquatic invasive species (B5.3, B5.4)
- Use, coordinate, expand and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)
- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)
- Improve, strengthen and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets (A1.3)
- Protect and maintain intact and functional floodplains (A5.3)
- Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands (B2.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.

Puget Sound Recovery -- Estuary Restoration Target View  
v. June 28, 2012



# Protect and Steward Working Waterfronts and Improve Public Access to Puget Sound

## The Challenge

Washington State's economy is intrinsically connected to the commercial and recreational maritime industry, including deepwater ports for international trade, shipbuilding facilities, boatyards, and marinas. We must identify ways in which the economic vitality of working waterfronts can be promoted, advanced and fostered while simultaneously achieving environmental benefits. It is important to design Puget Sound protection and restoration strategies in a manner that recognizes the contribution of the maritime industry to the region's economic portfolio.

Public access to Puget Sound offers the general public the opportunity "to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations" (WAC 173-26-221(4)). This access, and subsequently use and enjoyment, is important to the health and well-being of the region's citizens as it offers recreational opportunities such as swimming, boat launching and beachcombing to everyone. Public access also provides a means to get up close and personal with the surrounding environment through activities such as bird and whale watching and low tide hiking which provides hands on education experiences and further promotes the desire to maintain the health of the Sound.

The most common type of public access to shorelines is physical access, such as that provided by trails, docks, promenades, and bridges. Physical access may be implemented through dedication of land or easements, cooperative agreements, or acquisition of land along the shoreline. Public access can also be visual, such as via viewing towers and bridges or breezeways between buildings. A third type of access is "cultural access" to interpretive, educational, or historical features of the shoreline.

Public access to Puget Sound and its shorelines is threatened by numerous pressures. Geographic aspects such as natural topography, ongoing coastal erosion, and natural weathering make implementation and preservation of beach accesses challenging. In addition, anthropogenic sources such as population growth, privatization of coastal land, and waterfront commercial development all create demand for and limit public access to shorelines. It will be important to find ways to create and preserve public access as the natural and built environment around the shorelines of Puget Sound continue to change.

## Climate Change

As described in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012), "rising sea levels could affect port operations, damage seawalls and structures, and flood low-lying port land and surrounding transportation networks. The severity of impacts will depend on the local rate of sea level rise, the proximity to rivers subject to flooding, and the dependence of the port on vulnerable transportation links. Marinas and waterfront recreation facilities could also require more frequent repairs and modifications. Changes in the water level and coastal erosion could submerge or undermine fuel tanks for marinas and other facilities, which often locate their tanks close to their operations." In addition, rising sea level, erosion, and changes in surface water runoff patterns will alter coastal sediment transport systems. This could result in larger volumes of sediment delivery that require more frequent dredging.

A top priority response strategy related to ports is to reduce the risk of damage to buildings, transportation systems and other infrastructure. In addition, Port best practices that protect ecosystem health are part of other priority response strategies including reducing the vulnerability of coastal communities, habitats and species.

## Relationship to Recovery Targets

Protecting and stewarding working waterfronts will contribute towards progress on targets for toxins in fish, marine sediment quality, and shoreline armoring. Protecting and stewarding working waterfronts and increasing public access to Puget Sound will contribute to human well-being targets, yet to be established.

## Local Priorities

For the 2012 Action Agenda Update, Local Integrating Organizations did not identify working waterfronts and public access as top priorities. The Whatcom LIO is discussing a strategy to coordinate/collaborate with Port of Bellingham and City of Bellingham on restoration projects and opportunities for public access in context with the waterfront redevelopment.

## B4. Protect and steward working waterfronts and improve public access to Puget Sound

### **B4.1 Use, coordinate, expand, and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health.**

The Ports of Seattle and Tacoma are important gateways for international trade, and other major ports in Puget Sound include the Ports of Everett, Bremerton, Bellingham, Olympia, and Port Angeles. Ports and marinas have an important role to play in the protection and recovery of Puget Sound. Many ports are involved in habitat restoration and mitigation projects across a variety of scales and locations, from

shoreline in marine industrial areas to upland properties. The transition from a primarily resource-based economy has left some Puget Sound communities with degraded and polluted waterfronts from old industrial activities, in addition to pollution created by Combined Sewer Overflows (CSOs) and stormwater runoff. Many ports take on these types of cleanup projects through the Model Toxics Control Account (MTCA) or Superfund action, which prevents the spread of toxic plumes from abandoned industrial sites.

A significant number of large ports around Puget Sound require maintenance and/or new project dredging as part of their ongoing operations. Dredging is also a significant component of cleanup projects. For toxics control and reduction, it is critical that dredging and dredged material management practices ensure no degradation of the environmental quality of urban bays and waterways. The primary program that controls toxic substances from dredging is the Dredged Material Management Program (DMMP), an interagency effort that oversees the disposal and use of dredged sediments.

Marinas and boatyards are critical to controlling waste generated by boat maintenance and repair activities and are regulated by the Clean Water Act well as by state law governing hazardous waste disposal. Without regulated marinas and boatyards, these activities would likely occur in areas where hazardous wastes are released directly into the environment. Marinas are also key points of outreach and education for recreational boaters, such as promoting best practices for bilge water and waste disposal.

Given the sizable presence of Department of Defense (DOD) naval facilities in Puget Sound, it is also important to consider including DOD as a partner in programs that promote best practices for ports and the marine industry that are protective of ecosystem health.

## Ongoing Programs

In 2005 the Clean Marina Washington program was launched to improve environmental protection at marinas. Fifty-nine marinas are currently certified under the program. In 2011, the Northwest Marine Trade Association helped launch the Clean Boating Foundation, a non-profit organization aimed at helping boatyards improve their environmental practices through a voluntary Certified Clean Boatyard program.

In 2011 the legislature established a goal to phase-out copper bottom paint for recreational boats 65 feet and under by 2020 (SB 5436): “After January 1, 2018, new recreational water vessels with antifouling paint containing copper may not be sold in the state. Beginning January 1, 2020, the sale of copper antifouling paint intended for use on recreational water vessels is prohibited.”

Puget Sound ports have completed numerous development projects involving land and water cleanup and habitat remediation, and various projects are underway. Examples of recently completed projects include Port of Tacoma’s cleanup of the former Kaiser aluminum smelter and the Port of Anacortes’s “O” Avenue mitigation project, which included low-impact development features.

### Key Ongoing Program Activities

- The Bellingham Bay Demonstration Pilot Program began in 1996 to improve the environmental health of Bellingham Bay through cleanup of polluted sediments, restoration of historically lost habitat, control of pollution sources, and revitalization of under-utilized waterfront properties.

The Pilot includes 12 cleanup sites around Bellingham Bay and several habitat restoration projects. Clean up milestones for the Bellingham Bay Demonstration Pilot Project vary by individual project components. Progress on cleanup of contaminated sites in Bellingham Bay are viewable at the Department of Ecology's (Ecology) website:

[http://www.ecy.wa.gov/programs/tcp/sites\\_brochure/blhm\\_bay/sites/bel\\_bay\\_sites.html](http://www.ecy.wa.gov/programs/tcp/sites_brochure/blhm_bay/sites/bel_bay_sites.html).

Ecology will focus efforts on three significant cleanup and habitat restoration projects in Bellingham Bay: Cornwall Ave., Whatcom Waterway, and G-P Mill.

- Elliott Bay/Lower Duwamish cleanup: the U.S. Environmental Protection Agency (EPA) is scheduled to release its feasibility study for the Lower Duwamish cleanup in early 2012. A fact sheet with various cleanup alternatives and their associated expected time frames for completion is available here:  
[http://www.epa.gov/region10/pdf/sites/ldw/factsheet\\_oct2010rev.pdf](http://www.epa.gov/region10/pdf/sites/ldw/factsheet_oct2010rev.pdf)
- Ecology will focus efforts on continuing to control pollutant sources and remediate toxics in the Lower Duwamish [and East Waterway](#).
- Port Angeles Harbor Cleanup: Several sites in Port Angeles Harbor are in various stages of investigation and/or cleanup of toxic contamination as part of Ecology's Puget Sound Initiative. Further information is available here:  
[http://www.ecy.wa.gov/programs/tcp/sites\\_brochure/psi/portAngeles/psi\\_portAngeles\\_bay.html](http://www.ecy.wa.gov/programs/tcp/sites_brochure/psi/portAngeles/psi_portAngeles_bay.html)
- Ecology, in conjunction with the Clean Boatyard Washington program, will work toward ensuring Puget Sound boatyards meet the requirements as described in the Boatyard General Permit with a goal that 100 percent of Puget Sound boatyards covered under the Boatyard General Permit will meet the benchmarks for copper and zinc in stormwater discharges by 2014.
- Puget Sound ports and marinas covered under the National Pollution Discharge Elimination System Industrial Stormwater permit will comply with the permit's benchmarks and stormwater pollution prevention plan requirements.
- Washington Sea Grant will coordinate and host the third national Working Waterfronts conference in March 2013 in Tacoma.

Other ongoing activities and near-term actions related to working waterfronts are described in C1 (control of pollution sources to Puget Sound), C9 (cleanup of contaminated sites within and near Puget Sound).

### **Near-Term Actions**

None – work in the near term will focus on implementation of ongoing programs. Near-term actions related to cleanup of working waterfronts also are addressed in C9.

### **Emerging Issues and Future Opportunities**

- Exploration (and funding) for research and innovation to identify lower impact methods of shoreline armoring in an urban industrial context.
- Support for the recommendations contained in [Marine Spatial Planning in Washington: Final Report and Recommendations of the State Ocean Caucus to the Washington State Legislature](#), in particular Recommendation 4 which includes (among others) the following objectives:
  - Foster and encourage sustainable uses that provide economic opportunity and preserve coastal heritage without significant adverse environmental impacts

- Preserve and enhance public access to, commercial and recreational uses of, and other values for marine waters and shorelines
- Protect and encourage working waterfronts and support the infrastructure necessary to sustain water-dependent uses such as marine industry, commercial shipping, commercial, tribal and recreational fisheries, and shellfish aquaculture
- Exploration of opportunities for stormwater treatment pilot projects and development of innovative treatment methods at public ports; and support expansion of innovative and effective stormwater treatment projects currently in use.
- Identification and adoption of low impact development techniques to maximize effectiveness in the context of working waterfronts.
- Explicitly incorporate climate change impacts and the recommendations from *Preparing for Climate Change* (April 2012) including working with ports to determine short- and long-term strategies to protect port infrastructure and transportation linkages to ensure movement of commerce and international trade.

#### **B4.2 Increase access to and knowledge of publically owned Puget Sound shorelines and the marine ecosystem.**

Much of Puget Sound shorelines are privately held. Ecology maintains information on public access to Puget Sound in the Coastal Zone Atlas and the Trust for Public Lands has done additional analysis to map and evaluate public access to Puget Sound.

<https://fortress.wa.gov/ecy/coastalatlantools/UICoastalAtlas/Tools/PublicAccess.aspx>.

In June 2012, the Puget Sound Partnership will launch a mobile application and website to disseminate maps, descriptions, and directions to all publicly-owned shorelines, to make this information more accessible and easier to use.

The marine ecosystem is accessed directly by boaters and divers and by residents who travel or commute by ferry boat and who visit marine education centers such as the Seattle Aquarium or the Port Townsend Marine Science Center.

Ongoing programs such as the Shoreline Master Program (SMP) require consideration of public access to Puget Sound shorelines as part of local SMP updates, and agencies, such as State Parks and WDFW, provide an maintain both shoreline and marine access points.

#### **Near-Term Actions**

**B4.2 NTA 1:** State Parks Interpretive Experiences. Increase passive, active and virtual interpretive experiences on Puget Sound ecology, threats, vital signs, and recovery actions at State Parks and other publically owned lands that provide access to Puget Sound. Maximize opportunities to connect Park visitors with the regional ecosystem recovery effort.

*Performance measure: By December 2012, update the 2007 Puget Sound Initiative Project - Interpretive and Education Plan review existing interpretive plans for Puget Sound interpretive experience opportunities. By June 2013, identify potential funding sources for implementation of unfunded elements of the updated plan identified through interpretive plan review. Further metrics will depend on acquisition of funding.*

## Emerging Issues and Future Opportunities

There are a number of opportunities to explore additional strategies and investments to improve access to Puget Sound. Many of these were suggested by commenters during the comment period on the draft 2012 Action Agenda update and can be followed up on and considered for the next update. These include:

- Revising grant criteria and allowable expenditures so that sites acquired with public funds for conservation purposes will consistently include public access compatible with restoration and protection objectives.
- Making a concerted investment to preserve, repair and maintain parks, nature centers, fishing piers, trails, promenades and other shoreline access points throughout Puget Sound.
- Creating programs to subsidize free or low cost admission to the Seattle Aquarium, Port Townsend Marine Science Center, Poulsbo Marine Science Center, Arthur D. Feiro Marine Lab, MAST Science Center in Redondo, Point Defiance Aquarium, Marine Life Center in Bellingham, Nisqually Reach Nature Center, Makah and Suquamish Museums and similar facilities where the public can connect with and learn more about the Puget Sound marine environment.

In addition, public access strategies and actions will need to incorporate changes in sea level rise as needed.

## Target View: Eelgrass

Eelgrass is a marine plant that grows in the shallow waters of Puget Sound. It flowers and produces seeds, unlike seaweed, and expands quickly in the spring and summer, only to slow its growth in the winter in response to lower water temperature and light. Eelgrass is important because it provides food and habitat for birds, fish, crabs, shellfish and other marine organisms. It also dampens wave energy thereby protecting shorelines from erosion and improving water quality.

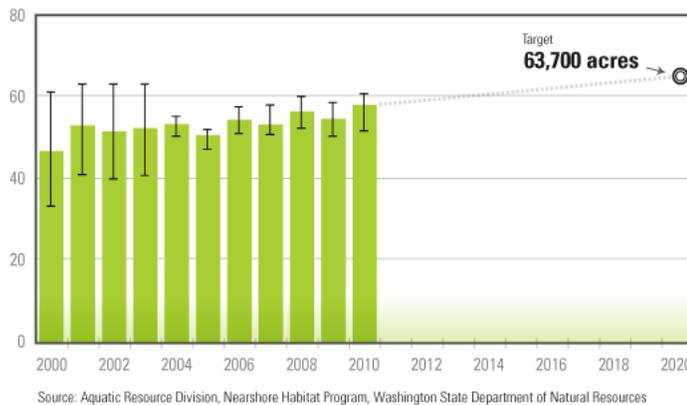
Eelgrass and other seagrass species are used as indicators of estuarine health throughout the world because they respond sensitively to many natural and human-caused environmental factors that affect water quality and shoreline sediment. Changes in the abundance or distribution of this resource are likely to reflect changes in environmental conditions. They are also likely to affect many other species that depend on eelgrass habitat.

One way to improve Puget Sound is to increase the amount of eelgrass that grows in its waters. Though some larger Puget Sound eelgrass beds are stable or possibly increasing in size, many of the smaller more widely dispersed beds are in decline. Although research is underway, currently, the reason for this decline is not fully understood.

The 2020 recovery target for eelgrass is:

- to increase the acres of eelgrass in Puget Sound by 20 percent from the 2000 to 2008 baseline period - an increase from about 53,100 acres to about 63,700.

**Acres of Eelgrass in Puget Sound**  
*in thousands, 2000-2020*



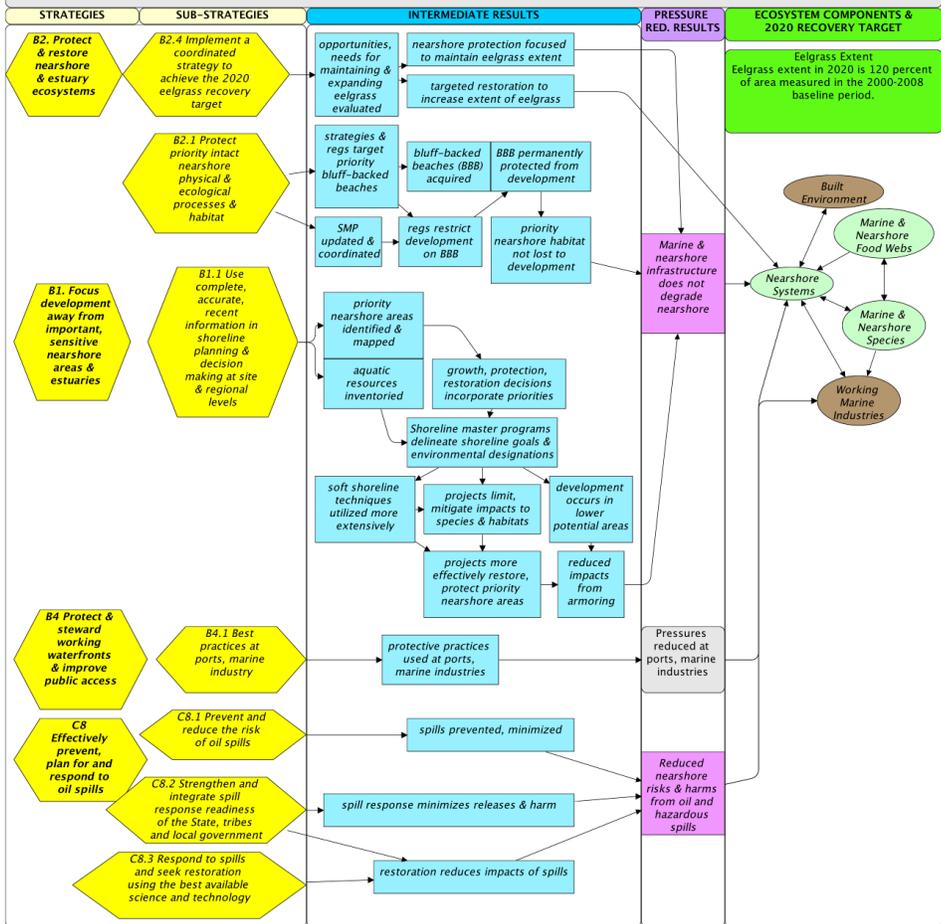
*The black bars in the graph represent the margin of error for the estimated acreage, showing the uppermost and lowermost potential value for each year. In 2004, DNR modified its survey methodology and the precision of the estimates improved.*

The Action Agenda strategies most related to the eelgrass target are:

- Implement a coordinated strategy to achieve the 2020 eelgrass recovery target (B2.4)
- Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Use, coordinate, expand and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)
- Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels (B1.1)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.

**Puget Sound Recovery -- Eelgrass Target View**  
v. June 28, 2012



# Protect and Restore the Native Diversity and Abundance of Puget Sound Species

## The Challenge

Puget Sound's terrestrial and freshwater species interact with marine species to form a complex and biologically rich food web that requires protection and responsible stewardship to maintain function and minimize disruption. The biodiversity of Puget Sound has provided valuable health, economic, and cultural benefits to humans, beginning with the earliest native residents. Many of these benefits are quantifiable in pounds of fish harvested or board-feet of timber produced. Other benefits, such as ecosystem services, are more difficult to quantify but are beginning to gain recognition through new and innovative metrics. The intrinsic value of biodiversity, such as its scenic beauty or contribution to quality of life, may never be fully measured but is nonetheless universally recognized as an important asset to protect. Protection and recovery of native species is an integral part of maintaining overall species diversity throughout Puget Sound. Currently sixteen Puget Sound species are listed as federally threatened or endangered and sixteen additional species are on the state endangered and threatened species lists. The Washington Department of Fish and Wildlife (WDFW) also lists eight species as sensitive, and approximately 35 Puget Sound marine fish and bird species are candidates for review and possible listing as State Endangered, Threatened, or Sensitive species.

One of many things that threaten biodiversity is the introduction of invasive plants and animals. It is significantly less expensive and more effective to prevent or rapidly respond to introductions of invasive species than to control and eradicate them once they have become established; however prevention and rapid response present many challenges especially in the context of the international shipping that occurs in Puget Sound. In recent years, a number of invasive species have taken hold in Puget Sound despite efforts to prevent them. These include such species as Japanese knotweed, *Spartina*, nutria, and New Zealand mud snails. Knotweeds are noxious weeds that spread quickly, particularly along rivers and streams, where they can out-compete native plants and destroy habitat for spawning fish. *Spartina* is a cord grass that out-competes native vegetation and converts mudflats into single-species meadows. *Spartina* destroys important habitat for migratory shorebirds and waterfowl, increases the threat of flooding and severely affects the state's shellfish industry. Nutria, large invasive rodents, threaten the health of marine and freshwater habitats. New Zealand mud snails are a highly invasive threat to freshwater and brackish water environments. They can dominate river and lakebed habitat by achieving densities of more than 100,000 per square meter.

Sub-strategies in this area address recovering native species and preventing and rapidly responding to invasive species.

## Climate Change

Climate change will have significant impacts on biodiversity including changes in habitat, types of species and where they are found in Puget Sound, and on species' lifecycles and predator-prey interactions. Already reduced populations may be further weakened formerly healthy populations may decline. Warmer temperatures allow nonnative plants, animals, insects and pathogens to expand their range and enhance winter survival. Native habitats will experience an increase in disturbances such as wildfires, floods, drought, or disease or insect outbreaks opening them up to more frequent invasion by opportunistic nonnative species that are adapted to survive in changed habitats. Ocean acidity will likely have significant impact on marine ecosystems, impairing the ability of organisms to form shells or skeletons. This will affect species important to the food web like shellfish, corals, and pteropods (a food source for salmon, herring, and whales). This stress will provide opportunities for nonnative species to become established and flourish.

Several of the high priority response strategies in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (Draft April 2012), relate directly to biodiversity and invasive species:

- **Safeguarding fish and wildlife and protecting critical ecosystem services that support human and natural systems.** This means protecting and restoring habitat, protecting sensitive and vulnerable species and their habitats, and reducing existing stresses on fish, wildlife, plants and ecosystems.
- **Reducing the vulnerability of coastal communities, habitat and species.** This includes preventing coastal habitat degradation and destruction and seeking opportunities for upland habitat creation.
- **Reducing forest and agriculture vulnerability to climate change.** This strategy includes enhancing surveillance and eradication of pests and diseases.
- **Supporting the efforts of local communities and strengthening capacity to respond and engage the public.**

The specific strategies and actions related to biodiversity and invasive species focus on the conservation, restoration, and improvement of ecological functions and processes, and ways to help species and ecosystems recover from the impacts of climate change and extreme events. Reducing non-climate stressors to help build the resilience of natural systems is critical. Actions include protecting and restoring connections between rivers and floodplains, restoring estuaries, managing freshwater withdrawals, maintaining stream flows, reducing existing pollution and contamination, and maintaining and restoring stream flows. For example, reducing stormwater pollution improves water quality and aquatic habitat, increasing the resilience of aquatic species to additional stresses from climate change. In addition, the state response strategy calls for taking early action to eliminate or control non-native species that take advantage of climate changes, especially where they threaten native species or current ecosystem function.

The strategies and sub-strategies, ongoing programs and near-term actions in this section of the Action Agenda are similar to those in *Preparing for Climate Change* and will help minimize impacts of climate change in Puget Sound.

## Relationship to Recovery Targets

Protection and recovery of native Puget Sound species is important for achieving the recovery targets associated with toxics in fish, marine sediment quality, shoreline armoring, orcas, wild Chinook, Pacific herring, and eelgrass. Control of invasive species in Puget Sound basin also will support recovery targets for biological health of Wadeable, lowland streams, shellfish beds, and eelgrass acres.

## Local Priorities

For the 2012 Action Agenda Update, in general, Local Integrating Organizations did not identify invasive species prevention and response as a top priority. Promoting invasive species eradication efforts is one of the Strait of Juan de Fuca's 19 Strategic Priorities. Other LIOs, including Hood Canal, Island, Stillaguamish-Snohomish, and Skagit are discussing invasive species strategies, including the need to continue support for local prevention and eradication programs.

## B5. Protect and restore the native diversity and abundance of Puget Sound species, and prevent and respond to the introduction of terrestrial and aquatic invasive species

### **B5.1** Implement species recovery plans in a coordinated way.

Recovering at-risk native species is vital to restore the biological health and integrity of Puget Sound. Implementation of existing species recovery plans will be most effective if overlapping actions within these plans are identified and redundancies eliminated.

Existing terrestrial species recovery plans include:

- Fisher (<http://wdfw.wa.gov/publications/00228/wdfw00228.pdf>)
- Marbled Murrelet (<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=B08C>)
- Northern Spotted Owl ([http://ecos.fws.gov/docs/recovery\\_plan/100915.pdf](http://ecos.fws.gov/docs/recovery_plan/100915.pdf))
- Western Gray Squirrel (<http://wdfw.wa.gov/publications/pub.php?id=00119>)
- Streaked Horned Lark (<http://wdfw.wa.gov/publications/pub.php?id=00391>)

Existing freshwater species recovery plans include:

- Oregon Spotted Frog (<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?scode=D02A>)
- Western Pond Turtle (<http://wdfw.wa.gov/publications/pub.php?id=00398>)

Existing marine species recovery plans include:

- Puget Sound Chinook Salmon (<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/PS-Chinook-Plan.cfm>)
- Hood Canal Summer Chum (<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/Hood-Canal-Plan.cfm>)
- Sea Otter (<http://wdfw.wa.gov/publications/00314/wdfw00314.pdf>)
- Southern Resident Killer Whale (<http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Status/upload/SRKW-Recov-Plan.pdf>)
- Puget Sound Rockfish Conservation Plan <http://wdfw.wa.gov/conservation/fisheries/rockfish/>)
- Marbled Murrelet ([http://ecos.fws.gov/docs/recovery\\_plan/970924.pdf](http://ecos.fws.gov/docs/recovery_plan/970924.pdf))

Each plan lays out a species-specific approach to ensure self-sustaining populations at appropriate levels of abundance. Recovery plans generally include an assessment of the stock status and an evaluation of the factors that contribute to declining populations and measures to mitigate them. These plans also recommend specific actions to protect species habitat needs, their food and forage requirements, and protection from human disturbance and harvest management.

In addition, WDFW has identified management recommendations for 101 species and five priority habitats. These can be found at [http://wdfw.wa.gov/conservation/phs/mgmt\\_recommendations/](http://wdfw.wa.gov/conservation/phs/mgmt_recommendations/).

Many of the actions to protect and restore habitat and to improve fresh and marine water quality and quantity described in other sections of the Action Agenda echo the types of actions called for in species recovery plans.

## Ongoing Programs

The U.S. Fish and Wildlife Service (USFWS) is the lead federal agency for protecting and restoring biodiversity in Puget Sound, and has jurisdiction under the Endangered Species Act (ESA) for all federally listed species except for salmon, steelhead, and marine mammals. The USFWS has provided substantial funding to protect and restore species biodiversity, as well as estuary restoration in Puget Sound. The USFWS also implements and funds research on the impacts of climate change on biodiversity in Puget Sound.

The National Oceanic and Atmospheric Administration (NOAA) has jurisdiction under Section 10 of the Endangered Species Act and its implementing regulations require habitat conservation plans (HCPs) for salmon, steelhead, and marine mammals. Elements of HCPs include, but are not limited to:

- An assessment of impacts likely to result from the proposed taking of one or more federally listed species.
- Measures that the permit applicant will undertake to monitor, minimize, and mitigate for such impacts, the funding available to implement such measures, and the procedures to deal with unforeseen or extraordinary circumstances.
- Alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives.
- Additional measures that the U.S. Fish and Wildlife Service may require.
- Both the U.S. Fish and Wildlife Service and NOAA prioritize restoration actions within plans.

At the state level, WDFW conserves and protects native fish and wildlife by:

- Protecting Puget Sound species and habitats by regulating construction projects in or near water that may harm fish and their habitat, and enforcing environmental, fishing, and hunting laws
- Identifying and implementing hatchery reform actions to reduce risks to native salmon and steelhead.
- Ensuring fishery impacts on native fish are reduced to levels consistent with conservation goals.
- Initiating new and enhancing existing partnerships with conservation, invasive species, and other organizations to help conserve Washington's fish and wildlife.
- Protecting, acquiring and restoring the habitat of species.
- Participating in Shoreline Management Act and Growth Management Act efforts of local governments.
- Completing and implementing the highest priority conservation actions.
- Developing an integrated climate change response and adaptation strategy for species, habitats and ecosystems to maintain healthy and sustainable fish and wildlife populations and to prevent the loss of critical ecological functions.

Federal law requires states to develop comprehensive wildlife conservation strategies, known as Wildlife Action Plans (WAP), in order to receive federal funding through the Wildlife Conservation and Restoration Program and State Wildlife Grants program. The purpose of these strategies or plans is to conserve wildlife and vital natural areas before they become too rare and costly to protect.

WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) creates a framework to protect species and habitats in greatest need of conservation; moves from species management to an ecosystems-based management approach; and expands the emphasis on biodiversity conservation, at the statewide and eco-regional scales including Puget Sound lowlands, the Cascade and Olympic eco-regions.

Through adaptive management, the strategy will do the following:

- Re-examine and redefine the relative priority of wildlife species and associated habitats
- Help coordinate land acquisitions among state and local agencies
- Improve coordination among federal and state agencies in conservation planning
- Complete habitat assessments at the local level
- Provide good biological information to local planners and decision makers to improve their ability to administer the Growth Management Act and other locally administered land use laws; and expand efforts to help local governments use "best available science" in protecting important habitats by providing them with good habitat mapping products.
- Better integrate the management of marine and aquatic ecosystems with terrestrial ecosystems, both within WDFW and among state and federal agencies
- Incorporate management recommendations into operational work plans within WDFW and other conservation partners
- Incorporate specific conservation actions into WDFW's cost accounting systems to help develop and monitor project budgets and priorities
- Prevent the introduction of new aquatic invasive species and control or eradicate established populations

Finally, both the Pacific Coast Joint Venture and the U.S. North American Bird Conservation Initiative (NABCI) seek to advance protection and recovery of bird populations across their migratory range and provide significant opportunities for collaboration with public and private entities in British Columbia and beyond. The Pacific Coast Joint Venture develops partnerships between public and private agencies and organizations to pool financial and management resources to fund and carry out on-the-ground projects to protect lowland wetlands and upland habitats. The U.S. North American Bird Conservation Initiative Committee uses a similar model to ensure the long-term health of North America's native bird populations. This Committee works with cross border partners to advance integrated bird conservation, based on sound science and cost-effective management.

### Near-Term Actions

**B5.1 NTA 1:** Develop and implement Species Plans. Develop (where necessary) and implement actionable plans for imperiled Puget Sound species.

*Performance measure: Number of actionable plans for imperiled species currently lacking such plans.*

**B5.1 NTA 2:** Fish and Wildlife Action Plan. WDFW, in coordination with the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, will complete a Fish and Wildlife Action Plan for Puget Sound by June 30, 2013. This action will carry out the agency's Comprehensive Wildlife Conservation Strategy in the Puget Trough, Cascades and Northwest Coast eco-regions to integrate terrestrial and aquatic species specific recovery plans, existing management tools, and interagency conservation plans into a unified ecosystem approach to set priorities focused on conserving and restoring critical habitat, improve biodiversity protection and restoration efforts and better coordinate them.

*Performance measure: A completed Fish and Wildlife Action Plan for Puget Trough by June 30, 2013.*

### **B5.2 Create a more integrated planning approach to protect and enhance biodiversity in the Puget Sound basin.**

Multiple state and federal agencies, local governments, non-profit organizations, and tribes operate programs and create plans that either explicitly benefit biodiversity in Washington State or have the potential to impact biodiversity. An integrated approach to identify programmatic overlap and gaps is important for maximizing the impact of biodiversity work in Washington State, minimizing duplication of effort and maximizing coordination of resources and synergies across plan implementation.

Existing state biodiversity plans and/or programs and policies that benefit biodiversity include:

- Washington Biodiversity Conservation Strategy
- WDFW's Comprehensive Wildlife Conservation Strategy
- WDFW's Priority Habitat and Species
- The Washington Natural Heritage Plan (produced by the Washington Natural Heritage Program in the Department of Natural Resources (DNR))

- DNR's Aquatic Lands Enhancement Account
- DNR's Aquatic Lands Habitat Conservation Plan
- DNR's Forest Practices Habitat Conservation Plan
- DNR's Natural Heritage Program for priority species and ecosystems
- Forest Practices Act (administered by DNR)
- Washington Wildlife and Recreation Program
- Washington Invasive Species Council's Invaders at the Gate Strategic Plan

The Washington Biodiversity Council (2004-2010) (the Council) ([http://www.rco.wa.gov/biodiversity/about\\_the\\_council.shtml](http://www.rco.wa.gov/biodiversity/about_the_council.shtml)) created a comprehensive framework for securing Washington State's biodiversity, the Washington Biodiversity Conservation Strategy ([http://www.rco.wa.gov/doc\\_pages/other\\_pubs.shtml#biodiversity](http://www.rco.wa.gov/doc_pages/other_pubs.shtml#biodiversity)). The concepts and recommendations described in the strategy are instructive for crafting an integrated planning approach to biodiversity. In 2010, Governor Gregoire asked the Natural Resources Cabinet to absorb the Biodiversity Council's oversight role. The Council completed this transition in June 2011 by handing off ongoing projects to member agencies. Without a single point of contact for biodiversity policy work in the state, coordination and collaboration to carry out the biodiversity conservation strategy will remain a challenge.

## Ongoing Programs

*Priority Habitats and Species (PHS) Program:* The PHS program (<http://wdfw.wa.gov/conservation/phs/>) serves as the backbone of WDFW's proactive approach to the conservation of fish and wildlife. It is the principal means by which WDFW provides important fish, wildlife, and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning purposes. Using the best available science, the PHS program identifies which common and at-risk species and habitat types are priorities for conservation, where these habitats and species are located, and what should be done to protect these resources when land use decisions are made. The program is supported by a [list](#) of priority habitats and species, [maps](#), [management recommendations](#) and [technical assistance staff](#). The database may be directly accessed at <http://wdfw.wa.gov/mapping/phs/>.

### *Landowner Assistance:*

- *WDFW Private Landowner Assistance:* WDFW enrolls private landowners in a voluntary [private lands access program](#) and participants may request technical assistance from WDFW staff to help improve fish and wildlife habitat on their lands. Department staff may also be available to help landowners apply for or implement federal programs administered by the Farm Service Agency (FSA) or the Natural Resource Conservation Service (NRCS) (for example, Conservation Reserve Program (CRP) and Environmental Quality Incentives Program (EQIP)). WDFW has developed guidance documents for the inventory, assessment, and prioritization of fish passage barriers and for the design of road culverts for fish passage. Additionally, biological and engineering assistance may be available from WDFW to help assess and review new and replacement fish passage structures.
- *Incentive-Based Landowner Conservation Programs:* DNR provides financial and technical assistance to communities and forest stewardship assistance to non-industrial private landowners as well as technical assistance on leases of state-owned aquatic lands. (More

information is available here:

[http://www.landscape.org/washington/programs/wa\\_programs/watersheds/dnr/#cmz](http://www.landscape.org/washington/programs/wa_programs/watersheds/dnr/#cmz)).

- Financial and technical assistance includes:
  - Helping rural landowners to remove or fix fish passage barriers.
  - Compensating small forest landowners for not harvesting timber along riparian corridors.
  - Offering private landowners the option of donation or compensation to preserve timberlands on islands of timber within rivers or streams.
  - Helping non-industrial private forest landowners manage their properties to improve timber production, forest health, wildlife and fish habitat, water quality, aesthetics, and fire safety.
  - Supporting the Washington Register of Natural Areas to recognize voluntary participation to protect and conserve priority species or ecosystems, as identified in the Washington Natural Heritage Plan.

*Local Habitat Assessment:* Washington Department of Fish and Wildlife has developed a suite of habitat assessment tools. One of these ranks relative habitat value across a whole county or watershed. The Local Habitat Assessment (LHA) methodology produces a color-coded map that is easy to interpret and use to inform local land use planning initiatives at a variety of scales. WDFW has collaborated with several Puget Sound jurisdictions to produce LHA maps for whole counties, watersheds, or smaller sub-areas. Assessments have been completed in Skagit County, the Birch Bay watershed in Whatcom County, and Kitsap County.

- *Puget Sound Basin Characterization:* WDFW's LHA is being integrated into a Puget Sound Characterization that applies several ecological assessments including water flow, water quality and the Puget Sound Nearshore Ecosystem Restoration Project. The Puget Sound Watershed Characterization is a collaborative effort between Ecology, WDFW, and the Puget Sound Partnership that covers the entire Puget Sound Basin. The project is producing landscape-scale assessments that provide scientific information on which areas are the most important to protect for water resources and habitats.

*Biodiversity Scorecard:* Washington Biodiversity Council and University of Washington researchers collaborated to develop a draft scorecard model to track the status of the state's biodiversity, similar to PSP's dashboard indicators. The model considers the status of species and ecosystems, ecosystem processes, human activities, and ecosystem services. This project is now housed with the Washington Natural Heritage Program (at DNR).

*Conservation Opportunity Maps:* These maps assess the distribution of important species, plant communities, and ecological systems, and overlay that with human population trends. They provide high-level guidance on where to invest in biodiversity conservation activities in Washington State.

- WDFW has developed a data viewer application for the maps using ArcGIS, which enables users to see the data underlying the maps.
- The Washington Natural Heritage Program is enhancing the map viewer on the [LandScope Washington](#) site to include these maps and data.

*Biodiversity Conservation Toolbox for Land Use Planners:* This toolbox aims to put biodiversity conservation information for Washington planners in one place. It is organized in six main categories to address the primary needs that planners identified: resources, guidance documents, case studies, policy language, data and maps, and training and conferences.

- The Washington Department of Commerce, Growth Management Services, now hosts this toolbox on its [Critical Areas and Best Available Science](#) page

*Green Bylaws Toolkit:* The Canadian Environmental Law Clinic published the [Green Bylaws Toolkit](#). This is a comprehensive resource that will help local governments protect threatened ecosystems. The Toolkit explains how to use a myriad of tools – from planning to regulatory bylaws – to protect wetlands, grasslands and other important ecosystems.

*Biodiversity Project Website:* The website was created to provide a hub for biodiversity information in Washington State.

- [LandScope Washington](#), administered by the Washington Natural Heritage Program, now hosts the content on stewardship and incentives, education, and Washington’s ecoregions

*Aquatic Habitat Conservation Plan:* DNR’s draft conservation plan includes management measures to minimize impacts on state owned lands from over water structures, log booming, and shellfish aquaculture and to meet the requirements of the federal Endangered Species Act. The plan is being finalized and implemented.

*Forest Practices Habitat Conservation Plan:* Carrying out DNR’s Forest Practices Habitat Conservation Plan (FPHCP) maintains and restores aquatic and riparian habitat in forests to meet the requirements of the federal Endangered Species Act, as well as those of the [federal Clean Water Act](#) (CWA) for species included in the plan.

WDFW and DNR will integrate the Forest Practices Application and Hydraulics Project Approval permitting process to protect fish and other natural resources; as well as reduce paperwork burdens and uncertainty for applicants, and enhance compliance and effectiveness monitoring. To reduce reliance on the state General Fund, the agencies will assess fees for services to cover administrative costs.

### **Near-Term Actions**

None; work in the near-term will focus on implementation of ongoing programs.

### **B5.3 Prevent and rapidly respond to the introduction and spread of terrestrial and aquatic invasive species.**

The goal of this sub-strategy is to 1) gain an understanding of invasive species presence and extent in Puget Sound terrestrial and aquatic ecosystems; 2) prevent the introduction of new high-priority, high-risk invasive species to these ecosystems; 3) rapidly respond when new priority invasive species are detected; 4) stop invasive species already here from spreading to other locations; and 5) completely eliminate them as soon as possible, wherever possible.

Accomplishing these goals requires the following elements:

- A forum to provide policy-level planning and direction for regional invasive species efforts and coordination, collaboration, and information sharing among federal, state, tribal, local, and private partners

- Cooperation and collaboration with Canadian provincial and federal partners to align invasive species management programs across the international border
- Education and outreach that increases awareness of the invasive species problem and offers solutions
- A Puget Sound invasive species monitoring program
- A Puget Sound early detection and rapid response system
- Prevention efforts that target the highest risk pathways, such as hull fouling and ballast water
- Maintained or enhanced programs to control, contain, or eradicate existing infestations
- Asking and answering research questions that fill critical information gaps

### Ongoing Programs

Efforts to prevent and respond to invasive species in Puget Sound are focused on a number of ongoing programs.

- *The Washington Invasive Species Council (the Council).* The Washington Invasive Species Council (WISC) is the legislatively-established forum to provide policy-level planning and direction for regional invasive species efforts and coordination, collaboration, and information sharing among federal, state, tribal, local, and private partners. Their strategic plan sets priorities, identifies gaps and provides goals, recommendations, and actions to address the significant threat invasive species pose to recovering Puget Sound. A key element of this sub-strategy is maintaining capacity to support the Council's role to provide outreach and policy-level planning, direction, coordination, and information sharing among member agencies and stakeholders. The Council provides structure and infrastructure for coordinated efforts to prevent and manage invasive species including integration of invasive species policies and protocols into existing processes such as the State Environmental Policy Act and Governor's Office of Regulatory Assistance Joint Aquatic Resource Permit Application (JARPA). Major funding sources include the Vessel Response Account and contributions from member agencies.
- *Basin-wide detection and rapid response efforts.* A second element is to enhance ongoing basin-wide detection and rapid response efforts to address invasive species risks. The effectiveness of the state's ability to prevent and respond to invasive species lies in these ongoing programs:
  - Washington State Department of Agriculture (WSDA) leads, and works with WDFW, to monitor for and eradicate *Spartina* infestations. WSDA also leads the monitoring for and eradication of invasive knotweed infestations, as well as other insect, plant pathogens, and weed pests. In addition, the WSDA prevents the introduction of invasive aquatic plants through its quarantine and inspection program, and controls other invasive aquatic plants.
  - WDFW regulates pathways and practices that introduce non-native animals, classifies non-native animals and responds to newly found animal invaders through its Aquatic Invasive Species Prevention and Enforcement, and Ballast Water Management programs. The state ballast water inspection and compliance program works to minimize the risks associated with hull fouling and ballast water discharges, two significant pathways for the introduction and spread of marine invasive species. The state general fund is the primary resource contributor.

- Washington State Noxious Weed Control Board classifies the threats related to terrestrial and aquatic plants and works with local weed boards and landowners to control and eradicate invasive plants infesting private property.
- Washington State Department of Ecology (Ecology) provides technical and financial assistance to local governments and lake associations to manage and eradicate freshwater invasive weeds such as Brazilian elodea and Eurasian milfoil. In addition, the Ecology coordinates the state's efforts related to the U.S. Environmental Protection Agency's (EPA) Vessel General Permit for managing incidental discharges from the normal operation of vessels.
- Washington State Department of Transportation (DOT) controls terrestrial and aquatic weed species along the state's major highway corridors as vehicular traffic and linear corridors serve as primary vectors for introduction and spread.

Funding sources for this work includes the Aquatic Invasive Species Prevention and Enforcement Account, Freshwater Aquatic Algae Control Account, state general fund (GF-S), and federal grants. It is essential to maintain and, in some cases, enhance these base programs. Reducing their capacity will open the gate to further invasions and associated effects on the region's economy and ecosystem. For example, tunicate management is not funded after FY2010–2011.

- *Cooperation and collaboration.* It is important to cooperate, collaborate and identify opportunities to improve coordination, strengthen existing partnerships, and develop new partnerships across jurisdictional boundaries and levels of government including tribes, and with non-profit organizations and private businesses, and with neighboring states, regional organizations, and Canadian entities to enhance public awareness, align programs and maximize limited resources to address common invasive species threats to Puget Sound.

## Near-Term Actions

**B5.3 NTA 1:** Invasive Species Baseline Assessment. By December 2014, the Invasive Species Council, in consultation with WSDA, will expand its baseline assessment to include an additional 15 of the Council's priority invasive species. The assessment provides locations of species, details about management programs, and identifies gaps that exist.

*Performance measure: 100% complete by December 31, 2014*

- 25% complete (Sep 30, 2012);
- 31% complete (Dec 31, 2012);
- 38% complete (Mar 31, 2013);
- 44% complete (Jun 30, 2013);
- 44% complete (Sep 30, 2013);
- 56% complete (Dec 31, 2013);
- 69% complete (Mar 31, 2014);
- 88% complete (Jun 30, 2014);
- 88% complete (Sep 30, 2014)

**B5.3 NTA 2:** Invasive Species Early Detection and Monitoring. By June 2014, the Invasive Species Council, in consultation with WSDA, will develop an early detection and monitoring program plan for priority invasive species in Puget Sound. The Council will coordinate

**the plan and implementation efforts with the Puget Sound Coordinated Ecosystem Monitoring Program.**

*Performance measure: Plans will be developed for five species. Secure funding by March 2013; Issue request for proposal. Hire contractor by June 2013; Identify existing invasive species monitoring efforts and protocols used in Puget Sound by December 2013; Develop conceptual monitoring plan that identifies targeted species and locations, and estimated costs to implement by June 2013; Seek funding opportunities to implement monitoring plan by October 2014.*

**B5.3 NTA 3: Managing Invasive Species on/in Boats and Ships. WDFW will prepare implementable recommendations for managing invasive species transported on and in the hulls of recreational watercraft and commercial ships.**

*Performance measure: Complete a management plan with recommendations by June 30, 2015.*

- Issue request for proposals and select contractor: June 2012;
- Complete assessment of non-indigenous marine species in Puget Sound: December 2012;
- Develop/identify standard methods for designating high-risk watercraft in Puget Sound: June 2013;
- Identify BMPs for in-water watercraft cleaning: December 2013;
- Identify other non-watercraft biofouling vectors for future research: 6/30/2014;
- Draft management plan reviewed by stakeholder group and Washington Invasive Species Council: December 2014

**B5.3 NTA 4: Ballast Water Treatment Effectiveness. By June 2015, WDFW will complete an assessment of and make recommendations to improve the effectiveness of open sea exchange and treatment in meeting state ballast water standards.**

*Performance measure: Complete report and make available to resource managers and the public by June 30, 2015.*

- Issue sub-award to University of Washington to analyses samples and conduct data analysis: 12/31/2012
- University completes analysis of archived samples and identifies research gaps: 6/30/2013
- WDFW collects new samples to fill research gaps: 12/31/2013
- Draft report reviewed by state Ballast Water Work Group: 12/31/2014

**B5.3 NTA 5: Zebra/Quagga and New Zealand Mud Snail Plans. By June 2015, WDFW will develop plans to respond to 1) a potential zebra/quagga mussel invasion in the Puget Sound Basin and 2) limit the spread of New Zealand mud snails.**

*Performance measure: Complete zebra/quagga mussel invasion management plan by June 30, 2015; Complete plan to limit spread of New Zealand mud snails by June 30, 2015.*

- Assess EPA grant opportunities and/or department legislation request for project funding: 6/30/2013

- Secure project funding; and issue contract to prepare management plans; 6/30/2014
- Draft management plans reviewed by Puget Sound Science Panel and Washington Invasive Species Council: 12/31/2014

#### **B5.4 Answer key invasive species research questions and fill information gaps.**

Key questions related to invasive species include: How invaded are Puget Sound terrestrial and aquatic ecosystems, and what is the full extent of the problem and level of risk? Answers to these questions can be used to develop more targeted response strategies. The aim of this sub-strategy is to provide a strong scientific basis for managing invasive species, understanding the effects of climate change on the spread and distribution of invasive species in terrestrial and aquatic ecosystems, and targeting specific pathways and species for management. Organizations that will play a role in answering these questions include Puget Sound Science Panel and Puget Sound Institute.

#### **Near-Term Actions**

**B5.4 NTA 1:** **Environmental and Economic Impact of Invasive Species. The Washington Invasive Species Council, in consultation with WSDA, will complete a risk assessment to evaluate the environmental and economic impacts of invasive species in the Puget Sound marine and nearshore ecosystems and incorporate short-term climate change considerations.**

*Performance measure: Workgroups will be convened by December 2012. WISC will revise performance measures to denote the number of pathways that will be considered by September 2013. Draft pathway analysis will be submitted to the Science Panel by August 2014. Final study will be completed by June 2015.*

#### **Emerging Issues and Future Opportunities**

- Development of biodiversity markets
- A mitigation bank for protection of prairie habitat
- Expansion of technical assistance to support local government efforts to plan and manage for biodiversity conservation
- Implementing the Washington Biodiversity Council recommendations for a sustainable leadership strategy by identifying a single state agency or entity to coordinate Puget Sound biodiversity
- Investigating whether and how invasive responses could be handled under Ecology's Aquatic Invasive Species Management General Permit so there is no delay responding to an early detection of an invasion
- Adding invasive species prevention protocols as components of JARPA review
- Increasing vessel inspections related to ballast water discharges
- Implementing recommendations from *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy*. This includes, but would not be limited to:
  - More explicitly incorporating climate change considerations into existing and new management plans for protecting sensitive and vulnerable species. This could include

modifying protection and recovery plans to accommodate migration, as well as longer-term shifts in species range associated with climate change and its effects. It could also include conservation of genetic diversity by protecting diverse populations and genetic material.

- Conducting and refining species and habitat vulnerability assessments to determine appropriate management approaches in a changing climate.
- More explicitly incorporating climate change considerations for species, habitats and ecosystem processes into land use, water and other natural resource planning and regulatory activities.

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## Target View: Pacific Herring

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Pacific herring are a vital component of the marine ecosystem, and are a key indicator of the overall health of Puget Sound. Healthy stocks of herring indicate that the food web in Puget Sound is functioning to provide a prey base for fish, seabirds, and marine mammals; that nearshore and open-water habitats are functioning properly; and that fisheries for bait and other products are available for Puget Sound residents.

Herring are one of a number of small, schooling fish species called “forage fish” that are preyed upon by larger predators for food (other species include surf smelt, Pacific sand lance, and northern anchovy). The Puget Sound Partnership has focused on Pacific herring as a key sentinel for Puget Sound health. Herring are one of the most abundant forage fish species, and their populations have been tracked since the 1970s.

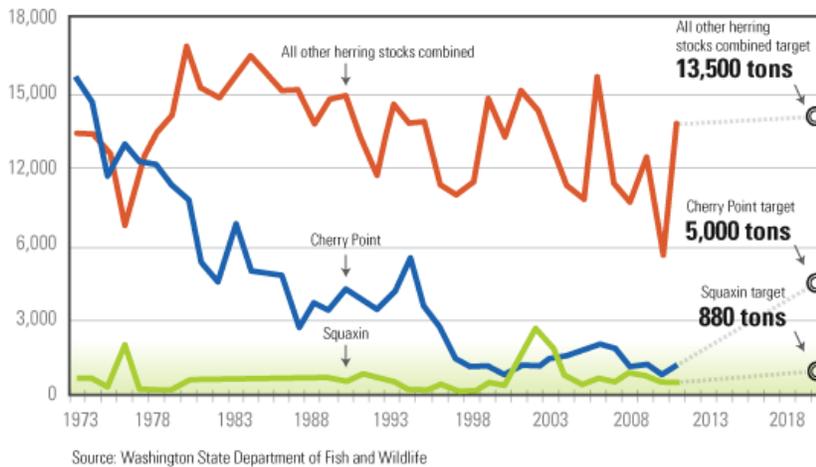
Overall, the number of herring in Central and Southern Puget Sound has been relatively stable for the past 40 years. However, the population of one large and important stock of Pacific herring, the Cherry Point stock in north Puget Sound, has declined by 90 percent since 1973. There are many factors that may have contributed to this decline, including pollution, overfishing, changes to the natural shoreline, parasites, changes in abundance of predators or prey, and disease. Some scientists think the decline may be part of a natural cycle, related to large-scale ecosystem conditions.

Efforts to help the recovery of Cherry Point herring have been taken, but we have yet to see their population turn around. More needs to be done to understand the causes of the decline. For herring in the rest of Puget Sound, appropriate fishery management is important to ensure continuation of the commercial and sport harvest. In addition, we need to protect the water quality and habitats essential to the well-being of all herring populations.

Further, as prey for virtually every large predator in Puget Sound, healthy herring populations play a significant role in a healthy food web. Herring are particularly susceptible to some types of toxic contaminants, such as PAHs (see “Toxics in Fish”). In addition, levels of some types of contaminants, such as PCBs (see “Toxics in Fish”) increase in fish tissues as the chemicals move up the food chain, from herring to salmon, birds, seals, orcas, and humans.

The 2020 recovery target for Pacific herring is: to increase the overall amount of spawning herring throughout Puget Sound to about 19,000 tons, meeting targets specified for Cherry Point (5,000 tons), Squaxin Pass (850 tons), and all other stocks (13,500 tons).

## Spawning biomass of Pacific herring stocks in Puget Sound In tons, 1973-2020

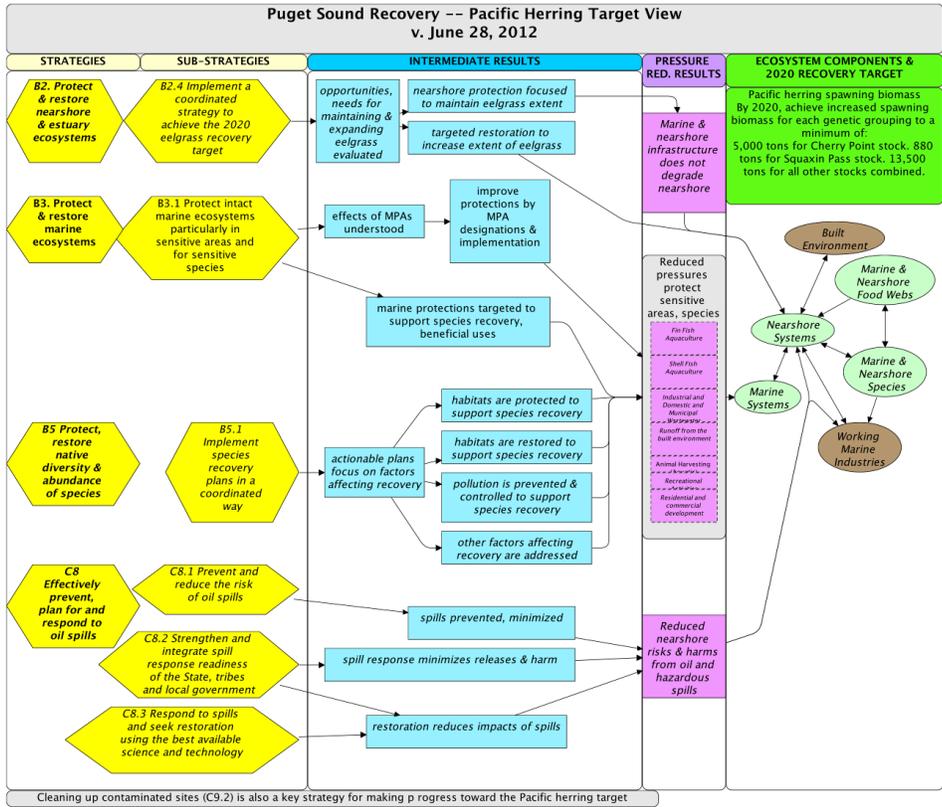


The graph represents the tons of adult Pacific herring estimated to be in Puget Sound, based on annual surveys. The estimated number of tons that spawn each year is called the spawning biomass. The herring targets are grouped based on results of genetic studies that indicate Cherry Point and Squaxin Pass herring stocks are genetically distinct and that all other sampled Puget Sound herring stocks are not genetically distinguishable from each other.

The Action Agenda strategies most related to the Pacific herring target are:

- Protect intact marine ecosystems particularly in sensitive areas and for sensitive species (B3.1)
- Implement species recovery plans in a coordinated way (B5.1)
- Effectively prevent, plan for, and respond to oil spills (C8.1, C8.2, C8.3)
- Implement a coordinated strategy to achieve the 2020 eelgrass recovery target (B2.4)
- Clean up contaminated sites within and near Puget Sound (C9.2)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.



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## Target View: Orcas

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Orca whales are an iconic species of the Pacific Northwest. We are thrilled when we see a killer whale breaching (jumping) high out of the water or when a resident pod swims majestically by a state ferry. Orcas also are at the top of the marine food chain – their main diet is Chinook salmon, as well as cod, herring and other fish species. Therefore, their health is a great indicator of the overall supply and quality of living organisms in the Sound.

The orcas in Puget Sound are generally known as southern resident orca whales and are actually a large extended family, or clan, comprised of three pods: J, K and L pods. They are often seen during the summer in the protected inshore waters of the Salish Sea, especially in Haro Strait west of San Juan Island, the Strait of Juan de Fuca and in Georgia Strait near the Fraser River. Orcas can live as long as 80 to 90 years.

The historic population of southern resident orcas may have numbered around 200 individuals, but by mid-2011, the population totaled fewer than 90 whales. Current potential threats to resident orcas include reduced quantity and quality of food, high levels of environmental contaminants possibly affecting immune and reproductive systems, human disturbance (especially boat traffic and noise disturbance), and the threat of oil spills. Further, there are currently only 17 female orcas capable of bearing young, and orcas generally wait three to five years between pregnancies. Also, about three orcas disappear from the population every year; generally their fates are unknown.

The 2020 target for orcas is, despite these challenges:

- To increase the number of southern resident orcas to 95 individuals. This would represent a one percent annual population growth rate from 2010 to 2020.

The Action Agenda strategies most related to the orca target are:

- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.4, C1.6, C1.3, C1.1)
- Implement species recovery in a coordinated way (B5.1)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.

Puget Sound Recovery -- Orca Target View  
v. June 28, 2012

