



STRATEGIES AND ACTIONS

B: MARINE AND NEARSHORE

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.

The strategies in this section will contribute most significantly to achieving recovery targets for the following vital signs.

- Shoreline armoring
- Estuaries
- Eelgrass
- Toxics in fish
- Floodplains
- Pacific herring
- Orcas
- Chinook salmon
- Marine sediment quality

THIS SECTION DESCRIBES SIX

STRATEGIES—and associated sub-strategies, ongoing programs, and actions—that are essential to the protection and restoration of marine and nearshore systems. The strategies and actions are organized under the following headings.

Protect and Restore 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

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

B4. Protect and Steward Working Waterfronts and Improve Public Access to Puget Sound

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

B5. Protect and Restore the Native Diversity and Abundance of Puget Sound Species

B6. Prevent and Respond to the Introduction of Invasive Species

RECOVERY IN FOCUS



Marine and nearshore strategies and actions contribute to achieving recovery targets for the vital signs presented in color in this *Puget Sound Vital Signs* graphic. The *Puget Sound Vital Signs* is an online tool that tracks and communicates ecosystem conditions and progress toward achieving recovery targets.

Marine, Estuarine, and Nearshore Systems

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 estuaries' recovery depends foremost on protecting and restoring the areas, species, and ecosystem processes that are most essential for ecological function. The challenge facing the planning community is to consolidate independent assessments into a more cohesive and coordinated policy directive. In the face of pressures associated with human population and economic growth, we will articulate where and how shoreline and marine development occurs, and which places we will strive to recover or set aside.

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 estuarine ecosystems.

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 (Mote et al. 2008). 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.

The following high-priority response strategies related to marine, nearshore, and estuarine areas are identified in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (Washington State Department of Ecology 2012a).

- **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's climate response strategy identifies several coast and ocean adaptation strategies with related actions. These strategies are recommended to help achieve the following.

- 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.

- 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.
- Enhance monitoring and research of ocean chemistry changes and effects on marine ecosystems.

Strategies for implementation are listed below.

- **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 strategies and actions in the Action Agenda help implement the state’s climate response strategy.

Recovery Targets

The strategies and actions in this section will contribute to achieving the recovery targets listed below with their associated vital signs and indicators.

They also will contribute to recovery targets for eelgrass, floodplains, orcas, Pacific herring, and Chinook salmon.

Vital Sign	Indicator	Recovery Target(s)
Estuaries	The area of estuarine wetlands restored to tidal flooding in Puget Sound’s large river deltas	7,380 quality acres of estuarine wetlands are restored basin-wide, which is 20% of total estimated restoration need.
	The number of Chinook salmon natal river deltas where 10-year salmon recovery goals have been met	By 2020, all Chinook natal river deltas meet 10-year salmon recovery goals (or 10% of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans).
Shoreline armoring	Net amount of shoreline armoring	From 2011 to 2020, the total amount of armoring removed should be greater than the total amount of new armoring in Puget Sound (total miles removed is greater than the total miles added).

Local Priorities

LIOs identified near-term actions that address marine, estuarine, and nearshore systems. These local actions are presented in the *Strategies and Actions* section along with Soundwide actions under the sub-strategy shaded below. The local action numbering contains the area abbreviation shown in parentheses after each LIO name. See Section 4, *Local Recovery Actions*, for detailed information about local planning.

Local Integrating Organization	Sub-Strategy								
	B1.1	B1.2	B1.3	B2.1	B2.2	B2.3	B2.4	B3.1	B3.2
Hood Canal Coordinating Council (HC)									
Island (ISL)									
San Juan (SJI)									
Snohomish-Stillaguamish (SNST)									
South Central Caucus Group (SC)									
Alliance for a Healthy South Sound (SS)									
Strait ERN (STRT)									
West Central (WC)									
Whatcom (WH)									

Strategies and Actions

B1. Focus Development away from Ecologically Important and Sensitive Nearshore Areas and Estuaries

The Growth Management Act and the Shoreline Management Act direct local jurisdictions to plan for growth and development while ensuring no net loss of critical areas and their associated ecosystems (e.g., wetlands, streams, slopes) 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.

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, has outlined a comprehensive set of protection and restoration priorities to improve sediment supply and other critical ecosystem processes for the Sound (Cereghino et al. 2012). 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

The Puget Sound Nearshore Ecosystem Restoration Project, which has become the Partnership’s nearshore program, is a partnership among the Corps; 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 3-year work plans are more fully described in strategy A6.

The Shoreline Master Programs (SMPs) also identify local protection and restoration priorities. SMPs include the items listed below.

- 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.
- 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 seven counties.

In addition, strategy B1 and its sub-strategies and actions—which relate to watershed characterization and the 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 Activities

- 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 WDFW, Ecology, and the Partnership to develop a network of marine protected areas in Puget Sound.

Near-Term Actions

The near-term actions¹ identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.1.1.2** **Human use patterns in marine areas.** Ecology will identify human use patterns for marine areas in Puget Sound, to support marine spatial planning.
- B.1.1 ISL3** **Improve Island County GIS capability to support land use analysis, planning, permitting decisions, and enforcement with respect to adaptive management and Shoreline Master Program requirements.** Island County will develop standard operating procedures for updating data and consistency in its data storage network to ensure usage consistency and relevant data.
- B.1.1 WC3** **West Sound eelgrass and forage fish surveys.** The West Sound Watersheds Council, in coordination with the Suquamish Tribe, DNR, 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.

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, 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 Shoreline Management Act (RCW 90.58) and revised SMP guidance (Washington Administrative Code [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 Growth Management Act and Shoreline Management Act planning programs to protect salmonids and

¹ Gaps in numbering reflect near-term actions that have been completed or otherwise retired.

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. 2009). 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 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, sub-strategy 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.

SHORELINE MASTER PROGRAMS

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 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 local Shoreline Master Programs, 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.²

Near-Term Actions

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.1.2.1 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 shoreline master programs in a manner that validates achievement of no net loss of ecological function and guides Puget Sound toward shoreline armoring target.
- B.1.2 ISL1 Develop an implementation strategy for Shoreline Master Program compliance.** Island County will develop an implementation strategy for Shoreline Master Program compliance that includes the following elements: a) develop an accurate evaluation of shoreline health that meets the state requirement for “no net loss” and Shoreline Master Program effectiveness based on guidance from Ecology; b) retain a consultant to set a baseline percentage of shoreline armoring and percent vegetative cover that will be used to quantitatively and qualitatively evaluate shoreline health status, trends, and compliance monitoring; c) conduct annual county-wide shoreline evaluations for trend analysis.
- B.1.2 SC4 Improve shorelines in the South Central Puget Sound Action Area by limiting new residential shoreline armoring and overwater coverage, and promoting “green” shoreline replacements.**
- Encourage programs and help implement projects that implement and promote incentives and best practices identified in local Shoreline Master Program studies updates. Support actions to retrofit/restore public and private shoreline properties.
 - Assist local governments by providing information on best practices and models. (e.g., hold informational sessions at standing planner forums including Puget Sound Regional Council, King County, and Seattle).
 - Work to promote existing and new incentive programs.
 - Use South Central Caucus Group (LIO) as a forum for sharing best practices for shoreline restoration and model shoreline regulations.
 - Compile incentive information and provide to local governments.
 - Coordinate outreach and incentive programs with existing industry best practices such as Leadership in Energy and Environmental Development, Green Shores for Homes project, and Built Green Certification program.
 - Seek funding to engage streamside/riparian, lakeshore, and nearshore area

² www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/SMPintro.html

property owners and to increase assistance to shoreline landowners who are willing to implement aquatic area protection and enhancement practices.

- Support WRIA 8 Green Shorelines Steering Committee’s outreach and education to key marine and freshwater shoreline audiences (e.g., property owners, real estate agents, construction and landscaping communities, and local government planning departments) to share green shorelines materials and messages and to encourage improved shoreline restoration stewardship.
- Support ECO Net endorsed education and outreach efforts for this action.
- Retrofit/restore public and private lands

- B.1.2 SNST14 Port Susan Marine Stewardship Area conservation.** Establish Port Susan as a Marine Stewardship Area and implement the conservation action plan.
- B.1.2 STRT15 Implement the City of Port Townsend’s Shoreline Master Program through public education and incentive programs.** Education and incentive programs will be made available and promoted to City residents. Programs include promotion of improved stormwater management, removal of shoreline armoring, and restoring native marine riparian vegetation along the city’s shorelines. Shoreline education and technical assistance will be offered through implementation of Phase 2 of Jefferson County’s Watershed Stewardship Resource Center, as described in two other Strait Action Area near-term actions.
- B.1.2 STRT16 Finalize and adopt the Shoreline Master Program, and update and implement the highest priority projects listed within the City of Port Angeles shoreline restoration plan, a part of the city’s updated Shoreline Master Program.** In addition to finalizing and adopting the Shoreline Master Program update, the focus is on beach restoration projects within Port Angeles Harbor, including inner Ediz Hook, West End Park, and Hollywood Beach.
- B.1.2 STRT19 Organize and implement annual Jefferson County restoration planning summits.** Organize and implement the first annual Jefferson County Restoration Planning Summits, one for marine and one for freshwater areas. Consider implementing follow up activity, where needed.
- B.1.2 STRT20 Implement the highest priority projects listed within the Jefferson County Shoreline Restoration Plan, a part of the County’s updated Shoreline Master Program.** Implement the highest priority shoreline restoration projects.
- B.1.2 STRT21 Assess implementation of the Jefferson County Shoreline Restoration Plan, a part of the County’s updated Shoreline Master Program.** Regularly assess implementation of the Jefferson County Shoreline Restoration Plan.
- B.1.2 STRT22 Develop and adopt the update of the Clallam County Shoreline Master Program.**
- B.1.2 STRT23 Identify and implement a framework for measuring and tracking no net loss in Clallam and Jefferson Counties.** Complete the Enhanced Shoreline Protection project (EPA Watershed Management Assistance Program Grant) for Clallam and Jefferson Counties and evaluate the results to determine next steps for implementation.

- B.1.2 STRT24 Expand pilot Ecosystem Services Valuation analysis conducted along the Central Strait nearshore to other shorelines within the Strait Action Area and North Olympic Peninsula.** Following lessons learned from the pilot Ecosystem Services Valuation analysis along the Central Strait nearshore within Clallam County and the City of Port Angeles, consider expanding the effort to other shorelines within the Strait Action Area and North Olympic Peninsula. This action is one of a number of efforts to coordinate implementation of shoreline master programs among local governments within the Strait Action Area.
- B.1.2 STRT25 Identify implementation priorities for the adopted update of the Clallam County Shoreline Master Program.** Following adoption of Clallam County’s Shoreline Master Program update, identify implementation priorities, such as improved mapping capabilities to identify and monitor functions of vulnerable shorelines, an effective shoreline landowner outreach program, etc.
- B.1.2 STRT26 Develop a monitoring and adaptive management strategy for the adopted update of the Clallam County Shoreline Master Program, one that’s based on the no net loss indicators.** Following adoption of Clallam County’s Shoreline Master Program update, develop a monitoring and adaptive management strategy that’s based on the no net loss indicators developed by the Enhanced Shoreline Protection project.
- B.1.2 WC2 West Sound Shoreline Master Program update alternatives to shoreline armoring.** During the Shoreline Master Program update process for all West Central jurisdictions, the West Sound Watersheds Council will ensure that restoration plans for every Shoreline Master Program include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring.
- 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, Growth Management Act, and the State Environmental Protection Act. At the federal level, these regulations include the Clean Water Act, The Endangered Species Act, the Coastal Zone Management Act, and others.

The Hydraulic Code administered by WDFW and the Shoreline Management Act administered by Ecology are the two principal state regulatory authorities for shoreline armoring in Washington State. Recent data based on the Hydraulic Project Approval program issued by WDFW indicate that construction of bulkheads (i.e., shoreline armoring) in Puget Sound is occurring at a steady net increase above the rate of removal. 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 Hydraulic Project Approval 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 5 years. Under the current regulations, protection of personal property will continue to supersede protection of shoreline processes and function along marine shorelines. WDFW is currently proposing changes to the hydraulic code rules to incorporate up-to-date fish science, simplify permitting, improve procedures, and establish a structure for adaptive management³.

Comprehensive updates of local SMPs were required of all Puget Sound jurisdictions by 2012. New shoreline rules, based on the Shoreline Management Act and 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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.1.3.1 HPA capacity effectiveness.** Improve Hydraulic Project Approval Compliance and Effectiveness for water crossing structures and marine shoreline armoring.
- B.1.3.2 Hydraulic code rules revision.** WDFW will use best available science to revise Hydraulic Code Rules (220-110 WAC) and clarify conditions under which hydraulic projects must be conducted to prevent or mitigate the impacts to fish life and habitat.
- B.1.3 ISL2 Develop technical guidance document and trainings for residents on new Shoreline Master Program guidelines.**
- B.1.3 SJ19 Increase use of BMPs, reduce shoreline armoring, and increase vegetative cover by making information and assistance available to landowners, contractors and consultants (Near Term Shoreline Action I).**
- B.1.3 STRT18 Provide shoreline education, training, and technical assistance in Jefferson County and City of Port Townsend through implementation of Phase 2 of SquareONE (formally called Watershed Stewardship Resource Center).** Consider expansion of the SquareONE concept to the other three local jurisdictions within the Strait Action Area.

Following lessons learned from the SquareONE pilot project in Jefferson County; consider implementing Phase 2 to include the City of Port Townsend. Also, consider

³ Additional information on WDFW changes to hydraulic code rules can be accessed via: <http://wdfw.wa.gov/licensing/hpa/rulemaking>.

possible expansion of the concept to the other three local jurisdictions within the Strait Action Area. This action is one of a number of efforts to coordinate implementation of shoreline master programs among local governments within the Strait Action Area.

(Note: This action has a double benefit in that it is also a part of C2.5 STRT31.)

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 *2011 Puget Sound Science Update*, have pointed to particular stressors or pressures that need to be addressed in order to recover ecosystem health (Puget Sound Partnership 2011a)⁴.

Salmon recovery nearshore and estuary projects are listed in sub-strategy A6.1 as part of the salmon recovery 3-year work plans for the watersheds, as well as several Soundwide actions.

OCEAN ACIDIFICATION

As identified in *Ocean Acidification: From Knowledge to Action, Washington State’s Strategic Response* (Washington State Blue Ribbon Panel on Ocean Acidification 2012), there is mounting evidence that aquatic plants and algae, including seagrasses and kelp, can increase the pH of seawater by absorbing carbon dioxide from surrounding waters. There is also evidence that seagrasses and kelp can remove carbon from the atmosphere by sequestering carbon, mostly in the sediments beneath them. Protecting, preserving, and where possible, restoring native seagrass and kelp habitat is an important means of remediating local acidification and protecting those nearshore and estuary habitats that provide refuge to organisms that are vulnerable to ocean acidification, such as shellfish.

One of the Blue Ribbon Panel’s recommendations includes enhancing the resilience of native and cultivated shellfish populations and the ecosystems on which they depend by restoring and enhancing seagrasses and kelp. The Action Agenda strategies for protecting and restoring nearshore and estuary ecosystems help to implement the Blue Ribbon Panel’s recommendations.

⁴ **The Encyclopedia of Puget Sound** builds on and replaces the *2011 Puget Sound Science Update* as the forum for and description of the state of the science of Puget Sound ecosystem recovery. It can be accessed via <http://www.eopugetsound.org/science-review>.

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 sub-strategy 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 sub-strategy 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 leak toxics such as polycyclic aromatic hydrocarbons and copper arsenate compounds.

SALMON RECOVERY PLAN PRIORITY: PROTECT AND RESTORE NEARSHORE AND MARINE HABITAT

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 Puget Sound Nearshore Ecosystem Restoration Project information for selecting areas of focus rather than the Recovery Plan. While these two approaches are connected, continued effort is needed to maintain the connection and strengths of each as identified in sub-strategy B1.1.

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 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, 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 Activities

- 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 and/or other covered habitats and species.

Near-Term Actions

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.2.1.1** **Protect 10% of bluff-backed beaches.** PSP will promote acquisitions, easements, or other protective covenants to permanently protect at least 10% of bluff-backed beaches with high sediment supply or other priority nearshore habitats facing potential shoreline development pressure.
- B.2.1.2** **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.
- B.2.1.3** **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.
- B.2.1 SS18** **McNeil Island long-term conservation and low-impact public access.** Track state efforts to determine the long-term management strategy of McNeil Island. Support protection and restoration of habitat and natural resources of the island for low-impact public access.

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 those listed below.

- 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, Corps)
- Congressional appropriations or authorizations
- Non-governmental organizations (e.g., Puget Sound Restoration Fund, Northwest Straits Initiative)

Prioritization of restoration projects in Puget Sound occurs at multiple levels as described in sub-strategy B1.1. These efforts include the Puget Sound Nearshore Ecosystem Restoration Project at the Soundwide scale, cities and counties through shoreline management plan 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 Corps 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.

SALMON RECOVERY PLAN PRIORITY: MARINE AND NEARSHORE HABITAT RESTORATION

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 3-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 and actions incorporate the actions in the 3-year work plans as part of what is needed to recover the Puget Sound. From a salmon recovery perspective, derelict vessel and creosote log removal are lower priorities and should be sequenced as later actions.

Ongoing Programs

The Puget Sound Nearshore Ecosystem Restoration Project effort described in sub-strategy B1.1 will include a recommendation to Congress for a Water Resources Development Act authorization of a comprehensive plan to implement ecosystem restoration throughout the Puget Sound nearshore.

The Estuary and Salmon Restoration Program provides funding and technical assistance to restore Puget Sound. It was established by the Legislature in 2006 and is implemented by WDFW. The goal of the

program is to use the science-driven strategies of the Puget Sound Nearshore Ecosystem Restoration Project 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 benefit 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 leak 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 Beach Watchers, and local parks staff have inventoried and removed creosote-treated material from Puget Sound beaches and overwater structures.

The salmon recovery watershed 3-year work plans and related funding described in sub-strategy A6.1 include nearshore and estuary restoration projects.

Key Ongoing Program Activities

- DNR, in collaboration with 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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

B.2.2.1 Implementation of projects identified by Puget Sound Nearshore Estuarine Restoration Program. WDFW and the Corps will advance implementation of projects

identified by Puget Sound Nearshore Ecosystem Restoration Project, 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.

- B.2.2.2 Washington State Parks nearshore restoration.** Washington State Parks will identify opportunities to provide nearshore restoration. Based on this assessment, Washington State Parks will refine its performance measures for this action including setting semi-annual estimates of the numbers of projects to be restored. Washington State Parks will restore nearshore habitat identified, including removal of hard armoring at state parks.
- B.2.2.3 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.
- B.2.2.4 Creosote piling inventory and removal.** DNR will complete a derelict creosote piling inventory of Puget Sound. DNR has removed 10,000 pilings since 2007, prioritizing removals near important herring spawning beds.
- B.2.2 SS8 Johns Creek (Bayshore) Estuary restoration.** Restore John’s Creek (Bayshore) Estuary, a Puget Sound Nearshore Estuarine Restoration Program project.
- B.2.2 SS9 Deschutes River estuary restoration.** Remove the 5th Avenue dam and restore 346 acres of estuarine and intertidal habitat. The project was recommended by the Capitol Lake Adaptive Management Plan steering committee and is a WRIA 13 Lead Entity and Puget Sound Nearshore Estuarine Restoration Program priority project.
- B.2.2 SS10 Sequelitchew Creek restoration.** Restore Sequelitchew Creek, a Puget Sound Nearshore Estuarine Restoration Program project.
- B.2.2 SS11 Chambers Bay estuarine and riparian enhancement project.** Enhance estuarine habitat structure, increase salt marsh, and restore marine riparian habitat within and around Chambers Bay, a Puget Sound Nearshore Estuarine Restoration Program project. These actions will improve shallow-water refuge, increase foraging opportunity, and improve rearing capacity of the shoreline for salmon, particularly early life stages of Chinook, chum and pink salmon.
- B.2.2 WC19 Point No Point Marsh restoration.** Pending the results of a feasibility study in progress, Kitsap Surface and Stormwater Management, WDFW, and the West Central LIO will design and construct a replacement tidegate at Point No Point State Park by December 31, 2014. The goal is restoration of tidal hydrology and fish passage at a regionally important location for salmon recovery.
- B.2.2 WC20 Waterfront Park bulkhead removal and conveyance retrofit.** With a goal of enhancing nearshore habitat through armoring removal and beach nourishment, the City of Bainbridge Island will complete a bulkhead removal, beach nourishment, and stormwater conveyance system retrofit. Funding has been secured for initial design work, community outreach, and armoring removal and beach nourishment, and funds

necessary to complete stormwater conveyance system retrofit work will be sought. All proposed project work must occur simultaneously in order to minimize project costs and maximize ecological outcomes.

B.2.2 WH7 Waterfront and estuary habitat connectivity projects. Implement restoration projects, and protect marine shorelines through stewardship projects.

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 1 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 near-term actions) are consistent with *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (Washington State Department of Ecology 2012a), 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 Shoreline Management Act 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, the EPA, under the Puget Sound Watershed Management Assistance Program, awarded the City of Seattle a 4-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 piloted Green Shores for Homes credits and locally developed incentives on Lake Washington. San Juan County partnered and piloted Green Shores for Homes in marine coastal

locations. The Islands Trust, a federation of local governments within the British Columbia Gulf Islands, also joined this initiative as a transboundary partner and Washington Sea Grant also partnered and coordinated in the effort. The goal of simultaneously implementing Green Shores for Homes in British Columbia and Washington, as well as in urban freshwater and rural marine shorelines, was 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 the development of incentives with the goal of inviting homeowners in the areas classified as amendable to the Green Shores for Homes approach, and encourage them to participate.

Near-Term Actions

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.2.3 ISL4** **Decrease the use of shoreline armor, or in those instances where armor is absolutely necessary, increase the utilization of soft shore protection to address shoreline protection concerns.** This effort will address two target audiences, Island County permitting staff and shoreline property owners. Education, outreach, and behavior change strategies will be used. Island County will engage its permitting staff and shoreline property owners in an extensive education and outreach campaign to meet its target of decreasing the use of shore armor and soft shore protection. The campaign will utilize appropriate behavior change strategies and technical/scientific data to support changes within the community. Island County will seek funding to provide technical assistance to landowners and to monitor program effectiveness.
- B.2.3 ISL5** **Remove hard shore armor and, where feasible, replace with soft shore protection where erosion control is needed to protect houses.** Develop a program for education and behavior change on shoreline armoring in Island County. Social marketing will be applied to program development. Financial incentives (e.g., free site visits from experts, and grants for cost share, design, permitting) will be offered to implement armor removal and possibly install soft shore protection. This program will include monitoring beach ecosystem health on removal and conversion projects (from hard shore to soft shore) to provide justification.
- B.2.3 SJ11** **Continue to develop a voluntary program providing alternatives and incentives for best management practices to avoid hard armoring and to maintain native vegetation (Near Term Shoreline Action III).**

B2.4 Implement a coordinated strategy to achieve the 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 eelgrass recovery target (increase eelgrass area by 20% by 2020). Annual Soundwide estimates will be produced within 1 year of sampling in order to ensure 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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

B.2.4.1 Eelgrass recovery target strategy. DNR, working in collaboration with PSP, will convene partners in state and local government, Tribes, the federal agencies, British Columbia, and non-governmental and business groups to develop a broad-based strategy to achieve the 2020 eelgrass recovery target and track progress.

B.2.4.2 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.

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 near-term action, the Legislature convened an 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 non-governmental organizations 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 WDFW (Van Cleve et al. 2009).

Near-Term Actions

The near-term actions⁵ identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

B.3.1.2 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.

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 and NOAA to work full-time to essentially rid Puget Sound of derelict commercial fishing nets, which had been accumulating for decades. As of August 1, 2013, the Northwest Straits Initiative has removed 4,437 derelict fishing nets and 2,765 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 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

⁵ Gaps in numbering reflect near-term actions that have been completed or otherwise retired.

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 expectations for derelict vessel removals annually and will apply United States Coast Guard Large Derelict Vessel Task Force recommendations to Puget Sound within 1 year of recommendations being issued.

Near-Term Actions

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.3.2.1 Legacy net removal.** The Northwest Straits Foundation will work with WDFW, tribes, fishers and others to remove approximately 500 known remaining legacy nets in shallow sub-tidal waters. Original milestones (1 through 3) were met; however more nets were found. As a result, an additional milestone was added.
- B.3.2.2 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. To date, approximately 204 nets are known to exist in Puget Sound in waters deeper than 105 feet. These nets may be degrading important habitat for listed rockfish species. Pilot removal operations will focus on concentrations of known deepwater nets in documented rockfish habitat in the San Juan Islands.
- B.3.2.3 Derelict fishing net reporting, response and retrieval program.** The Northwest Straits Foundation will coordinate with WDFW and tribes to maintain a program to encourage reporting of newly lost fishing nets, respond promptly to all reported lost nets, and retrieve lost nets.

Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, a number of ideas for future work 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 the following.

- Whether or not we have effective statutory and regulatory tools in place to meet the shoreline armoring recovery 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: Shoreline Armoring

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

Recovery Target

- From 2011 to 2020, the total amount of armoring removed should be greater than the total amount of new armoring in Puget Sound (total miles removed is greater than total miles added).

Relevant Strategies (and Sub-Strategies)

Protect and restore nearshore and estuary ecosystems.

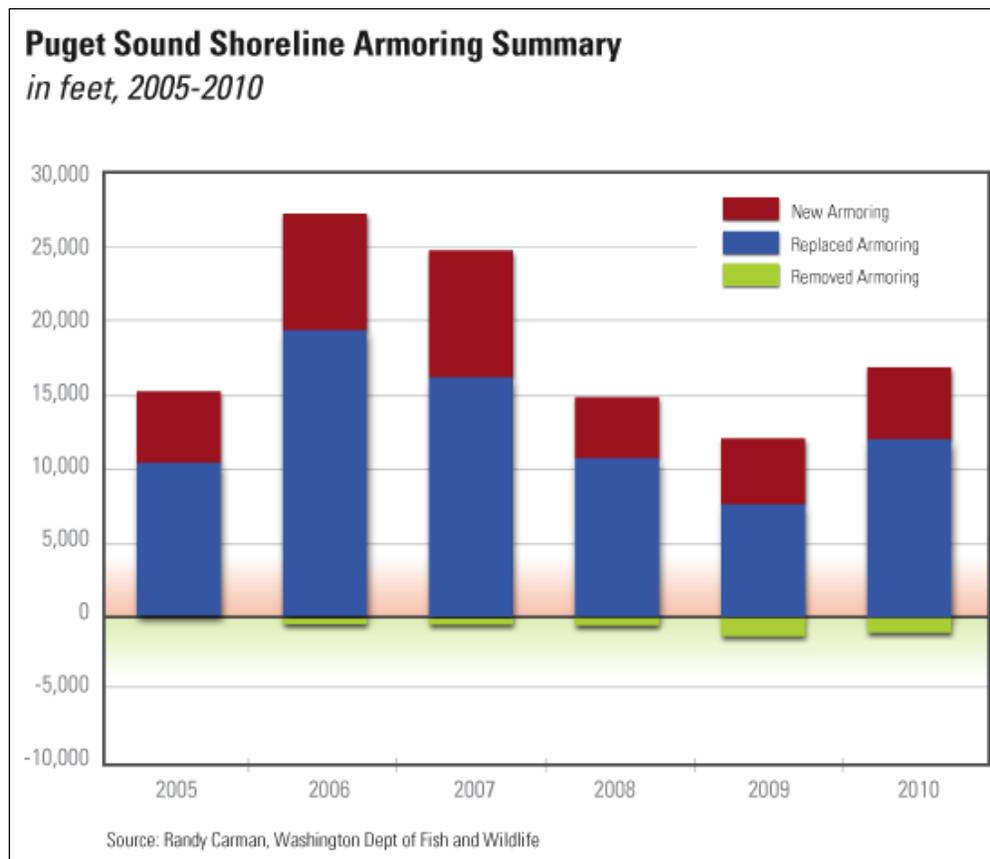
- B2.1. Permanently protect priority nearshore physical and ecological processes and habitat.
- B2.2. Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands.
- B2.3. Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment.

Focus land development away from ecologically important and sensitive areas.

- A1.3. Improve local government ability to implement plans, regulations, and permits consistent with Puget Sound recovery.
- A1.4. Ensure full, effective compensatory mitigation for impacts that cannot be avoided.
- A6.1. Implement high priority projects in 3-year work plans.
- A6.5. Maintain and enhance the community infrastructure that supports salmon recovery.

- B1.1. Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels.
- 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.
- B1.3. Improve, strengthen, streamline implementation and enforcement to protect marine and nearshore ecosystems and estuaries.
 - B4.2. Increase access to Puget Sound.

Figure C-6 (Appendix C, *Results Chains*) depicts how the strategies (and related sub-strategies) contribute to achieving the shoreline armoring recovery target. Appendix C also contains a results chain for each individual strategy in the Action Agenda, showing how that strategy (and its related sub-strategies) reduces pressures and contributes to achieving numerous recovery targets.

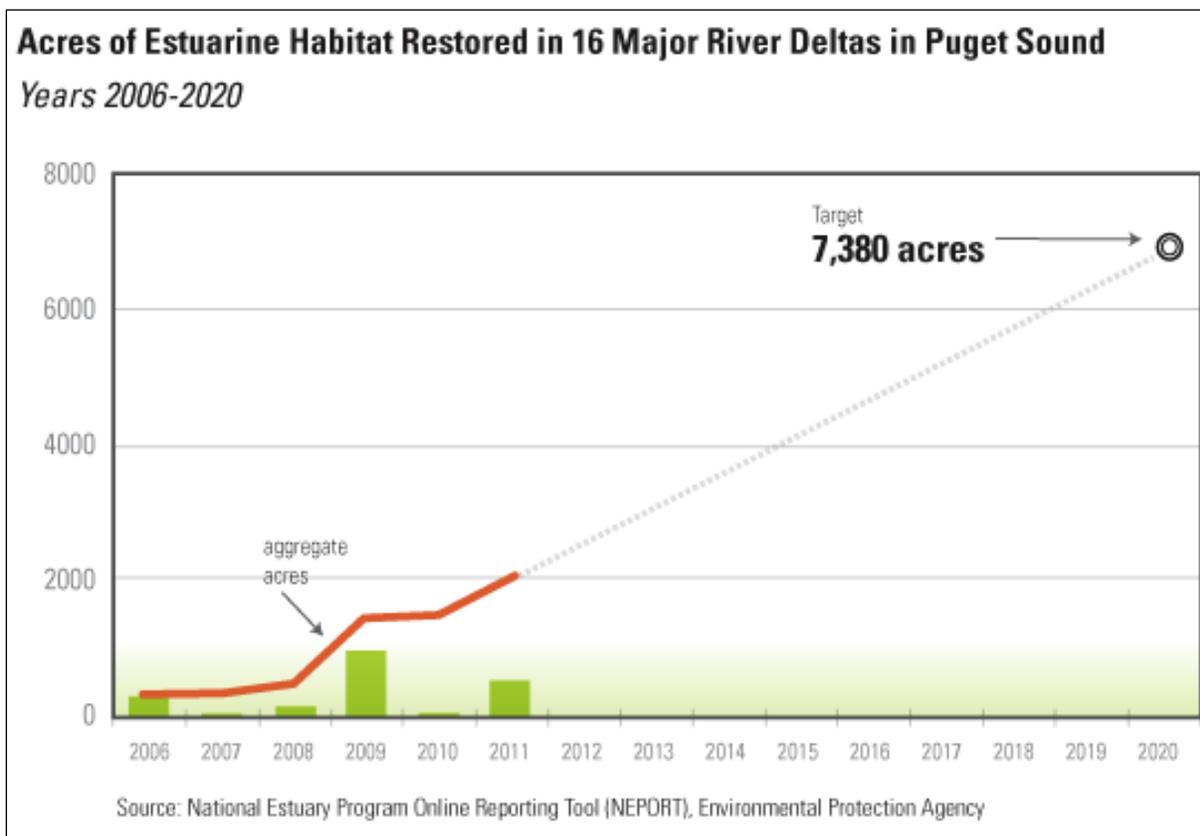


Target View: Estuaries

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 graph below depicts acres of estuarine habitat restored in major Puget Sound river deltas. The 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 recovery 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.



Recovery Target

- 7,380 quality acres of estuarine wetlands are restored basin-wide, which is 20% of the total estimated restoration needed.
- By 2020, all Chinook natal river deltas meet 10-year salmon recovery goals (or 10% of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans).

Relevant Strategies (and Sub-Strategies)

- A1.3. Improve, strengthen and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets.
- A4.2. Provide infrastructure and incentives to accommodate new and re-development within urban growth areas.
- A5.3. Protect and maintain intact and functional floodplains.
- B1. Focus development away from ecologically important and sensitive nearshore areas and estuaries. (B1.2, B1.3)
- B2.2. Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands.
- 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.
- B5. Prevent and respond to the introduction of terrestrial and aquatic invasive species. (B5.3, B5.4)

Figure C-7 (Appendix C, *Results Chains*) depicts how the strategies (and related sub-strategies) contribute to reducing pressures on estuaries and achieving the estuaries recovery target. Appendix C also contains a results chain for each individual strategy in the Action Agenda, showing how that strategy (and its related sub-strategies) reduces pressures and contributes to achieving numerous recovery targets.

Working Waterfronts and Public Access

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 Puget 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 a Changing Climate: Washington State's Integrated Climate Response Strategy* (Washington State Department of Ecology 2012a), "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 high-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.

Recovery Targets

The strategies and actions in this section will contribute to achieving the recovery targets listed below with their associated vital signs and indicators.

Vital Sign	Indicator	Recovery Target(s)
Toxics in fish	Levels of four types of toxic contaminants in fish: polychlorinated biphenyls, flame retardants, hydrocarbons, and endocrine-disrupting compounds	By 2020, contaminant levels in fish will be below health effects thresholds (i.e., levels considered harmful to fish health or harmful to the health of people who consume them).
	Levels of contaminant-related disease in fish	By 2020, contaminant-related disease or impairments in fish are reduced to background levels.
Marine sediment quality	Sediment Chemistry Index	By 2020, all Puget Sound regions and bays achieve chemistry measures reflecting minimum exposure with Sediment Chemistry Index scores >93.3.
	Sediment Quality Standards	Have no sediment chemistry measurements exceeding the Sediment Quality Standards set for Washington State.
	Sediment Quality Triad Index	All Puget Sound regions and bays, as characterized by ambient monitoring, achieve the following: Sediment Triad Index scores reflect unimpacted conditions (i.e., SQT values >81).
Shoreline armoring	Net amount of shoreline armoring	From 2011 to 2020, the total amount of armoring removed should be greater than the total amount of new armoring in Puget Sound (total miles removed is greater than total miles added).

Local Priorities

No LIOs identified near-term actions that address working waterfronts and public access.

Strategies and Actions

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 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, 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 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 (Senate Bill [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 is viewable at Ecology’s website.⁶ Ecology will focus efforts on 12 priority cleanup and habitat restoration projects in Bellingham Bay. Current projections are that all the sites will be cleaned up or in progress by 2016.
- EPA released its feasibility study for the Elliott Bay/Lower Duwamish cleanup October 31, 2012.⁷
- Ecology will focus efforts on continuing to control pollutant sources and remediate toxics in the Lower Duwamish and East Waterway.
- 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.⁸
- 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% 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 Pollutant Discharge Elimination System (NPDES) Industrial Stormwater permit will comply with the permit’s benchmarks and stormwater pollution prevention plan requirements.

Other ongoing activities and near-term actions related to working waterfronts are described under strategies C1 and C9.

⁶ www.ecy.wa.gov/programs/tcp/sites_brochure/blhm_bay/blhm_bay.htm

⁷ Executive summary for the final feasibility study is available here:
www.epa.gov/region10/pdf/sites/ldw/fs13/final_fs_executive_summary_103112.pdf

⁸ www.ecy.wa.gov/programs/tcp/sites_brochure/psi/portAngeles/psi_portAngeles_bay.html

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 strategy 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 the *Marine Spatial Planning in Washington: Final Report and Recommendations of the State Ocean Caucus to the Washington State Legislature* (Washington State Department of Ecology 2011a), 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 a Changing Climate: Washington State's Integrated Climate Response Strategy* (Washington State Department of Ecology 2012a) 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 Atlas⁹, and the Trust for Public Lands has done additional analysis to map and evaluate public access to Puget Sound.

In June 2012, the Partnership launched a mobile application (Go2Beach) and website to disseminate maps, descriptions, and directions to all publicly owned shorelines, to make this information more accessible and easier to use.¹⁰

⁹ <https://fortress.wa.gov/ecy/coastalatlas/>

¹⁰ <http://www.rco.wa.gov/recreation/>

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 SMPs require consideration of public access to Puget Sound shorelines as part of local SMP updates, and agencies, such as State Parks and WDFW, provide and maintain both shoreline and marine access points.

Near-Term Actions

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.4.2.1 Washington State Parks interpretive experiences.** Increase passive, active and virtual interpretive experiences on Puget Sound ecology, threats, vital signs, and recovery actions at Washington 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.

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 2012/2013 Action Agenda and can be followed up on and considered for the next substantive update to the Action Agenda planned for 2016. These include the following.

- 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, Marine Science and Technology 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.

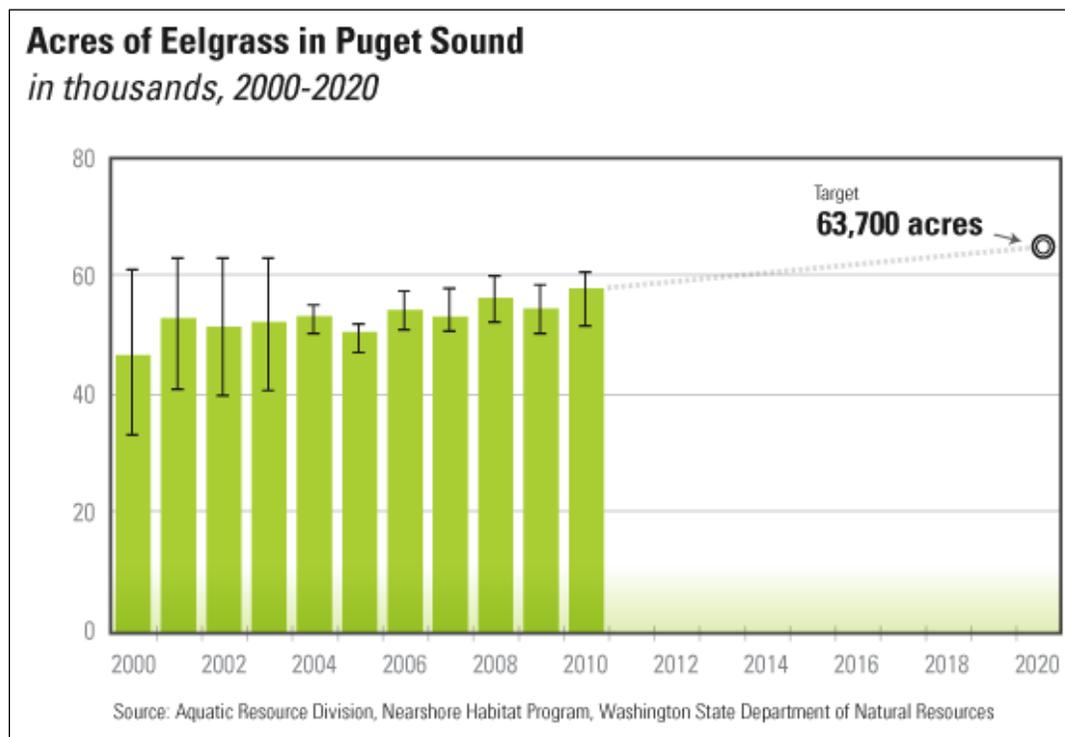
Target View: Eelgrass

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 graph below shows acres of eelgrass in Puget Sound. The black bars represent the margin of error for the estimated acreage, showing the uppermost and lowermost potential value for each year. The target shown in the graph (63,700 acres by 2020) is equivalent to the percentage increase described in the target below. In 2004, DNR modified its survey methodology and the precision of the estimates improved.



Recovery Target

- A 20% increase in the area of eelgrass in Puget Sound relative to the 2000–2008 baseline reference by 2020.

Relevant Strategies (and Sub-Strategies)

- B1.1. Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels.
- B2.1. Permanently protect priority nearshore physical and ecological processes and habitat.
- B2.4. Implement a coordinated strategy to achieve the eelgrass recovery target.
- 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.
- C8. Effectively prevent, plan for and respond to oil spills. (C8.1, C8.2, C8.3)

Figure C-8 (Appendix C, *Results Chains*) depicts how the strategies (and related sub-strategies) contribute to reducing pressures on eelgrass and achieving the eelgrass recovery target. Appendix C also contains a results chain for each individual strategy in the Action Agenda, showing how that strategy (and its related sub-strategies) reduces pressures and contributes to achieving numerous recovery targets.

Native 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. 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* (Washington State Department of Ecology 2012a) 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's climate 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 actions in this section are similar to those in the state's climate response strategy and will help minimize impacts of climate change in Puget Sound.

Recovery Targets

The strategies and actions in this section will contribute to achieving the recovery targets listed below with their associated vital signs and indicators.

Vital Sign	Indicator	Recovery Target(s)
Toxics in fish	Levels of four types of toxic contaminants in fish: polychlorinated biphenyls, flame retardants, hydrocarbons, and endocrine-disrupting compounds	By 2020, contaminant levels in fish will be below health effects thresholds (i.e., levels considered harmful to fish health or harmful to the health of people who consume them).
	Levels of contaminant-related disease in fish	By 2020, contaminant-related disease or impairments in fish are reduced to background levels.
Marine sediment quality	Sediment Chemistry Index	By 2020, all Puget Sound regions and bays achieve chemistry measures reflecting minimum exposure with Sediment Chemistry Index scores >93.3.
	Sediment Quality Standards	Have no sediment chemistry measurements exceeding the Sediment Quality Standards set for Washington State.
	Sediment Quality Triad Index	All Puget Sound regions and bays, as characterized by ambient monitoring, achieve the following: Sediment Triad Index scores reflect unimpacted conditions (i.e., SQTI values >81).
Shoreline armoring	Net amount of shoreline armoring	From 2011 to 2020, the total amount of armoring removed should be greater than the total amount of new armoring in Puget Sound (total miles removed is greater than total miles added).
Eelgrass	Eelgrass area	A 20% increase in the area of eelgrass in Puget Sound relative to the 2000–2008 baseline reference by 2020.
Orcas	Number of southern resident killer whales	By 2020, achieve an end-of-year census of 95 individual southern resident killer whales, which would represent a 1% annual average growth rate from 2010 to 2020.
Chinook salmon	Chinook salmon population abundance as measured by the number of natural origin adult fish returning to spawn	Stop the overall decline and start seeing improvements in wild Chinook abundance in two to four populations in each biogeographic region.
Pacific herring	Biomass of spawning Pacific herring	Increase the overall amount of spawning herring throughout Puget Sound to 19,380 tons. For each stock, the targets are: <ul style="list-style-type: none"> • Cherry Point: 5000 tons • Squaxin Pass: 880 tons • All other stocks: 13,500 tons

Local Priorities

LIOs identified near-term actions that address native species. These local actions are presented in the *Strategies and Actions* section along with Soundwide actions under the sub-strategy shaded below. The local action numbering contains the area abbreviation shown in parentheses after each LIO name. See Section 4, *Local Recovery Actions*, for detailed information about local planning.

Local Integrating Organization	Sub-Strategy			
	B5.1	B5.2	B5.3	B5.4
Hood Canal Coordinating Council (HC)				
Island (ISL)				
San Juan (SJI)				
Snohomish-Stillaguamish (SNST)				
South Central Caucus Group (SC)				
Alliance for a Healthy South Sound (SS)				
Strait ERN (STRT)				
West Central (WC)				
Whatcom (WH)				

Strategies and Actions

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 the following.

- Fisher (Hayes and Lewis 2006)
- Marbled murrelet (U.S. Fish and Wildlife Service 1997)
- Northern spotted owl (U.S. Fish and Wildlife Service 2010)
- Western gray squirrel (Linders and Stinson 2007)
- Streaked horned lark (Pearson and Altman 2005)

Existing freshwater species recovery plans include the following.

- Oregon Spotted Frog¹¹

¹¹ <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=D02A>

- Western pond turtle (Hays et al. 1999)

Existing marine species recovery plans include the following.

- Puget Sound Chinook salmon (National Marine Fisheries Service 2007)
- Hood Canal and Eastern Strait of Juan de Fuca summer-run chum (Hood Canal Coordinating Council 2005).
- Sea otter (Lance et al. 2004)
- Southern resident killer whale (National Marine Fisheries Service 2008)
- Puget Sound rockfish (a conservation plan; Washington Department of Fish and Wildlife 2011)

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.¹²

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 USFWS is the lead federal agency for protecting and restoring biodiversity in Puget Sound, and has jurisdiction under the Endangered Species Act 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.

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, the following.

- 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 USFWS may require.

¹² http://wdfw.wa.gov/conservation/phs/mgmt_recommendations

- Both the USFWS and NOAA prioritize restoration actions within plans.

At the state level, WDFW conserves and protects native fish and wildlife through the following actions.

- 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, 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 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 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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

B.5.1.1 **Develop and implement species plans.** Develop (where necessary) and implement actionable plans for imperiled Puget Sound species.

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 those listed below.

- 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 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 Council¹³ (2004–2010) created a comprehensive framework for securing Washington State’s biodiversity, the Washington Biodiversity Conservation Strategy (Washington Biodiversity Council 2007). 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 Program¹⁴ 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 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 program¹⁵ 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 or the NRCS (e.g., the Conservation Reserve Program and Environmental Quality Incentives Program). 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 communities¹⁶ and forest stewardship assistance¹⁷ to non-industrial private landowners as well as technical assistance on leases of state-owned aquatic lands¹⁸.

¹³ http://www.rco.wa.gov/biodiversity/about_the_council.shtml

¹⁴ <http://wdfw.wa.gov/conservation/phs/>

¹⁵ http://wdfw.wa.gov/hunting/hunting_access/private_land/landowners.html

¹⁶ http://www.dnr.wa.gov/researchscience/topics/urbanforestry/pages/rp_urban_commandurbanforestry.aspx

¹⁷ http://www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/forest_stewardship_program.aspx

¹⁸ http://www.dnr.wa.gov/businesspermits/topics/shellfishaquaticleasing/pages/aqr_aquatic_land_leasing.aspx

- **Financial and technical assistance** includes the following.
 - 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. WDFW 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 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 Local Habitat Assessment 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 Watershed Characterization.** The Local Habitat Assessment method is being integrated into a Puget Sound Watershed 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 among Ecology, WDFW, and the 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 the Partnership's *Puget Sound Vital Sound* online tool. 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 Washington¹⁹ 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

¹⁹ <http://www.landscape.org/washington/>

address the primary needs that planners identified: resources, guidance documents, case studies, policy language, data and maps, and training and conferences.

- Commerce’s 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 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 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 gain an understanding of invasive species presence and extent in Puget Sound terrestrial and aquatic ecosystems; prevent the introduction of new high-priority, high-risk invasive species to these ecosystems; rapidly respond when new priority invasive species are detected; stop invasive species already here from spreading to other locations; and 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 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. 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.
- 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 EPA's Vessel General Permit for managing incidental discharges from the normal operation of vessels.
- Washington State Department of Transportation (WSDOT) 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 FY 2010–2011.

- **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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.5.3.1 Invasive species baseline assessment.** Washington 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.
- B.5.3.2 Invasive species early detection and monitoring.** Washington 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.
- B.5.3.3 Managing invasive species on/in boats and ships.** Prepare implementable recommendations for managing invasive species transported in the hulls of commercial watercraft by developing a 5-year (2015–2020) state ballast water management plan.
- B.5.3.4 Ballast water treatment effectiveness.** 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.

- B.5.3.5 Zebra/quagga mussel and New Zealand mud snail plans.** 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.
- B.5.3.6 Invasive species baseline assessment.** Washington Invasive Species Council, in consultation with WSDA, will expand its baseline assessment to include the last remaining 20 priority invasive species. The assessment provides locations of species, details about management programs, and identifies gaps that exist.
- B.5.3.7 State ballast water management.** Support effectiveness of state ballast water management by developing a Memorandum of Agreement with the U.S. Coast Guard and EPA for cooperative state/federal management of ballast water.
- B.5.3 ISL11 Implement a noxious and invasive weed eradication program.**
- B.5.3 SNST12 Riparian corridor knotweed control.** Program leads will be divided among basins: Stillaguamish—Stillaguamish Tribe and Snohomish County; Skykomish/Snohomish—Tulalip Tribes and Snohomish County; Snoqualmie—Snoqualmie Tribe and King County. Leads will work to vet methods and strategies, and develop control and elimination plans, and monitoring programs.
- B.5.3 WH6 Implement and expand the noxious weed eradication program.** The Noxious Weed Board has implemented a program in Whatcom County to remove knotweed from the Nooksack Forks and spartina species from marine intertidal areas including the Nooksack and Lummi River deltas. Long term surveys and continued annual removal/treatment is necessary to prevent the establishment of spartina and to manage knotweed infestations.

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

The near-term actions identified for this sub-strategy are described below. Appendix D, *Near-Term Actions*, provides a consolidated table of all near-term actions, performance measures, and owners.

- B.5.4.1 Environmental and economic impact of invasive species.** 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.

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 Joint Aquatic Resource Permit Application review.
 - Increasing vessel inspections related to ballast water discharges.
 - Implementing recommendations from *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy*. This includes, but would not be limited to, the following.
 - 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.
-

Target View: Pacific Herring

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.

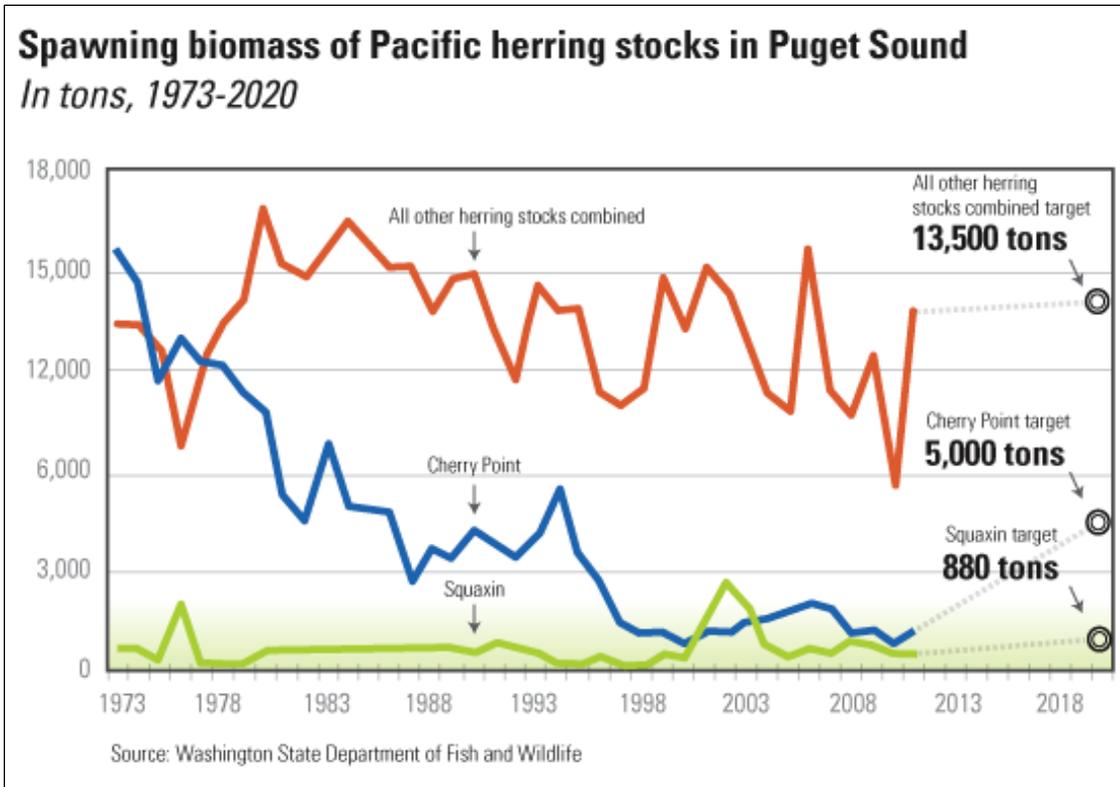
Herring are one of a number of small, schooling fish species called “forage fish” that are preyed upon by larger predators for food (other species include surf smelt, Pacific sand lance, and northern anchovy). The Partnership has focused on Pacific herring as a key sentinel for Puget Sound health. Herring 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% 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 polycyclic aromatic hydrocarbons (PAHs; see “Toxics in Fish”). In addition, levels of some types of contaminants, such as polychlorinated biphenyls (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 graph below 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.



Recovery Target

Increase the overall amount of spawning herring throughout Puget Sound to 19,380 tons. For each stock, the targets are:

- Cherry Point: 5,000 tons
- Squaxin Pass: 880 tons
- All other stocks: 13,500 tons

Relevant Strategies (and Sub-Strategies)

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

Figure C-9 (Appendix C, *Results Chains*) depicts how the strategies (and related sub-strategies) contribute to reducing pressures on Pacific herring and achieving the Pacific herring recovery target. Appendix C also contains a results chain for each individual strategy in the Action Agenda, showing how that strategy (and its related sub-strategies) reduces pressures and contributes to achieving numerous recovery targets.

Target View: Orcas

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 3 to 5 years between pregnancies. Also, about three orcas disappear from the population every year; generally their fates are unknown.

Recovery Target

By 2020, achieve an end-of-year census of 95 individual southern resident killer whales, which would represent a 1% annual average growth rate from 2010 to 2020.

Relevant Strategies (and Sub-Strategies)

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

Figure C-10 (Appendix C, *Results Chains*) depicts how the strategies (and related sub-strategies) contribute to reducing pressures on orcas and achieving the orcas recovery target. Appendix C also contains a results chain for each individual strategy in the Action Agenda, showing how that strategy (and its related sub-strategies) reduces pressures and contributes to achieving numerous recovery targets.