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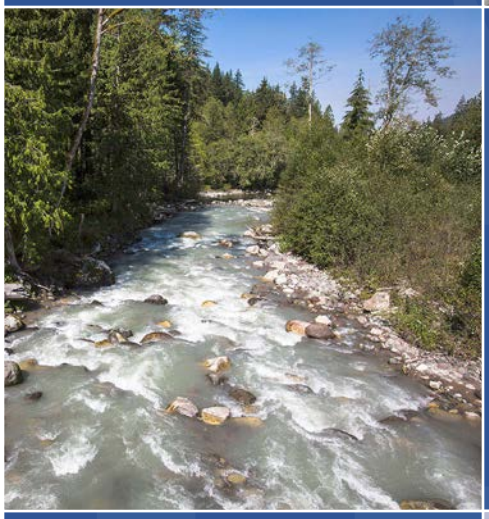
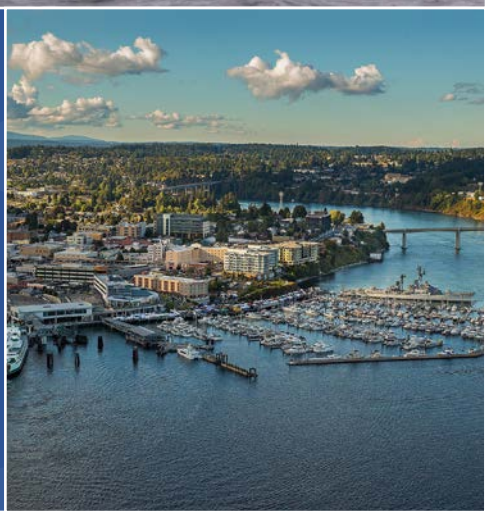
February 2021



EPA Geographic Funding at Work on Puget Sound Recovery

Prepared by:
U.S. Environmental Protection Agency
Region 10



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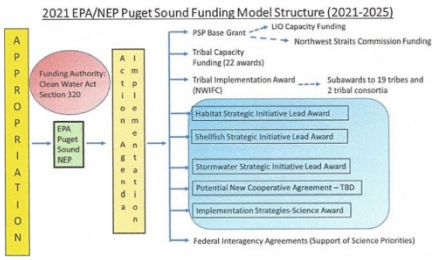
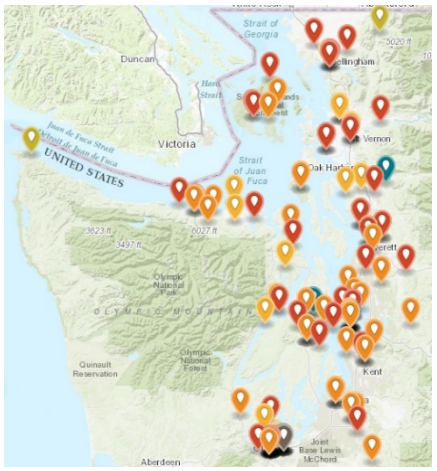




THE PUGET SOUND NEP ATLAS SHARES INFORMATION ABOUT EPA INVESTMENTS

Puget Sound is an economic and cultural engine for the region's more than 4.7 million people, including 19 federally recognized tribes. Federal support of Puget Sound recovery comes from many programs, most of which are administered by EPA, the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, U.S. Department of Interior, and the U.S. Army Corps of Engineers.

Since 2010, Congress has appropriated over $350 million in Clean Water Act Section 320 funds for Puget Sound. Under Section 320, EPA has provided National Estuary Program (NEP) and Geographic Program funding and support to help communities make on-the-ground improvements for clean and safe water, protected and restored habitat, thriving species, and a vibrant quality of life for all, while supporting local jobs.

EPA's work with the Puget Sound Partnership, state agencies, tribes and other partners has supported important gains in recovery. Results include, for example:

- comprehensive regional plans to restore the Sound,
- more than $1 billion leveraged for recovery,
- partnerships with 19 federally recognized tribes,
- transboundary collaboration with Canada,
- scientific gains on toxic effects of urban stormwater, and,
- since 2007, a net increase of harvestable shellfish beds

Looking ahead, EPA recognizes that more must be done to achieve a healthy Puget Sound. To achieve positive trends, EPA will continue to enhance Federal Task Force leadership, including a new Action Plan for 2022-2026; cooperation with Canada; fulfillment of National Estuary Program responsibilities, including the approval of a new comprehensive management plan for recovering Puget Sound (the Action Agenda); partnering with tribes; funding and grants, including managing and awarding up to $100 million in projects over the next five years; and scientific support.

The foundation is well-established, EPA is a vital partner, and, ultimately, success will depend on the passion and perseverance of the thousands of people who make up the collaborative effort to protect and restore Puget Sound.

Introduction

A northwest icon, Puget Sound is an economic and cultural engine for the region's more than 4.7 million people, including 19 federally recognized tribes. Puget Sound - ancestral home to tribes since time immemorial - has long been a hub of industry, a destination for tourists, a center for academics, and home to generations of loggers, fishers, shippers, artists, and other trailblazers.

Whether you're on Double Bluff Beach on Whidbey Island, Olympia's Percival Landing, the Deception Pass Bridge, or Seattle's Space Needle, you're presented with snow-capped, glaciated mountains draped in evergreens.

That snow, those trees, countless creeks and wetlands, the perennial rains, and, yes, the occasional sun shower continue to shape a remarkably diverse and productive ecosystem. This stunning natural environment provides critical habitat for fish, birds, and marine species, including many species of mammals such as harbor seals, porpoises, and the region's iconic Orcas.

All of this beauty and richness helps make this region one of the fastest growing in the nation.

How do we protect and restore Puget Sound in the face of such rapid growth? A good start is recognizing this region's collective sense of history, of culture, and of what we call "place." Many people are passionate about Puget Sound and ready to help protect the remaining healthy places and restore those where damage has occurred.

The U.S. Environmental Protection Agency and Congress recognize the unique natural, economic, and cultural value of Puget Sound. The significant environmental progress that National Estuary Program funds help deliver, in collaboration with our partners, is much-needed fuel for recovery of Puget Sound.

Joint state and federal restoration attempts began in earnest in the 1980s. Since then, EPA ecologists, engineers, biologists, and planners - in our offices in Seattle, Olympia, Washington, D.C., and our labs in Manchester and Corvallis - have worked hand-in-hand with our partners among federal agencies, tribes, state agencies, local governments, universities, businesses, and non-profits to support research and restoration projects throughout the Puget Sound watershed.

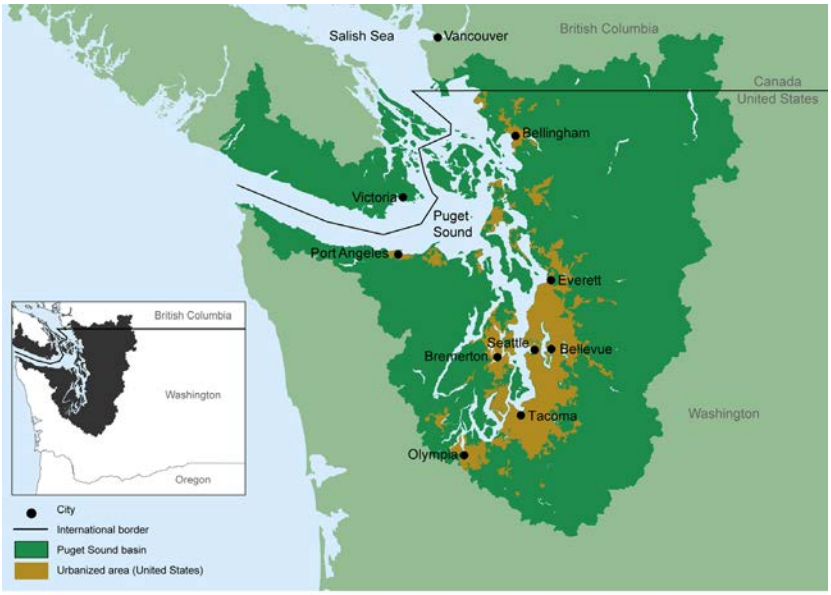
The work is complex and demanding. Together we are making progress. This report tells the story of EPA's recent work to seed and feed the protection and restoration of Puget Sound.

Purpose and Scope of this Document

This document presents an overview of EPA's work to protect and restore water quality and ecological integrity in Puget Sound. It includes information on funding, program accomplishments, and recent successes. By highlighting our work together, our aim is to provide decision-makers and the public an overall view of our program and to reinforce the importance of our collective efforts for recovery of one of the most important ecosystems in the country. Many thanks to our Puget Sound restoration partners for the pictures, figures, tables, and other information in this report. This report is not intended as a primary source or a formal financial report.

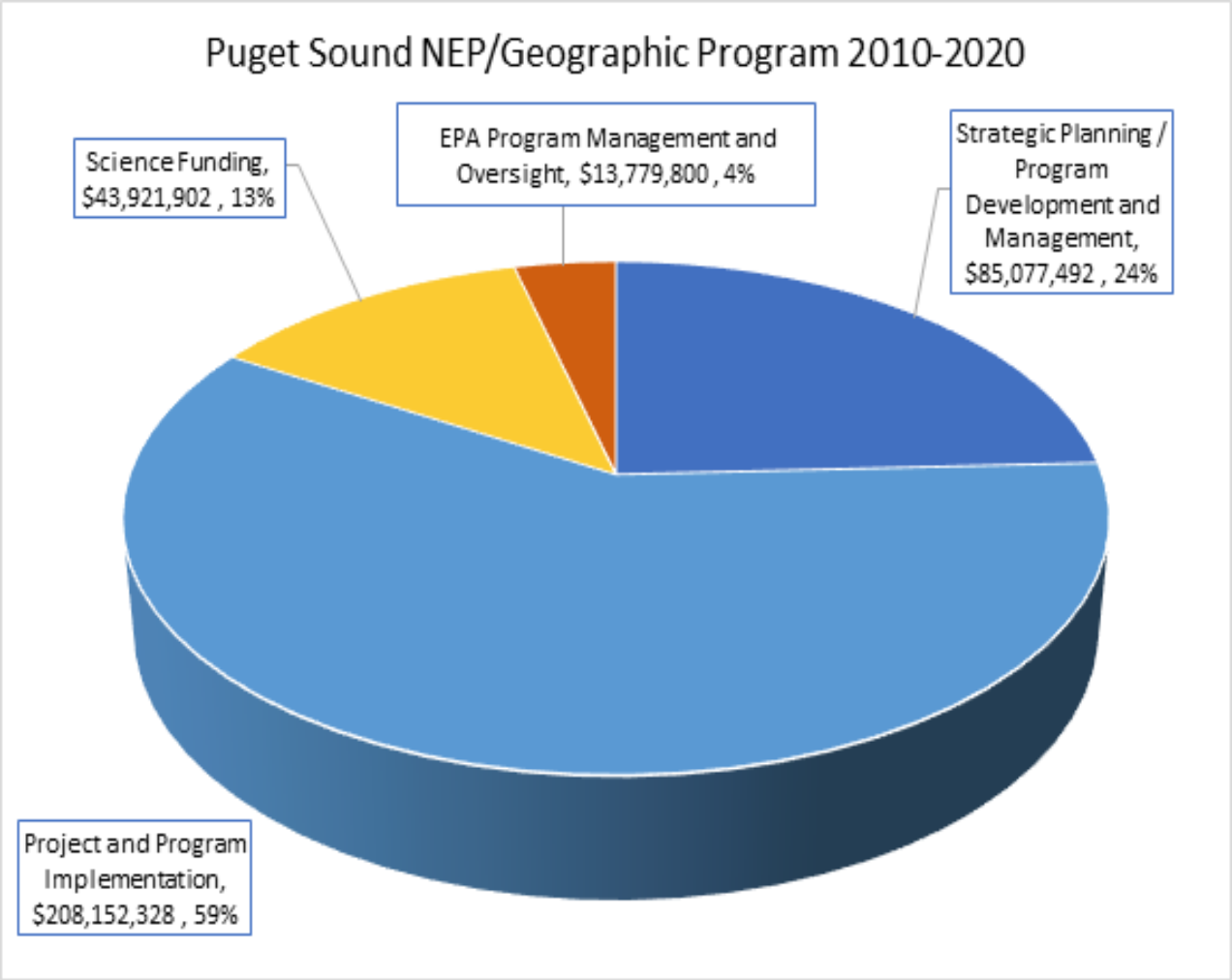
EPA Puget Sound Funding

Federal support of Puget Sound recovery comes from many programs, most of which are administered by EPA, the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, U.S. Department of Interior, and the U.S. Army Corps of Engineers.



Source: GAO analysis of data from the Department of Homeland Security, Puget Sound Partnership, U.S. Census Bureau, and U.S. Geological Survey; MapInfo. | GAO-18-453

Since 2010, Congress has appropriated over $350 million in Clean Water Act Section 320 funds for Puget Sound. Under Section 320, EPA has used National Estuary Program (NEP) and Geographic Program funding to help communities make on-the-ground improvements for stormwater, habitat, shellfish, flooding, water quality and quantity, and endangered species, while supporting local jobs.


Puget Sound NEP/Geographic Program 2010-2020
Science Funding, $43,921,902 , 13%
EPA Program Management and Oversight, $13,779,800 , 4%
Strategic Planning / Program Development and Management, $85,077,492 , 24%
Project and Program Implementation, $208,152,328 , 59%

Puget Sound NEP and Geographic Program Budget (2015-2019)

	2015	2016	2017	2018	2019
EPA NEP Base	$600,000	$600,000	$600,000	$600,000	$600,000
PSP Geographic	$5,592,800	$2,560,000	$2,941,000	$2,971,000	$3,054,229
PSP Implementation Strategies			$1,250,021	$1,815,857	$1,900,000
WA Dept of Ecology SIL		$5,200,000	$4,200,000	$4,200,000	$4,200,000
Ecology Watershed LO	$5,490,000				
Ecology Toxics/Nutrients LO	$2,655,000				
WA Dept of Health SIL		$5,000,000	$4,200,000	$4,200,000	$4,200,000
Health Pathogens LO	$2,675,000				
WA FWD and DNR SIL		$5,200,000	$4,900,000	$4,900,000	$4,859,771
WA FW Marine Nearshore LO	$2,681,000				
NWIFC	$2,490,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000
Tribal Organizational Capacity	$3,500,000	$3,700,000	$3,750,000	$3,697,963	$3,700,000
UW Puget Sound Institute	$488,232	$625,000			
Federal Interagency Agreements	$1,242,268	$541,032	$1,610,765	$946,935	$995,000
EPA Programmatic Contracts	$70,000	$0	$0	$91,764	$80,125
EPA Staff/Operations	$976,700	$1,027,968	$1,002,214	$1,039,481	$873,875
Total	**$28,461,000**	**$28,454,000**	**$28,454,000**	**$28,463,000**	**$28,463,000**

Highlights

Leveraging[1]

EPA's National Estuary Program dollars seed other state, federal, local, and private sources to fund the actions prioritized in the *Puget Sound Action Agenda*. We also work with the Puget Sound Partnership and the Strategic Initiative Leads to turn our NEP funds into hundreds of millions of dollars in additional support of Puget Sound recovery. For example, between 2014 and 2019, the Partnership played a primary role in leveraging an additional $412 million toward Action

[1] Puget Sound National Estuary Program 2020 Evaluation

Agenda implementation. During the same period, the Partnership worked with broader groups of partners in securing a further $703 million for work supportive of the Action Agenda. This included important infrastructure upgrades - committing a combined total of over $1.1 billion toward Puget Sound recovery over that time.

Investing in natural resources and water infrastructure creates jobs. In fact, according to a 2010 study on employment impacts of forest and watershed restoration in Oregon,[2] every $1 million spent on watershed restoration results in an average of 16.7 new or sustained jobs, and $2.2-$2.5 million in total economic activity. That means, for the 2014-2019 period, Puget Sound funding likely resulted in over 16,000 new or sustained jobs in the region.

These investments are a boon to local economies: 80 percent of funds invested in restoration projects stay in the county where the projects are located, providing needed economic and environmental benefits in more rural and financially distressed counties.

[2] Nielsen-Pincus and Moseley, 2010. Economic and Employment Impacts of Forest and Watershed Restoration in Oregon. University of Oregon: Ecosystem Workforce Program, Working Paper Number 24.

Puget Sound Federal Task Force

On September 30, 2016, nine federal agencies and cabinet departments signed a Memorandum of Understanding (MOU) creating the *Puget Sound Federal Task Force*. This was an update and renewal of an existing 2008 MOU. The signatories - with EPA's leadership as national co-chair with the White House Council on Environmental Quality and regional co-chair with NOAA Fisheries West Coast Region - developed a five-year Action Plan (FY2017-2021). This Action Plan provided a shared federal vision of a healthy and sustainable Puget Sound ecosystem and a blueprint for leveraging federal agencies and resources on a targeted suite of priorities.

Highlights

Shorelines Workgroup

The state/federal Shorelines Workgroup is exploring solutions for tackling barriers associated with the federal permitting process for habitat restoration and beach stabilization projects that include soft shore approaches. Out of this work, and as a directive under the Shoreline Armoring Implementation Strategy, a Multi-Agency Review Team (MART) was established in 2018 under an EPA Puget Sound grant. The MART seeks to pilot streamlined permitting approaches and promotion of marine habitat restoration projects. This work will increase certainty, improve the permitting process, and reduce costs for landowners while incentivizing fish friendly projects.

Mud Mountain Dam Fish Passage

The Army Corps of Engineers began the Mud Mountain Dam fish passage project in June of 2018. The project is designed for 95 percent survival of salmon smolts traveling downstream past the dam. Once completed, up to 60,000 fish, including ESA-listed species, will be moved upriver daily - making it the largest trap-and-haul facility in the country.

Native Olympia Oyster Seeds

The Puget Sound Restoration Fund and NOAA's Ken Chew Center produced over 4.9 million native Olympia oyster seeds. The seeds were spread at priority restoration sites, including Drayton Harbor, a newly reclassified upgraded shellfish growing area in northern Puget Sound.

Stormwater Research Collaborative - Reducing the Toxic Effects of Urban Stormwater

Urban stormwater runoff has become the foremost water quality threat to aquatic habitats in Puget Sound. Human population growth continues to drive development and land conversion in coastal watersheds. Increased development reduces opportunity for water to filter through vegetation and soils, increasing the loading of toxic chemicals in stormwater runoff and into Puget Sound. This can have extensive negative impacts on the health and survival of salmon, as well as the levels of contaminants in both freshwater and marine food webs.

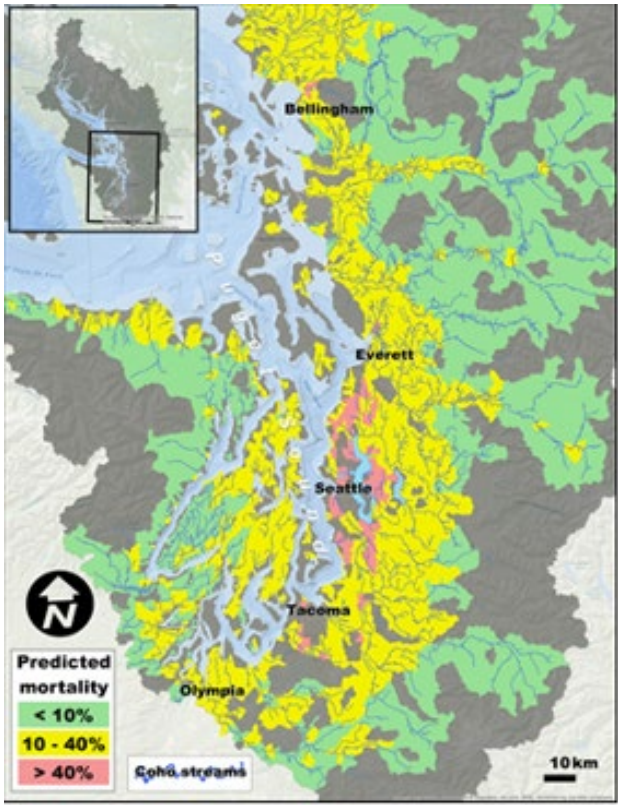
Over the last decade, EPA has supported a collaboration among National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and the Washington State Stormwater Center. The Puget Sound Stormwater Science Team (PSSST) consists of researchers and students from NOAA's Northwest Fisheries Science Center, USFWS, WFWO, WSU's Puyallup Research & Extension Center, and UW-Tacoma's Center for Urban Waters.

EPA-supported collaborative research on stormwater and toxics reduction strategies have shown that:

RAIN GARDENS AT THE WASHINGTON STORMWATER CENTER ON WSU'S PUYALLUP CAMPUS

MEMBERS OF THE PUGET SOUND STORMWATER SCIENCE TEAM TESTING A GREEN STORMWATER TECHNOLOGY: COMPOST-AMENDED BIOSWALES.

- Motor vehicles are major sources of toxic contaminants in roadway runoff routinely discharged to streams, rivers, lakes, and nearshore marine habitats;
- There are thousands of distinct chemicals in urban stormwater, and the toxicological impacts of most remain poorly understood;
- Coho salmon are sensitive to untreated stormwater, which consistently causes mass mortality events that vary in severity across a gradient of urbanization in Puget Sound;
- The urban mortality syndrome poses a threat to other threatened salmonid species, including Puget Sound steelhead;
- Toxic threats to aquatic habitats scale in proportion to pavement and other impervious surfaces within large watersheds (e.g., the Snohomish River Basin), a basis for prioritizing green infrastructure mitigation efforts;
- Common petroleum-derived compounds in stormwater are also found in crude oil (e.g., the 1989 Exxon Valdez spill) and cause nearly identical developmental defects in the embryos of herring and other shore-spawning marine forage fish;
- Conventional green infrastructure methods involving bio-infiltration effectively remove pollutants and reduce or eliminate toxic impacts to salmon, forage fish, and invertebrates.



PREDICTED LEVELS OF PRE-SPAWN COHO SALMON MORTALITY ACROSS PUGET SOUND WATERSHEDS

Overall, the ongoing stormwater science in Puget Sound is defining the nature and extent of toxic threats to salmon and other priority species, identifying practical solutions for local communities, engaging the public (including underrepresented populations), and informing adaptive responses to the dynamic and shared conservation goals of the Federal Task Force. As an example of outreach, the PSSST created a story map that describes research on stormwater and Puget Sound salmon, with materials to support local citizen science and access to the team's most recent publications.[3]

[3] https://fws.maps.arcgis.com/apps/MapSeries/index.html?appid=5dd4a36a2a5148a28376a0b81726a9a4

Fostering the Development of the Puget Sound Recovery "Science Enterprise"

Through participation and leadership roles in the Puget Sound Federal Task Force Science and Monitoring Work Group, the Puget Sound Partnership Science Panel, and the Puget Sound Ecosystem Monitoring Program, the EPA Puget Sound Team is supporting needed prioritization, coordination and leveraging among many organizations and programs that provide science and monitoring support for Puget Sound ecosystem recovery. The benefits include a more robust conceptual basis for Puget Sound recovery, better prioritization of needed science and monitoring, improved leveraging of programs and resources across partners, increased and more effective collaborations, and leaps in innovative approaches.

U.S. - Canada Cooperation in the Salish Sea

The U.S. and Canadian federal governments have a unique responsibility to address transboundary environmental challenges of our shared Salish Sea ecosystem (including Puget Sound).

In 2000, EPA and Environment and Climate Change Canada signed a Joint Statement of Cooperation that commits us to work collaboratively to achieve our common goals. This agreement calls for our two agencies to develop and periodically update action plans to achieve the goals outlined in the Statement of Cooperation. The Action Plans are developed and implemented through a Working Group that includes representation from federal, state, and indigenous partners in the Salish Sea region.

The 2017-20 Action Plan focuses on:

- Promoting information exchange and coordination, including the Health of the Salish Sea Ecosystem Report and the Salish Sea Ecosystem Conference.
- Supporting coordination and information sharing at the tribal/First Nation, state/provincial, and federal levels.
- Support information sharing activities relating to major federal initiatives and environmental assessments.

Highlights

Salish Sea Ecosystem Conference[4]

Recognizing the importance of scientific exchange and dialogue with resource managers and public officials, thirteen organizations co-sponsored the first Puget Sound Research Conference in April 1988. Fifteen years later the event grew - with support from the EPA and Environment and Climate Change Canada - into an international conference occurring every other year and alternating between venues in Seattle and Vancouver.

[4] https://cpb-us-e1.wpmucdn.com/wp.wwu.edu/dist/1/2658/files/2019/05/2020-SSEC-One-Pager.pdf

Now known as the Salish Sea Ecosystem Conference, the event brings together about fifteen hundred scientists, First Nations and tribal government representatives, resource managers, community and business leaders, knowledge holders, and policy makers. The conference has become the premier scientific research and policy gathering in the Pacific Northwest.

Health of Salish Sea Ecosystem Report

The Health of the Salish Sea Ecosystem Report is one of the significant accomplishments stemming from the Statement of Cooperation and Working Group meetings. This report is a key part of tracking progress in Salish Sea ecosystem management, identifying priorities, and facilitating opportunities for cross-border collaboration.

National Estuary Program - Puget Sound Partnership

Introduction[5]

Under Section 320 of the 1987 Clean Water Act (CWA) Amendments, Congress recognizes Puget Sound as an estuary of national significance and the Puget Sound Partnership as the state lead for the Puget Sound National Estuary Program. Section 320 of the CWA calls for each National Estuary Program (NEP) to develop and implement a Comprehensive Conservation and Management Plan (CCMP) to protect and restore water quality and ecological integrity, with support from the Environmental Protection Agency. The Puget Sound NEP's approved CCMP is the Action Agenda for Puget Sound.

To develop and implement the Action Agenda, the Partnership uses a 'collective impact' approach. Collective impact is an approach to large-scale change in which groups of people contribute and commit to a common agenda to solve a specific problem.

The Partnership's role in achieving collective impact is to serve as the backbone organization for the recovery community. As the backbone organization, the Partnership supports a wide range of groups to work together by:

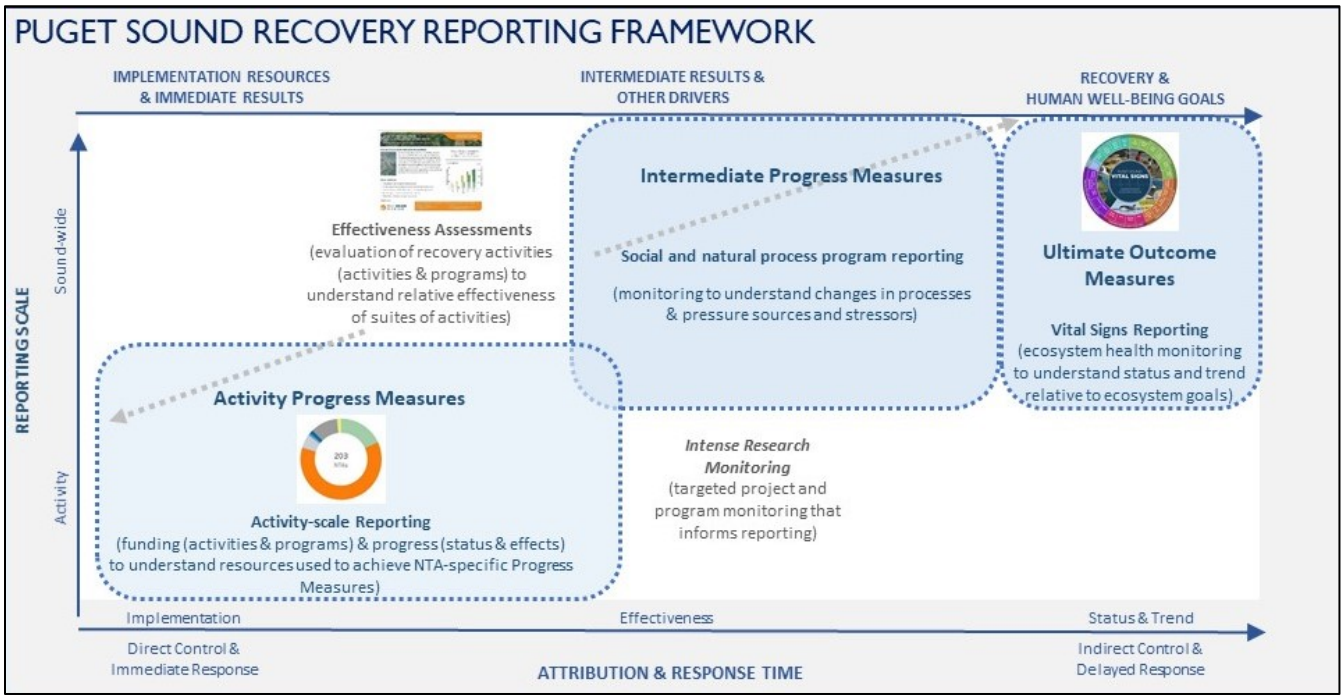
- Charting a course for science-informed recovery.
- Maintaining the shared measurement and monitoring infrastructure that enables learning and continuous improvement.
- Mobilizing funding for recovery actions, helping to remove barriers to implementation, and educating key decision makers.
- Improving coordination between Local Integrating Organizations and Lead Entities.
- Incorporating the Salmon Common Indicators into the Vital Signs and Progress Measures Framework.
- Developing shared workplans among the Boards including the Ecosystem Coordination Boards and Salmon Recovery Council.

Highlights

Puget Sound Recovery Reporting Framework[6]

Since 2018, the Partnership has been leading an effort to develop a comprehensive framework for tracking and reporting on Puget Sound health and progress toward ecosystem recovery.

[5] Puget Sound National Estuary Program 2020 Evaluation
[6] Puget Sound National Estuary Program 2020 Evaluation



The Puget Sound Recovery Reporting Framework defines three specific types of measures:

- Activity Progress Measures that inspire and demonstrate activity contributions towards Vital Sign targets;
- Intermediate Progress Measures that establish a common understanding of drivers causing changes to Vital Signs; and
- Ultimate Outcome Progress Measures (aka Vital Signs and indicators) that reflect the health of the Puget Sound ecosystem and human well-being.

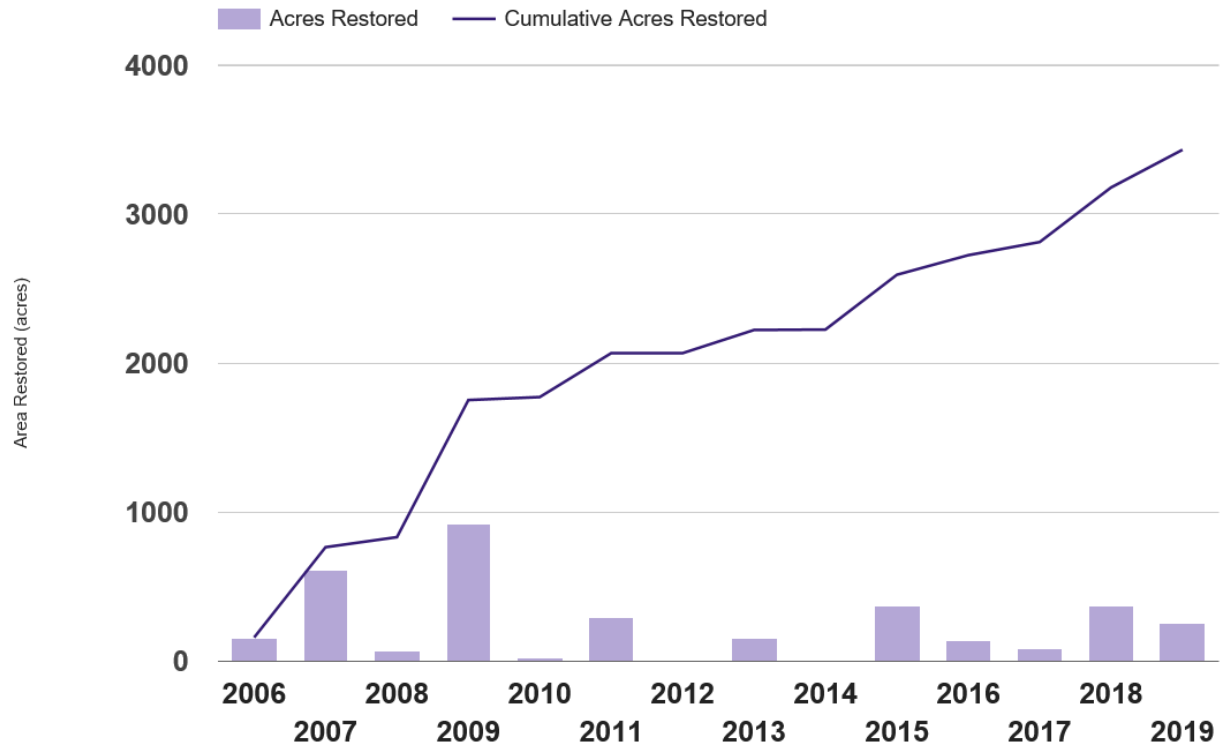
Combined with results from intensive research and monitoring, the Partnership will use information from these three types of measures to assess the effectiveness of activities, track progress toward reducing critical barriers and pressures, and make decisions about how to invest in management actions.[7]

Habitat Protection and Restoration

The Puget Sound NEP reports the number of habitat acres they have protected and/or restored with their partners annually to EPA. These reports describe the projects, specify the habitat types, indicate the protection activity/restoration technique/approaches, and identify the lead implementers along with supporting data.

[7] Puget Sound National Estuary Program 2020 Evaluation

Since 2006, the Puget Sound NEP has reported the restoration or permanent protection of over 56,000 acres - over 87 square miles - of aquatic and contributing shoreline habitats.[8]



Tracking Implementation

Starting in 2019, the Partnership began tracking CCMP implementation through the newly developed Action Agenda Tracker. The Tracker allows implementers, funders, decision makers, and the public to track Puget Sound recovery actions, and helps tell stories about the work, investments, and accomplishments of the broad community of organizations and individuals dedicated to Puget Sound recovery. Prior to the 2018 Action Agenda, the Partnership tracked implementation using Report Cards (see the archives for 2012, 2014 and 2016).[9]

Northwest Straits Commission

The Northwest Straits Commission leverages EPA Puget Sound funds to catalyze and empower local communities to participate in marine conservation and restoration. By design, the Commission brings diverse interests together to protect and restore marine waters, habitats, and species in Puget Sound to achieve ecosystem health and sustainable resource use. This work is

[8] To view these annual habitat acre totals by habitat types, see NEP map at: https://gispub2.epa.gov/NEPmap/
[9] Puget Sound National Estuary Program 2020 Evaluation

done by active Marine Resources Committees. Established through the congressionally authorized Northwest Straits Marine Conservation Initiative, Marine Resources Committees are county-based committees of volunteers appointed by their local elected officials who address local threats to the marine environment, complementing the efforts of existing authorities.[10]

Marine Resources Committees commit over 12,000 hours of conservation action in Puget Sound each year. Marine Resources Committees have added nearly three million Olympia oyster seeds to recover Puget Sound's only native oyster, monitored over 30 forage fish spawning sites to help understand the complex life-cycle of these key prey species, and served in non-partisan advisory roles to their local governments on marine issues ranging from non-native finfish aquaculture to marine spatial planning. Marine Resources Committees bolster the region's stewardship ethic by organizing community education events on topics most pressing to Puget Sound, such as sea level rise and actions individuals can take to help our endangered Southern Resident Killer Whale.

Through the Northwest Straits Commission, partnerships are prioritized to achieve collaborative conservation. For example, thanks to the support of EPA and the Puget Sound Partnership, the Northwest Straits Commission is coordinating with Washington Sea Grant, WDFW, and local communities to trap and remove the invasive European Green Crab in north Puget Sound. This work is a testament to the Commission's ability to mobilize quickly in the face of emerging issues.

[10] https://nwstraitsfoundation.org/project/marine-resources-committees/#:~:text=Established%20through%20the%20congressionally%20authorized,complementing%20the%20efforts%20of%20existing

Tribal Partnerships and Trust Responsibilities

EPA's partnership with Puget Sound tribes includes active engagement with individual tribes and tribal consortia, as well as two funding streams for federally recognized tribes: Tribal Capacity Funding and the Tribal Implementation Award. Tribal Capacity Funding supports tribal participation in regional coordination boards and management conferences, as well as recovery activities consistent with the Action Agenda. The Tribal Implementation Lead Award, led by the Northwest Indian Fisheries Commission, facilitates projects of high tribal priority that are consistent with the Action Agenda. In 2019, as in all other years of the Puget Sound Tribal Capacity Program, tribes have used EPA funding to support nearly 20 full-time technical positions dedicated to protecting and restoring Puget Sound habitats and resources critically important to tribes.

Federally Recognized Tribes of the greater Puget Sound Basin

EPA recognizes the right of tribes as sovereign governments to self-determination and acknowledges the Federal government's trust responsibility to tribes.[11] EPA also recognizes the importance of respecting tribal treaty rights and its obligation to do so.[12]

Since time immemorial, the tribes of Puget Sound have managed their ancestral homelands and abundant natural resources in accordance with their tribal values and teachings. Because their livelihoods and cultural identities are at stake, tribes are on the front lines of Puget Sound recovery and are committed to protecting culturally important resources such as salmon and protecting and restoring the ecological integrity of Puget Sound to sustain these resources.

[11] See EPA Policy for the Administration of Environmental Programs on Indian Reservations, signed in 1984, which remains the cornerstone for EPA's tribal program

[12] See EPA Policy on Consultation and Coordination with Indian Tribes: Guidance for Discussing Tribal Treaty Rights

Tribes are leaders in Puget Sound recovery and indispensable partners who have made substantial investments in recovery efforts. Tribes contribute traditional knowledge of natural resources gained over thousands of years. They also offer significant contributions to the body of science that can shape recovery efforts, employing experts who conduct research, monitoring, and evaluation. Tribes develop and implement strategic programs that connect science with policy and action, which have contributed to hundreds of successful recovery projects.

"I DON'T BELIEVE IN MAGIC. I BELIEVE IN THE SUN AND THE STARS, THE WATER, THE TIDES, THE FLOODS, THE OWLS, THE HAWKS FLYING, THE RIVER RUNNING, THE WIND TALKING. THEY'RE MEASUREMENTS. THEY TELL US HOW HEALTHY THINGS ARE. HOW HEALTHY WE ARE. BECAUSE WE AND THEY ARE THE SAME. THAT'S WHAT I BELIEVE IN." – BILLY FRANK, JR.

Highlights

Skokomish

Over the past decade, the Skokomish Tribe has used EPA Puget Sound funding to support its local and regional leadership roles, and local implementation of Puget Sound recovery projects. In terms of leadership roles, for example, in 2007 the Northwest Indian Fisheries Commission member tribes recommended Dave Herrera, the Skokomish Natural Resources Policy Advisor, as one of three tribal representatives to the Puget Sound Management Conference's Ecosystem Coordination Board. The ECB is a 27-member board appointed by the Governor which advises the Leadership Council and Puget Sound Partnership.

EPA funds have also supported the tribe in leading research efforts to characterize the ecosystem response to the collaborative work to restore the Skokomish River estuary. They have used EPA funds to, for example, gather 10 years' worth of post estuary restoration monitoring data, including data on fish response.

For the past decade, the tribe has used EPA funding to support planning and implementing school focused education outreach events, and planning, designing, and implementing on-the-ground restoration projects.[13]

[13] For example, completing the Weaver and Purdy Creeks channel reconnection project, the Upper South Fork channel/floodplain assessment and large woody debris design, the Bourgault Farm overflow channel assessment and design, the Skokomish Valley Road relocation design, and the South Fork canyon fish passage/barrier assessment

The Skokomish Tribe Natural Resources Department envisions the Skokomish tribal community having a thriving and healthy natural environment with abundant populations of fish, wildlife, and other resources; this is to sustain the cultural and spiritual identity of the community, in addition to providing economic stability for present and future generations. The Department works to protect Skokomish treaty rights through effective management that will preserve and enhance the natural and cultural resources of the Tribe and will perpetuate the tribal fisheries resources for this and future generations. In fulfilling its mission, the Department has formed strong relationships and roles within the local and regional communities over many years and collaborates with many partners.

The tribe's leadership and collaborations within these forums have contributed to the development of the Skokomish River Ecosystem Restoration Project[14]. In September 2019, that project met a major milestone when the Project Partnership Agreement was signed by representatives from the U.S. Army Corps of Engineers, the Skokomish Indian Tribe, Mason County, and the Washington Department of Natural Resources. This agreement signifies the transition into the construction phase of this approximately $22.1 million cost-share project. The project aims to restore a total of 277 acres in the Skokomish River Basin, including habitat critical for Endangered Species Act (ESA)-listed Chinook and chum salmon, key food sources for southern resident orca whales.

LIMITED CHANNEL CAPACITY IN THE SKOKOMISH RIVER LEADS TO FREQUENT FLOODING, CAUSING FISH STRANDING AND MORTALITY

Jamestown S'Klallam Tribe

Jamestown S'Klallam Tribe's project has two components: acquisition and restoration of high priority Dungeness River floodplain, and protection of subsistence and commercial shellfish fisheries through monitoring. EPA Puget Sound funding has contributed to the tribe's effort, in 2019, to partner with multiple agencies and entities fighting the European green crab invasion. The source populations of European green crabs that appear to have spread to Puget Sound need to be eradicated. Many areas have not yet been surveyed for the presence of green crabs. An invasion of European

[14] https://www.nws.usace.army.mil/Missions/Civil-Works/Programs-and-Projects/Projects/Skokomish-River-Basin/

Green crabs could threaten the existence our native crabs that generate billions of dollars in revenue around the Salish Sea.

Puyallup Tribe

With the help of EPA Puget Sound funds, the Puyallup Tribe is evaluating existing geomorphologic and habitat conditions within Chambers Creek. The work includes creating a conceptual design to restore habitat function along an approximately 3.4-mile-long creek corridor. The tribe is also coordinating with the technical work group which is overseeing the feasibility study for the Chambers Dam removal near the mouth of Chambers Creek.

Samish Indian Nation

In the past six years, the Samish Indian Nation Department of Natural Resources - in partnership with the Washington State Department of Natural Resources, Washington Conservation Corps, Veterans Corps, and EarthCorps - have removed over 767,000 pounds of treated wood and other marine debris from public and private shorelines of Skagit County, southern Whatcom County, and the San Juan Islands. Materials collected include creosote-treated wood and other debris that wash onto beaches and into lagoons and estuaries. Work also includes removing structures that line the nearshore and no longer serve a purpose. The tribe continues to survey and clean up islands in Samish traditional territory.[15]

[15] For more information, see: https://storymaps.arcgis.com/stories/907423ba45d84895b769db1dbd061502

Strategic Initiatives

The EPA/NEP Puget Sound Funding Model (2016-2020) targets areas of high priority in Puget Sound around three Strategic Initiatives within the Action Agenda.

The three Strategic Initiatives are led by state agencies which convene advisory groups of policy and technical experts. The groups determine which projects from the Action Agenda are the best fit for sub-awards that prioritize near-term recovery.

EPA staff work with Strategic Initiative Leads, the Puget Sound Partnership, and other key Puget Sound recovery partners to:

- Propose regional recovery and protection priorities to the Puget Sound management community
- Coordinate with regional, tribal, and local partners to improve and adaptively manage Puget Sound strategic planning processes
- Collaborate to address issues that affect all three Strategic Initiatives (cross-cutting issues)
- Establish the key sequences of actions to lead from present conditions to long-term goals (see Implementation Strategies)
- Solicit, identify, review, and prioritize local and regional Near-Term Actions
- Manage sub-awards to local, tribal, state, county, non-governmental organizations, and academic institutions to carry out a wide variety of projects, assessments, and monitoring

Implementation Strategies

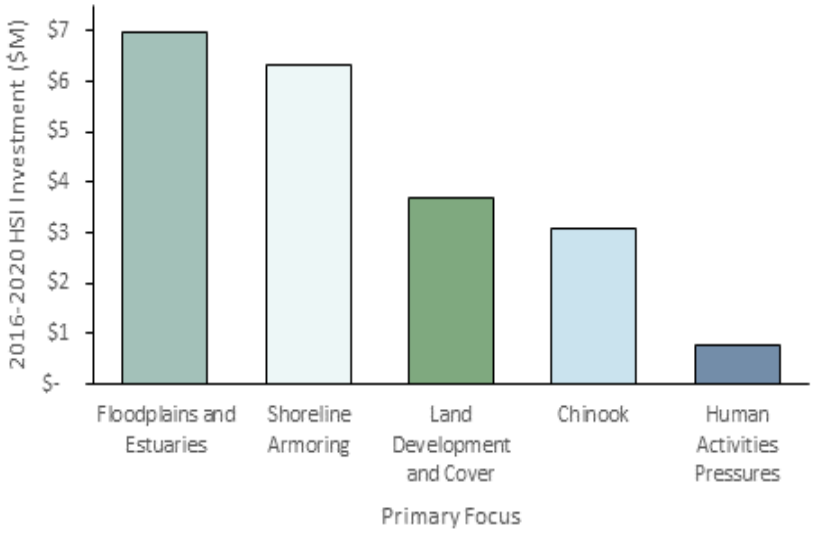
Implementation Strategies, which are developed with EPA funding and led by several state agencies with cooperation from a multitude of partners, are plans for achieving specific ecosystem targets for the Puget Sound.

Implementation Strategies describe the sequence of steps, activities, and results needed to move closer to a recovery goal; help Puget Sound recovery partners decide what to prioritize in the Action Agenda; and help the Strategic Initiative Advisory Teams evaluate and recommend which projects to support with EPA Geographic Funds. Aligning work and ongoing programs with the strategies helps the entire Puget Sound community make the greatest progress toward recovery goals.

The EPA has funded collaborative processes to develop the following Implementation Strategies: Shellfish Beds, Land Development and Land Cover, Floodplains, Shoreline Armoring, Chinook, Freshwater Quality, Toxics in Fish, and Eelgrass (recovery strategy).

Habitat Strategic Initiative

From 2016-2020, the Habitat Strategic Initiative has allocated over $20 million in EPA funds towards Near Term Actions that accelerate habitat protection and restoration. EPA funding and the Habitat Strategic Initiative have contributed to thousands of acres of restored or permanently protected aquatic and shoreline habitats.



APPROXIMATE INVESTMENT ALLOCATIONS BY VITAL SIGN AND PRESSURES TO HABITATS (2016-2020)

Protecting and restoring habitat is fundamental because, within the last two centuries, approximately 70 percent of important nearshore habitats are estimated to have been damaged or lost. Over 60 percent of the floodplain areas in the 17 major rivers of Puget Sound have impaired or lost floodplain function related to constrained river flow and non-natural land cover. Puget Sound lost at least two-thirds of its remaining old growth forest, more than 90 percent of its native prairies, and 80 percent of its marshes.[16] Finally, 29 percent of shorelines have been armored, disrupting the natural process of erosion which maintains our beaches and creates habitat for many other species.

The Habitat Strategic Initiative invests in projects that advance four key areas: estuaries, floodplains, land development and cover, and shoreline armoring.

The Habitat Strategic Initiative is co-led by the Washington State Department of Fish & Wildlife (WDFW) and Washington State Department of Natural Resources (DNR). Support is provided by the Washington State Department of Commerce.

[16] https://vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/15

Highlights

Integrated Floodplain and Estuary Management

One of the goals of the EPA National Estuary Program is to use funds to pilot or stimulate innovative and collaborative work across geographic scales, and to transition those projects to alternative funding sources once proven successful. The Floodplains by Design network is an example of this.

In 2012, the National Estuary Program invested $800,000 to improve floodplain management in the region by supporting The Nature Conservancy's creation of the regional Floodplains by Design initiative. In 2016, the Habitat Strategic Initiative further invested $500,000 in the Nature Conservancy to support the acceleration of integrated floodplain management including developing a five-year vision, supporting network expansion, and developing the capacity of floodplain leaders to communicate about integrated floodplain management. Floodplains by Design is now funded by the state at a $20 million per biennium level.

Overall, these continuing efforts to build and coordinate regional and local integrated floodplain management programs have resulted in the re-connection of thousands of acres of floodplain and the restoration of hundreds of miles of riverine processes.

Shore Friendly

Bulkheads and rock seawalls are intended to protect waterfront properties from natural erosion processes at beaches and intertidal areas - some of the most ecologically important habitats in Puget Sound. About 29 percent of Puget Sound shorelines have been armored in this way, resulting in a significant impact on beach and intertidal biodiversity and ecological balance.

BEFORE (2017) AND DURING CONSTRUCTION (2018)

The Shore Friendly program was developed in 2014 with support from EPA Puget Sound funds. The program encourages landowners to forgo or remove shoreline armoring to help protect and restore important shoreline habitats, and in the last few years some remarkable projects have made significant improvements.

AFTER (2020)

After the initial investment in five local pilot-programs, 2016 EPA Puget Sound funds provided additional support to two of the pilot programs. The Shoreline Armoring Implementation Strategy prioritized the creation of a sustainable funding pathway for local Shore Friendly programs. The Habitat Strategic Initiative collaborated with the Puget Sound Partnership and Kitsap County to lead a workshop for the Management Conference. As a result, the Ecosystem Coordination Board requested that WDFW ask the legislature for ongoing state funds to support the continuation of these types programs through the Estuary and Salmon Restoration Program (ESRP). ESRP officially adopted the Shore Friendly program.

SHORE FRIENDLY KITSAP TESTIMONIAL:

"MY DREAM WAS THAT MY BEACH WOULD BE RESTORED TO A NATURAL HABITAT FOR WILDLIFE AND PEOPLE TO ENJOY. THE PROJECT TOTALLY MET WHAT I HAD DREAMED OF HAPPENING." -LEE DERROR

Since 2014 over 1,300 landowners have participated in Shore Friendly workshops or presentations, nearly 500 have received on-site assistance, and 3,204 linear feet of shoreline armor have been removed. Local Shore Friendly programs are now active in each Puget Sound county.

Prioritizing Coastal Streams and Embayments along Puget Sound Shores with the Railroad

With 2017 EPA Puget Sound funds and in-kind services from the Tulalip Tribe, this effort identified and assessed stream crossings and embayments associated with the BNSF right-of-way along the shore of the Salish Sea.

The goal of this project was to develop a prioritization framework that evaluates the relative benefit to juvenile Chinook salmon of restoring stream access from coastal waters impacted by the presence of the railroad.

The project team, led by Confluence Environmental Company, in association with Environmental Science Associates, Coastal Geologic Services, and the Tulalip Tribes, combined field data with available remotely-collected data sets. They assembled a geodatabase covering nearly 200 stream mouths that cross the railroad within 200 feet of the marine shoreline as well as 13 embayments.

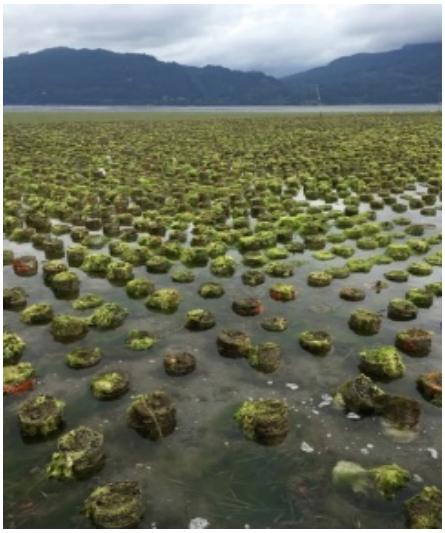
The team then developed an evaluation framework to characterize the following:

- The likelihood of use by juvenile Chinook salmon, and
- The quality of habitat to support non-natal rearing by juvenile Chinook salmon.

The process generated a prioritization list that can help inform restoration of sites along the railroad right-of-way. The project was guided by an advisory team which included state, county, and non-profit organization staff, as well as active participation from BNSF.

Shellfish Strategic Initiative

The EPA-funded Shellfish Strategic Initiative aims to protect and restore shellfish beds by reducing fecal bacteria and pathogens in waterways that flow to shellfish growing areas. Project funding supports planning and research, as well as components of pollution identification and correction (PIC) programs. PIC programs include water quality monitoring, education and outreach, technical assistance, financial incentives, agriculture best management practice implementation, and regulatory compliance.



SAMISH BAY GEODUCK BED

Fecal bacteria from human and animal waste can pollute water and lead to shellfish harvest closures. Preventable bacteria pollution sources include improperly managed farm animal manure, unmanaged pet waste, failing septic systems, sewer cross connections, and human waste from boaters and other recreationalists.

The Shellfish Strategic Initiative Lead is the Washington State Department of Health in partnership with the Washington State Department of Ecology and Washington State Department of Agriculture.

Highlights

Net Increase in Commercial Shellfish Acreage

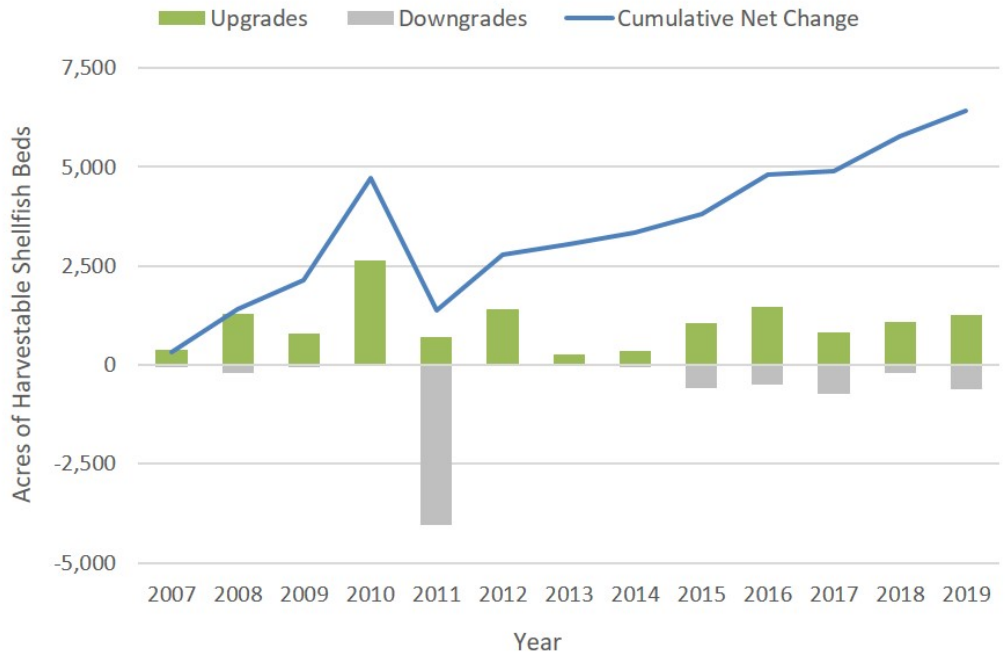
EPA funds have supported local water quality staff throughout Puget Sound and helped protect 159,288 acres of shellfish beds so they can be safe to harvest. EPA funds helped restore 13,529 ares of shellfish beds, resulting in a net increase in 6,418 acres of harvestable Puget Sound shellfish beds since 2007. A net increase of harvestable shellfish beds is particularly notable given increasing population and development across the region.

Protecting and restoring shellfish areas is important to Puget Sound's rural economy. Each acre of commercial Pacific oyster beds produces between $10,000 and $20,000 per year. Shellfish harvest contributes roughly $180 million to Washington State's economy per year, and 3,200 direct and indirect jobs.[17] And, shellfish are an essential food source and treaty-protected resource for Puget Sound tribes.

Shellfish beds are protected and restored through the creation of shellfish protection districts, development and implementation of closure response plans, effective PIC programs, on-site

[17] According to the Washington Shellfish Initiative

sewage system management plans, agricultural best management practices, and control of boaters' waste.



Pollution Identification and Correction: Supporting Local Government Efforts to Keep Pathogens out of Shellfish Beds

EPA's Puget Sound National Estuary Program Shellfish Strategic Initiative has been instrumental in supporting PIC programs in all 12 Puget Sound counties.

PIC programs survey watersheds and offer education, technical, and financial assistance to help community members manage septic systems, farm animal manure, pet waste, urban wildlife, and boater/recreationalist waste to prevent pollution to waterways.

PIC programs are an important tool for local partners to protect and restore shellfish beds and protect people from water-borne pathogens.

WHATCOM CONSERVATION DISTRICT IN SUPPORT OF THE WHATCOM CLEAN WATER PROGRAM (PIC)

Skagit County: Spotlight on Samish Bay

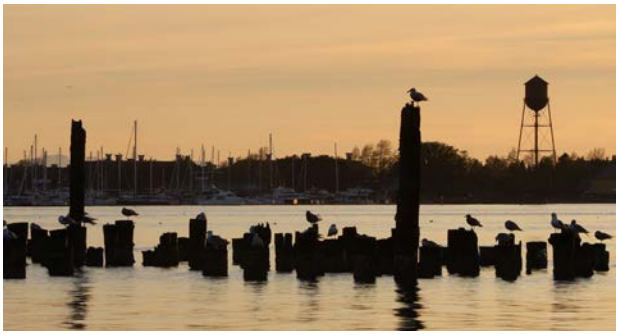
EPA supports the Skagit PIC program and the Clean Samish Initiative - a coalition of local, state, tribal, federal, and shellfish industry partners - to improve water quality in Samish Bay. Samish Bay is a 4,000-acre commercial shellfish growing area. Along with other Puget Sound counties, the Skagit PIC program uses innovative methods - including a sewage sniffing dog - to find and fix sources of fecal pollution. EPA's Manchester Laboratory is partnering with the county to perform microbial source tracking analysis to help narrow down sources contributing to fecal bacteria contamination trouble spots. All this work is making a difference: bacteria levels in the Samish River watershed have been reduced by 60 percent since 2011.

SKAGIT COUNTY PUBLIC WORKS WORKING WITH A SEWAGE SNIFFING DOG TO LOCATE LEAKING ONSITE SEWAGE SYSTEMS.

Whatcom County - Drayton Harbor

With the support of EPA Puget Sound funds, Drayton Habor landowners have fenced farm animals out of waterways; created protected heavy use and manure storage areas to better manage pastures, manure, and mud; fixed leaky onsite sewage systems; and picked up pet waste.

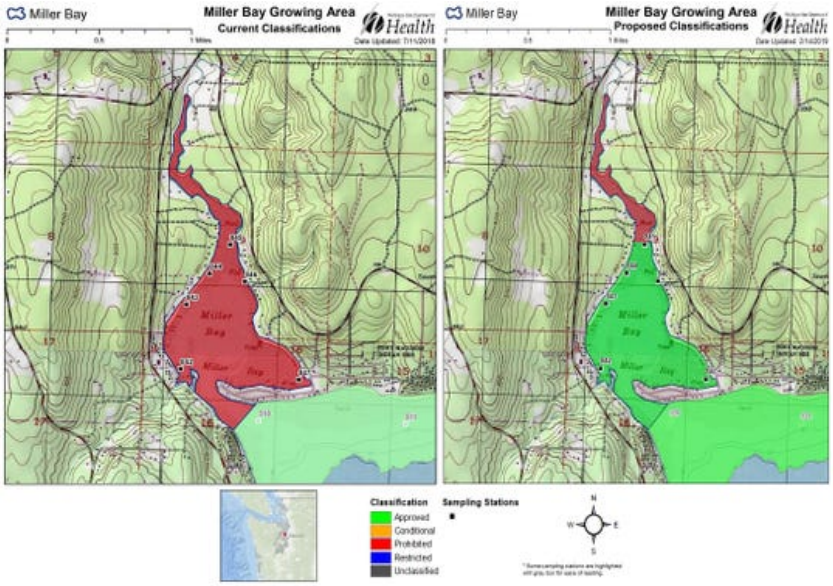
Those efforts are paying off. On October 22, 2019, the Washington State Department of Health removed harvest restrictions on 765 acres in Drayton Harbor for commercial shellfish harvest. The 765 acres is in addition to a classification upgrade of 810 acres of shellfish growing area in Drayton Harbor in December 2016.



DRAYTON HARBOR (RICK BEAUREGARD)

These recent upgrades followed 21 years of work by partners throughout the watershed, including the City of Blaine, Whatcom County, Whatcom Conservation District, the Puget Sound Restoration Fund, and the Washington Departments of Agriculture, Ecology, and Health to reduce fecal bacteria pollution from freshwater creeks and other human-influenced sources surrounding the harbor.

Kitsap County - Miller Bay



EPA Puget Sound funds have contributed to Kitsap County's efforts to find and fix sources of fecal bacteria pollution that have impacted shellfish beds, including Miller Bay, a historically important shellfish harvest area for the Suquamish Tribe.

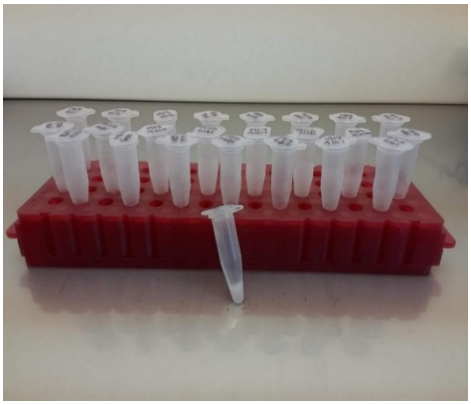
Kitsap County's PIC program staff conduct records reviews, field inspections, and sampling/dye testing to verify septic system issues and help correct confirmed septic system failures. Over the last few years, they've spoken to almost every home and agricultural property owner about best management practices to make sure fecal bacteria don't enter the water. EPA also funds the Kitsap Conservation District, which provides technical assistance and funding to help agricultural landowners employ best management practices.

Because of measurable water quality improvements, the Department of Health has determined it is safe to upgrade the harvesting status of 236 acres of Miller Bay from "prohibited" to "approved."

EPA Laboratory Support for Microbial Source Tracking

EPA Region 10's Manchester Environmental Laboratory provides important scientific support through microbial source tracking for counties' Pollution Identification and Correction programs. For example, the lab recently completed a microbial source tracking analysis of all the fecal bacteria-impaired streams in Kitsap County to shed light on sources of pathogens in hotspots.

Water quality teams sample streams and ditches and use DNA analysis methods to help evaluate whether the fecal bacteria are more likely from dogs, humans, cattle, or other animals. This information sheds light on trouble spots, and helps the counties hone their management actions (e.g., whether to focus on onsite sewage systems or pet waste).



MICROCENTRIFUGE TUBES AT THE EPA LAB CONTAINING THE EXTRACTED, PURIFIED DNA FROM MST SAMPLES (STEPHANIE BAILEY)

Stormwater Strategic Initiative

EPA's stormwater funding aims to prevent pollution from getting into stormwater by educating planners and builders, and implementing a holistic watershed approach to stormwater management. EPA's stormwater funding has led to scientific advances to characterize the thousands of chemicals in stormwater, which products leach phthalates, and what chemicals are emitted from our cars' tires and fluids. These scientific advances will enable more targeted policy action.

The Stormwater Strategic Initiative is led by the Washington State Department of Ecology, in partnership with the Washington Stormwater Center at Washington State University and the Washington State Department of Commerce.

Highlights

Building Green Cities: Low Impact Development Guidance for Local Jurisdictions

EPA Puget Sound funds enabled the Washington State Department of Commerce and Puget Sound Regional Council to create and provide guidance and tools for local jurisdictions. This guidance helps local jurisdictions incentivize developers to incorporate more Low Impact Development in their projects than is required by municipal stormwater regulations.

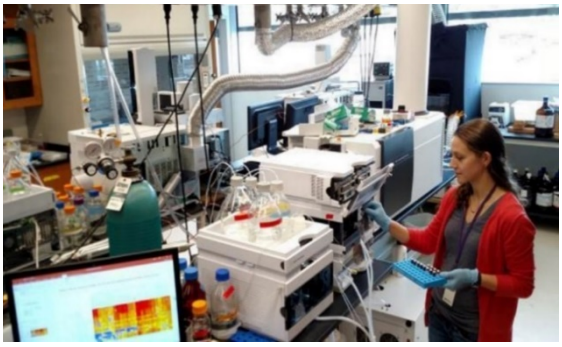
The *Building Green Cities* guidebook is intended for municipal staff, specifically those involved in permitting, stormwater management, green infrastructure, and incentive programs. The guidance provides staff resources to facilitate conversations with private developers, engineers, and property owners about Low Impact Development, and provides information on how to determine, develop, and implement incentive programs. The guidance is also valuable to developers who are proactively seeking Low Impact Development information, training, and partnership opportunities.

This guidance and efforts like it are important because Washington's Puget Sound region is one of America's fastest growing areas. Local jurisdictions direct new development primarily into urban growth areas due to geographic constraints and Growth Management Act policies. While this growth brings many benefits to the region, it can also strain the environment's resilience and protection functions by increasing the risk of polluted stormwater runoff that threatens local waterways. To protect the health of our streams, rivers, lakes, and the Puget Sound, local jurisdictions can build cities that more effectively manage stormwater runoff, while increasing density and livability for our growing population.

Low Impact Development is a green infrastructure approach to stormwater management. It integrates on-site natural features with distributed stormwater best management practices (e.g., rain gardens, cisterns, trees and plants, permeable pavement, and green roofs). These practices can slow stormwater runoff at its source, infiltrate water into the soil, and mitigate toxics through treatment by soil microorganisms.

Stormwater Chemical Characterization and Watershed Prioritization - University of Washington

With support from EPA Puget Sound funds, researchers at the University of Washington Tacoma and the Center for Urban Waters collected more than 140 water samples in 15 Puget Sound creeks during storm events in fall 2017 through spring 2019. They used these samples to identify sources, watersheds, and time periods responsible for high levels of stormwater pollution that are killing returning coho salmon before they can spawn.



USING HIGH-RESOLUTION MASS SPECTROMETRY TO IDENTIFY ORGANIC CONTAMINANTS LINKED TO URBAN STORMWATER MORTALITY SYNDROME IN COHO SALMON

Using state-of-the-art analytical equipment, these award-winning researchers prioritized Puget Sound watersheds most impacted by urban runoff and characterized "polluto-graphs" to measure pollutant flows in urban creeks. One major finding from this work is that leachate from automobile tires contribute to coho pre-spawn mortality. Coho salmon are an important indicator species for stormwater pollution since they are particularly sensitive to stormwater's toxic effects.

Using EPA Stormwater Strategic Initiative funding, the UW Center for Urban Waters continues to expand their study and partner with local jurisdictions to continue this high impact chemical characterization work.

THIS FEMALE COHO DIED IN LONGFELLOW CREEK BEFORE SPAWNING

Depave Puget Sound: Reimagining Overly Paved Spaces

With the help of EPA Puget Sound funds, Pierce Conservation District created an important replicable model: a program aimed at healthy transformation of landscapes.

Depave is a movement to improve the health of cities and the environment in Puget Sound. In Depave projects, communities come together to re-think the landscape around them, transforming areas that are unnecessarily paved into places where nature and people can thrive. For example, the District used their EPA grant to transform the Holy Rosary Bilingual Academy's asphalt play area into a green space for kids.

Each Depave project brings local benefits and improves quality of life in the communities where they take place.

Taken together, Depave projects in our region provide benefits for us all. Cleaner water, cleaner air, and improved habitat for local wildlife are just a few of the many outcomes of the Depave movement.[18]

VOLUNTEERS GET READY TO HAUL AWAY PIECES OF ASPHALT DURING A DEPAVING EVENT AT A SCHOOL IN TACOMA. (DEPAVE PUGET SOUND/ CARAVANLAB)

DEPAVE PUGET SOUND/ CARAVANLAB

[18] For more information, see: http://depavepugetsound.org/

Permeable Pavement Standards Based on Lessons Learned

POROUS ASPHALT AND PERVIOUS CONCRETE

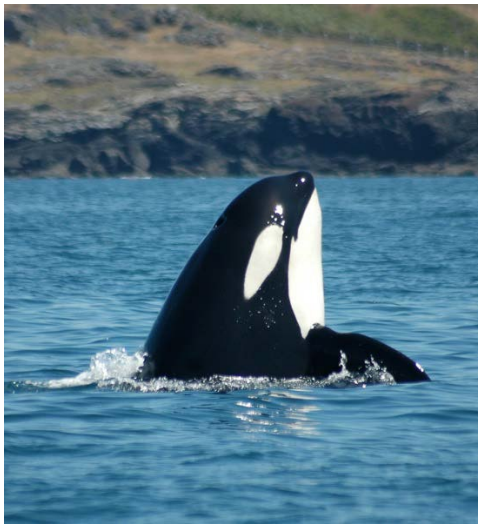
Rain turns into stormwater runoff with all the pollutants it contacts, such as yard chemicals, oil, grease, pet waste, street dirt, and heavy metals. As in most cities, Tacoma's stormwater flows untreated to the Puget Sound.

Permeable pavements have been proven as a cost-effective solution to managing stormwater. Permeable pavement allows water to soak in while providing some level of filtration. But, can permeable pavement measurably improve Puget Sound water quality? Is it strong enough to withstand weather and traffic?

Industry standards are imperative to the long-term success of permeable pavements. This requires a solid set of specifications and reliable material testing. With the support of EPA Puget Sound funds and other partners, the City of Tacoma is testing new material and studying exactly how different permeable pavements filter contaminants out of stormwater runoff.

This work could be a game-changer in reducing stormwater pollution in Puget Sound!

Toxics in Fish and the Southern Resident Orca Task Force



It is difficult to imagine a Washington without orcas or salmon. These species are part of the cultural identity, fishing economy, and tourism industry of our region. But both Washington's Southern Resident orcas and Chinook salmon are facing an uncertain fate.

The state's Southern Resident Orca Task Force 2019 final report and recommendations incorporated work from the EPA funded Stormwater Strategic Initiative Lead's draft Toxics in Fish Implementation Strategy. Those recommendations, now incorporated into agency budgets, have resulted in new commitments to coordinate programs to carry out the Toxics in Fish Implementation Strategy.

Advancing Science for Puget Sound Ecosystem Recovery

Science is essential to a well-informed, adaptively managed Puget Sound recovery effort. EPA supports a variety of tribal, state, and local partner scientific activities through funding agreements. EPA's support bolsters: original research, monitoring, assessments, modeling, social science, identification and prioritization of science needs, synthesis of existing information, alternative scenarios development and use, structured decision-making, and communication of scientific information to policy makers, decision-makers, stakeholders, and the public.

Highlights

Foundational Programmatic Science Support

EPA supports core elements of the Puget Sound National Estuary Science Program through two cooperative agreements with the Puget Sound Partnership: National Estuary Program Base Grant and Implementation Strategies-Science Award.

The Puget Sound Base Agreement supports the Puget Sound Partnership's Strategic Science Program in the following ways.

- Research**:** Foundational elements of a strategic science program, including developing and implementing the technical program for the Salish Sea Ecosystem Conferences, and helping to coordinate the multi-party science enterprise that supports ecosystem recovery through an increased understanding of issues, new approaches, and priorities for estuary resiliency.
- Ecosystem Assessment and Monitoring: Ensures that Puget Sound Partnership programs and activities are continually improved; decision-making is informed by credible scientific information; approaches are applied to develop and monitor progress measures, including Vital Sign indicators; tools used for monitoring are efficient and cost-effective; and opportunities to improve the quality of data collection are provided.
- Reporting: Facilitates the Puget Sound Partnership's programmatic reporting obligations by encouraging the support of the infrastructure of tools utilized by Management Conference partners so that recovery and protection are adaptively managed, and trends and emerging issues are documented.

In addition to the specific science tasks in the Base Agreement, Local Integrating Organizations (LIOs) are supported through coordination grants that enable LIO coordinators to participate in science-related work groups, initiatives, and activities. These include the Vital Signs Revision Effort, Implementation Strategies development, and the Structured Decision-Making workshops.

The Implementation Strategies-Science Award supports a scientific collaborative among the PSP, the University of Washington Puget Sound Institute, Oregon State University, and Northern Economics. As the core support for leadership and stewardship of Puget Sound science, this work plan supports three tasks:

- Science support for partially completed and anticipated Implementation Strategies.
- Science support for balanced and comprehensive ecosystem approaches.
- Open, transparent, and productive evaluation, integration, and communication of science, including rigorous science review, and evaluation.

Recommendations stemming from the Implementation Strategies-Science Award have directly informed investments in recovery programs as well as staffing decisions at state regulatory agencies.

Investments like these are helping partners to make science-informed decisions based on the latest knowledge.

Tribal Science Support

EPA directly supports tribal science through the Puget Sound Tribal Capacity Program. Eligible activities under this program include significant technical work in support of tribal priorities related to Puget Sound recovery. The range of science work completed by grantees includes collaborative science; water quality toxin/pathogen research; baseline water quality monitoring; and habitat, training, wetlands, GIS, climate change, traditional knowledge, and food web research. During the first nearly 10 years of the program, the PSTCP has supported between 17-20 technical tribal staff each year. Technical tribal staff lead on-the-ground restoration activities and provide input and expertise to local and regional planning processes or forums. EPA also supports tribal science through the Tribal Implementation Lead program, which is a subaward program managed by the Northwest Indian Fisheries Commission for all federally recognized Puget Sound tribes and authorized consortia of eligible tribes.

Science Teams, Work Groups, Science Initiatives, and Activities

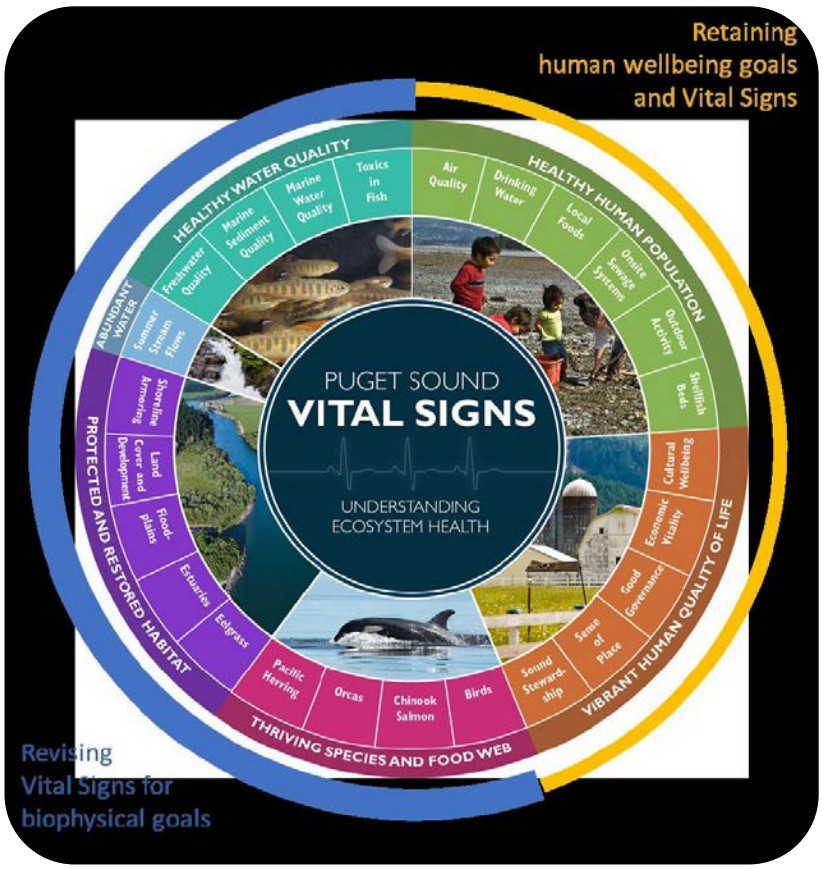
EPA staff from the Puget Sound Program participate in and directly contribute to the following Puget Sound recovery science teams and work groups, science initiatives and activities, and science prioritization and funding processes.

- Puget Sound Federal Task Force Science and Monitoring Workgroup
    - Two EPA staff co-chair this group.
    - An important function of this group is to produce a compilation of Federal science and monitoring activities, programs, and staffing of teams that support Puget Sound ecosystem recovery and connect the work at the federal level to the greater Puget Sound recovery effort.

- Puget Sound Ecosystem Monitoring Program (PSEMP): An EPA staff member serves as Chair of the PSEMP Steering Committee and helps advance monitoring efforts necessary to understand what actions are effective in achieving Puget Sound Vial Sign and Indicator targets and recovery.
- PSP Management Conference Science Panel: Two EPA staff members serve on the Science Panel. Another is the EPA programmatic liaison. The IS-Science Award supports the staff capacity critical to keeping Science Panel work groups going, including focusing on development of the Science Work Plan and the Alternative Futures Scenarios effort.

Updating the Vital Signs for Puget Sound

The Puget Sound National Estuary Program's Leadership Council recently adopted a set of revisions to the Puget Sound Vital Signs. The Vital Signs tool include 36 biophysical indicators, 17 potential future indicators, and 13 Vital Signs, to express the statutory recovery goals for protecting and recovering the water quality, water quantity, habitats, and species and food webs of the Puget Sound ecosystem. Vital Signs help the Puget Sound recovery community set the course for recovery. The collaborative process to develop the revised Vital Signs and indicators was led by the Puget Sound Partnership. The process relied on insights from science, management, and policy experts from throughout the Puget Sound recovery community, including EPA staff.



The revisions affirm the Vital Signs and their indicators as ultimate outcome progress measures for Puget Sound protection and recovery, as part of an overarching framework to identify and measure short-term, mid-term, and ultimate outcomes to understand whether Puget Sound is on a path towards recovery.

Salish Sea Model (FY20)

EPA funds contributed to the development of the Salish Sea Model (SSM) by the Pacific Northwest National Laboratory. SSM was developed to meet the need for a comprehensive, predictive model to address water quality, and to serve as a restoration planning tool. The model assesses recurring hypoxia in Puget Sound, loss of eelgrass meadows, loss of nearshore habitat, and persistence of toxic contaminants in sediments and tissue.

SALISH SEA MODEL GRID WITH REFINEMENT NEAR THE HOOD CANAL BRIDGE REGION TO FACILITATE INCORPORATION OF THE BRIDGE BLOCK IN THE SIMULATION.

The model was used to design restoration actions near the mouth of the Stillaguamish River, and comprehensive basin-wide models of the Skagit River and Snohomish River estuaries for restoration activities around Whidbey Basin.

In FY20, SSM helped researchers from University of Washington and Washington State Department of Fish and Wildlife track pharmaceuticals such as opioids and the chemotherapy drug melphalan - along with a suite of 62 other contaminants. The SSM was used to compute a Salish Sea-wide map of effluent concentration from 99 wastewater outfalls over a one-year period.

Expanding the Use of Structured Decision-Making

EPA funds supported review and analysis of the funding decisions made by the Strategic Initiative Leads. This study concluded that while all three Strategic Initiative Leads used some form of Structured Decision-Making (SDM) - an approach for careful and organized analysis of natural resource management decisions - their processes could be improved.

To improve funding decision-making, EPA supported training for tribal, state, and local staff to better understand and implement SDM. Specifically, EPA supported training on the SDM tool, DASEES (Decision Analysis for a Sustainable Environment, Economy and Society). The DASEES tool leads decision makers through SDM steps in a collaborative, accessible, and visual way that highlights trade-offs between economic, social, and ecological values.

In addition to training, researchers from Oregon State University and EPA-ORD are working with four Local Integrating Organizations (LIOs) on pilot uses of Structured Decision Making and DASEES. The LIOs share enthusiasm about using methods that allow for improved and structured incorporation of a variety of variables, including human well-being, into traditional natural science and policy discussions.

THE FIVE STEPS OF THE STRUCTURED DECISION-MAKING FRAMEWORK.

Science Enterprise Collaboration with EPA's Office of Research and Development

In 2013, the EPA Regional Administrator wrote to EPA Office of Research and Development leadership requesting support on critical science needs for Puget Sound. The request included identification of ORD's Pacific Ecological Systems Division (PESD) support tools applicable to local and regional land use planning and decision making. Models of interest included those capable of estimating (1) changes in ecosystem services in response to a variety of land use scenarios, and (2) progress on a set of 25 ecosystem indicators adopted by the Puget Sound Management Conference as terrestrial and marine Vital Signs. The Regional Administrator's letter also called for state-of-science/technology syntheses to better protect treaty resources.

In response to this request, ORD-PESD has worked with Puget Sound NEP program staff on the following collaborative efforts.

- PESD's VELMA ecohydrology model was identified as capable of quantifying land use impacts on water quality and quantity, fish habitat, production of food and fiber, and other ecosystem services.
- Region 10 Puget Sound team members have monthly calls with PESD researchers to support the Puget Sound NEP-ORD cooperative relationship to apply VELMA with several stakeholders in the Puget Sound region. For example, Region 10-supported VELMA research was initiated to help communities optimize green infrastructure installations for reducing urban stormwater contaminant loads to Puget Sound.
- PESD fisheries ecologists have supported tribal scientists on cold water refugia work.
- ORD tools supportive of Puget Sound science needs are being introduced to the NEP network through ORD-NEP collaborative webinars.

Looking Ahead

EPA's work - together with the Puget Sound Federal Task Force, tribes, Canada, Puget Sound Partnership, Strategic Initiative Leads for Habitat, Shellfish and Stormwater, the scientific community, and many others across the region - has indeed supported important gains in recovery.

Looking ahead, EPA recognizes that despite progress made, degradation continues to outpace recovery. More must be done to achieve a healthy Puget Sound – a Sound with clean and safe water, protected and restored habitat, thriving species, and a vibrant quality of life for all.

We look forward to providing future highlights of EPA's enhanced efforts on: Federal Task Force leadership, including a new Action Plan for 2022-2026; cooperation with Canada; fulfillment of National Estuary Program responsibilities, including the approval of a new comprehensive management plan for recovering Puget Sound (the Action Agenda); partnering with tribes; funding and grants, including managing and awarding up to $100 million in projects over the next five years; and scientific support. EPA will continue to focus its work on turning the tide and achieving positive trends for habitat, stormwater pollution prevention, and shellfish harvest.

The foundation is well-established, EPA is a vital partner, and, ultimately, success will depend on the passion and perseverance of the thousands of people who make up the collaborative effort to protect and restore Puget Sound.

Contact Information

For more information on EPA's efforts to protect and restore the Puget Sound ecosystem, visit: https://www.epa.gov/puget-sound.

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