

# Salish Sea Currents

timely, local stories about ecosystem recovery

Heartbeat line overlays Seattle Skyline from Alki Beach.  
Graphic: Puget Sound Institute w/ iStockPhoto images

*New EPA-funded Implementation Strategies are designed to target Puget Sound recovery in the most direct and coordinated way ever conducted by state and federal agencies. We report on how these strategies will affect Puget Sound's Vital Signs for years to come, and why you should care (a lot).*

## KEY TAKEAWAYS

- Implementation Strategies are designed to target and improve the Puget Sound 'Vital Signs,' a carefully selected set of indicators of ecosystem health and human well-being.
- They prioritize and focus Puget Sound recovery actions, while adjusting for new and emerging science.
- There are nine Implementation Strategies in development and more yet to be launched.
- As they are completed they will provide essential content for the Puget Sound Action Agenda and will guide recovery efforts for years.
- The development of Implementation Strategies is funded by EPA, and led by several state agencies with cooperation from a multitude of partners.

## Implementation Strategies will target Puget Sound 'Vital Signs'

On the surface, Puget Sound seems like the picture of health. Its gorgeous blue waters and abundant wildlife draw tourists from around the world. And while the region's natural beauty is undeniable, it hides a disturbing truth. If Puget Sound were a patient, it would be pretty sick.

That's the general opinion of scientists and researchers who have been monitoring Puget Sound's so-called Vital Signs — 25 indicators of ecosystem health ranging from water quality and shellfish harvests to Chinook salmon runs and human wellbeing.

Creating these Vital Signs became an important step in Puget Sound recovery several years ago when they were established by the state as a way to gauge improvements or declines in the ecosystem. Scientists, like doctors, need some way to measure the health of the patient.

But knowing how sick the patient is doesn't necessarily solve the problem. You actually have to prescribe the correct treatment for a specific ailment and observe carefully to see if it is working or causing side effects. You adjust the treatment as needed.

In a similar fashion, Puget Sound's recovery docs are zeroing in on their patient's problems. Implementation Strategies, a culmination of this process, are designed to target the Vital Signs in the most direct and coordinated way ever conducted for Puget Sound. If the treatment works, Puget Sound's condition will improve.

## DEVELOPING MEASURES OF ECOSYSTEM HEALTH

When the Puget Sound Partnership's Leadership Council met for the first time in June of 2007, members believed that their mission would be difficult but not impossible.

The Washington State Legislature had just passed a law creating the Puget Sound Partnership, a new agency charged with coordinating efforts to restore Puget Sound to a healthy condition. The agency would consider the entire watershed, from "snow caps to white caps," and it would be part of one of the most ambitious cleanup efforts in the country, with a goal of significant change by 2020.

The seven-member Leadership Council was placed in charge of the massive endeavor but was given no regulatory authority. Instead, the effort would rely on volunteer cooperation from local, state and federal agencies, tribes and — in the broadest sense — residents of the entire region. Plans would address habitat and species, water quality and quantity, and human health and well-being, as mandated by the Legislature.

Experts quickly pointed out plenty of things that needed fixing. Just over a year after its first meeting, the Leadership Council adopted the first Action Agenda, a comprehensive conservation plan for Puget Sound — its roadmap to recovery.

The Action Agenda outlined hundreds of projects to protect and restore the ecosystem, but it still needed a way to track progress. Identifying indicators of ecosystem health, known as "Vital Signs," could give managers a sense of whether their actions were helping. The Leadership Council's first chairman, Bill Ruckelshaus, recalls the difficulty of taking this next important step, as scientists involved in the selection process struggled to narrow down hundreds of possible indicators.



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“It is not just a recovery effort. It is about learning to live sustainably in a modern society.”

Nick Georgiadis, Senior Research Scientist  
Puget Sound Institute

“Once we had the overall plan,” Ruckelshaus said, “we needed the indicators to say how we were going to make progress.” It was obvious, he said, that they would need a proper indicator to restore salmon, but “what we found was that it was harder than we thought to get those [other] indicators down.”

The agency was dealing with an area twice the size of Connecticut with thousands of different species, more than 10,000 streams and a multitude of opinions about where to focus recovery efforts.

With the help of scientists from around the region, the Leadership Council narrowed the Vital Signs to 25 key indicators of ecosystem health, from orcas and Chinook salmon to clean water and protected forestland.

While they didn’t satisfy everyone, “I think the indicators we ended up with are pretty good,” Ruckelshaus said recently while considering the overall progress. “If we could get them in a good condition, then Puget Sound would be pretty healthy.”

## REINVIGORATING THE ACTION AGENDA

No one doubts that past restoration projects have improved scattered habitats throughout the region, and protecting special places remains a key part of the endeavor. But getting Puget Sound on a clear road to health has proven difficult, and experts agree that more focused efforts are needed.

The Puget Sound ecosystem is “super complex,” and the restoration effort involves a multitude of government entities and nongovernment partners, said Kari Stiles, adaptive systems manager for the Partnership. With many of the Vital Signs showing no improvement, the Implementation Strategies could help reveal effective pathways to success.

“We are not starting from a blank slate,” Stiles said, “but the Implementation Strategies are intended to define the roadmap of how we get from here to there for each of the Vital Signs.”

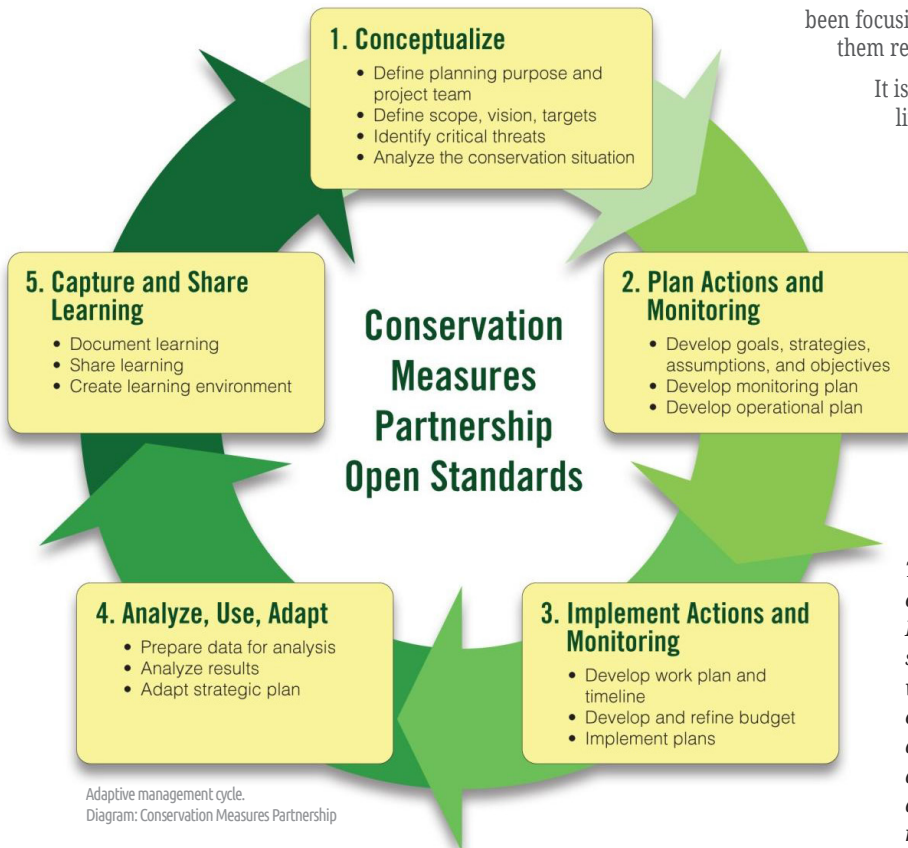
So far, nine Implementation Strategies are under development, with more yet to be launched. As completed, these will provide essential content for the Puget Sound Action Agenda and will guide recovery efforts for years.

Such decisions are especially important in a time of scarce resources, officials say. A 2015 report by the Puget Sound Partnership describes a shortfall of more than \$800 million dollars for what it called “Near Term Actions” during the years 2014-2015. With an average of about \$30 million federal dollars per year dedicated to these actions, experts view prioritization as critical. But figuring out where efforts will do the most good is no easy task.

“As more of these issues are expressed as chains of cause and effect, it becomes clear that we must address root causes to get traction,” says Nick Georgiadis, a research scientist with the University of Washington Puget Sound Institute, who has been focusing on the details of the Implementation Strategies. “Most of them require social and behavioral changes for any of this to pan out.”

It is not just a recovery effort, he added. “It is about learning to live sustainably in a modern society.”

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## LEARN AND ADAPT

The implementation Strategies are part of an overall “adaptive” approach to management for Puget Sound — the idea that successful efforts should be recognized and propagated elsewhere, while less effective actions should be revised or eliminated. Interdisciplinary teams of scientists and other experts are combining their forces to account for new and emerging issues, as well as the practical considerations that come with moving from planning to implementation.

## HOW IT WORKS

Each Implementation Strategy addresses a problem — such as the loss of shellfish beds or toxic chemicals in fish — by first identifying the various “pressures” that created the problem. Actions that might help reduce the pressures and solve the problem are considered and prioritized, informed by the latest scientific findings and understanding.

In the case of shellfish beds, the goal is to allow for the safe harvesting of shellfish, an economic and cultural tradition going back to the mid-1800s. Washington leads every other state in commercial shellfish production, and each year Puget Sound growers sell more than 16 million pounds of clams, oysters and mussels worth more than \$72 million. That production is still significant, despite the closure of thousands of acres of shellfish beds because of pollution.

Cleaning up just a portion of that pollution could result in hundreds of new jobs in the shellfish industry, as well as expanded recreational opportunities on public and private beaches. Ready access to shellfish remains important for many people — including Native Americans, who eat a lot of fish and shellfish and place these traditional foods at the center of their cultural gatherings.

The approved indicator for healthy beaches calls for a net increase in shellfish beds open to commercial and recreational harvest. The Implementation Strategy describes a series of high priority “approaches” for reducing pollution, such as that from failing septic systems. Ideas include programs to increase awareness among homeowners while providing funding for needed upgrades. Much of that work is underway.

The shellfish Implementation Strategy also has revealed that more work is needed in areas where shellfish beds are affected by agricultural runoff. One priority approach includes increased support for farmers who raise livestock to improve waste-management systems.

While the shellfish strategy involves cleaning up pollution, it also recognizes that currently open shellfish-growing areas must remain open. Otherwise, reaching the target of a net increase of 10,800 acres of harvestable shellfish beds becomes even more difficult. Careful monitoring and rapid response to increasing pollution are considered essential.

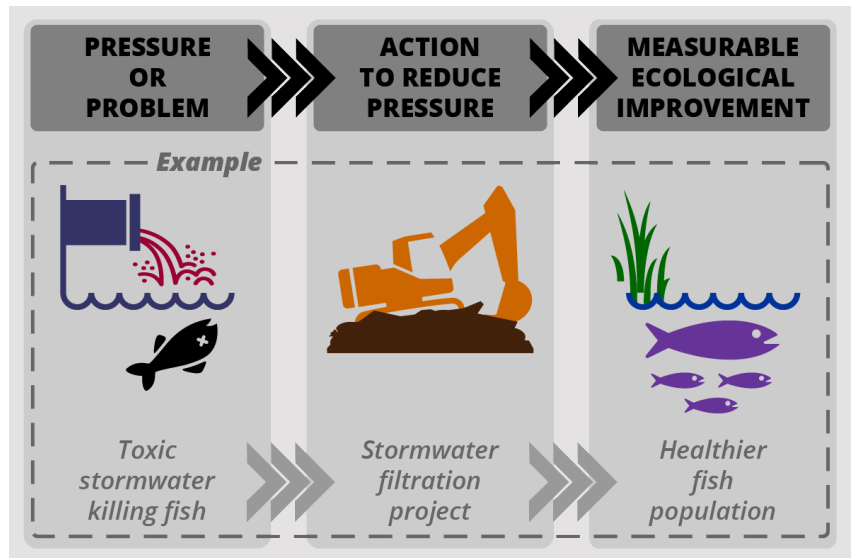
## ORGANIZING THE REGIONAL EFFORTS

The new Implementation Strategies are organized under the three existing strategic areas of emphasis, or Strategic Initiatives, in the Action Agenda. Labeled Stormwater, Shellfish and Habitat, each initiative is led by one or more agencies.

“Until now, we have asked people to submit their ideas for funding to advance one of the three Strategic Initiatives,” said Angela Adams, EPA’s team leader for Puget Sound. “But when you do that, you are not necessarily matching priorities with actions.”

The EPA is a major source of funding for development of the Implementation Strategies, with funds flowing through the congressionally authorized National Estuary Program.

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## WHAT IS CONTAINED IN AN IMPLEMENTATION STRATEGY?

Implementation strategies are typically designed to advance a single Vital Signs indicator, a measure of ecological health or human well-being. A complete strategy should include the following elements:



### A DESCRIPTION OF CURRENT CONDITIONS:

What is the status of the Vital Signs indicator, and how much work is left to be done before the target is reached?



### LOGIC MODELS:

What are the problems to be overcome, and what sequence of actions will most likely lead to the desired improvement?



### ONGOING PROGRAMS:

What efforts are already established to improve the conditions, and how effective are those programs?



### NEW IDEAS:

How will changes in policies, actions and approaches best achieve the goal?



### SCIENCE AND RESEARCH:

Is the natural system understood well enough to predict the consequences of human intervention? If not, what further studies are needed?



### MONITORING:

Are the ongoing ecosystem changes adequately measured? What will it take to understand the outcome of various actions?



### ADAPTIVE MANAGEMENT:

How could prescribed actions be changed in response to what is learned along the way?



### COSTS:

Once a strategy is outlined, what kind of financial support is needed for each of the proposed actions needed to achieve the recovery target?



IMPLEMENTATION STRATEGIES WILL TARGET PUGET SOUND "VITAL SIGNS" [ CONTINUED ]

## STATUS OF IMPLEMENTATION STRATEGIES

The following nine Implementation Strategies are under development with others yet to be launched. These strategies are designed to improve specific measures, called indicators, which track the 25 Vital Signs used to measure ecological health. Many of the Vital Signs (the headings below) have multiple indicators, but Implementation Strategies have not yet been proposed for all indicators.\* Ultimately, the strategies are designed to advance the major Puget Sound recovery goals of improving water quality, water quantity, habitat, the food web, human health and human quality of life. (Status information provided by the Puget Sound Partnership.)

\* Although it is unlikely that an independent Implementation Strategy will be developed for every Vital Sign, all Vital Signs will be addressed by at least one Implementation Strategy. In cases where key pressures, recovery approaches, barriers or opportunities are common across multiple Vital Signs, an Implementation Strategy could address more than one Vital Sign.  
-- Source: Puget Sound Partnership










TOPIC	GOAL	INDICATOR	TARGET	PROGRESS	HIGH-LEVEL STRATEGIES	STATUS OF IS
 <b>Chinook salmon</b>	Improve species and food web	Salmon population	Stop the overall decline and increase two to four populations in each region of Puget Sound.	None. Nearly all populations are declining or show no trend.	Under review.	In progress, completion mid-2017.
 <b>Eelgrass</b>	Protect and restore habitat	Area of eelgrass beds	Increase the area of eelgrass beds by 20 percent over a 2000-2008-baseline measurement.	None. The amount of eelgrass has grown to about 8 percent above the baseline, but experts declared the trend "not changing" because of uncertainties in the estimates.	Protect eelgrass through regulations and state leasing policies; retrofit docks to allow light to pass through; locate mooring buoys away from eelgrass beds; expand no-anchor zones in eelgrass areas; and reduce pollution that can increase water turbidity.	Early prototype, not complete.
 <b>Estuaries</b>	Protect and restore habitat	Area of estuarine wetlands restored to tidal flooding	7,380 acres restored to functioning conditions	2,791 acres have been restored as a result of 28 restoration projects.	Incomplete, but ideas include working with the agricultural community to restore unusable farmland; improving nearby drainage for agriculture; and rezoning or purchasing upland areas to allow farmers to relocate from lands affected by rising tides.	Overall strategy and narrative complete. Still to be developed are specific actions, changes in programs and policies, needs for research and monitoring, and cost estimates.
 <b>Floodplains</b>	Protect and restore habitat	Area of floodplains restored to proper function	Restore or have projects underway to restore 15 percent of degraded floodplains, which amounts to 43,557 acres	About 3,851 acres of floodplains have been improved with 56 projects through 2015.	Discourage development and redevelopment in sensitive floodplains; restore floodplains, including levee removal or setback; and involve communities in land-use planning.	Overall strategy and narrative complete. Still to be developed are specific actions, changes in programs and policies, needs for research and monitoring, and cost estimates.
 <b>Freshwater quality</b>	Water quality	Benthic Index of Biotic Integrity, a measure of stream invertebrates	"Excellent" scores retained for all lowland streams, with improvements from "fair" to "good" for 30 streams	Mixed. Only 76 percent of "excellent" streams maintained that ranking, but more streams listed as "fair" improved than declined.	To be developed.	Planning underway, completion late 2017.
 <b>Land development and cover</b>	Protect and restore habitat	Acreage of ecologically important lands converted to development and other uses	Loss of vegetated area on ecologically important lands not to exceed 0.15 percent over any five-year period	None. Losses may be occurring at an increasing rate.	Improve implementation of growth-management regulations to protect sensitive lands; increase acquisition of important habitats; provide incentives for protection by private landowners; and encourage compact growth.	Overall strategy and narrative complete. Still to be developed are specific actions, changes in programs and policies, needs for research and monitoring, and cost estimates.
 <b>Shellfish beds</b>	Healthy human population	Harvestable acreage of shellfish growing areas	Net increase of 10,800 acres by 2020, including 7,000 acres where harvest was prohibited.	New openings of 9,254 acres and closures of 5,559 acres result in a net increase of 3,695 acres by September 2016.	Identify and repair failing septic systems; work with farmers to improve manure management systems where; and protect upgraded areas from further pollution.	Overall strategy and narrative complete. Still to be developed are specific actions, changes in programs and policies, needs for research and monitoring, and cost estimates.
 <b>Shoreline armoring</b>	Protect and restore habitat	Length of man-made bulkheads and seawalls	The total amount of armoring removed should exceed the total amount added from 2011 to 2020	The total amount permitted armoring removals in two years — 2014 and 2015 — exceeded the amount of permitted new construction, but total permitted construction since 2011 still exceeds removal.	To be developed.	Planning underway, completion late 2017.
 <b>Toxics in fish</b>	Water quality	Toxic chemical levels in fish tissue.	Toxic levels should fall below multiple health-effects thresholds and screening levels.	Mixed. For example, levels of polychlorinated biphenyls (PCBs) have not declined in Pacific herring, but levels of polybrominated diphenyl ethers (PBDEs) have met the target except for a few samples in South Puget Sound.	To be developed for one or more indicators.	Planning underway, completion late 2017.

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