

Revised Puget Sound Vital Signs and Indicators

What are the Puget Sound Vital Signs?

The Vital Signs address the ecosystem components that the Puget Sound recovery community sees as important to understand, monitor, and assess on an ongoing basis. They are designed to relate to the six statutory goals for ecosystem recovery defined in the law that created the Puget Sound Partnership. The six goals are paraphrased as healthy water quality, protected and restored habitat, abundant water, thriving species and food webs, healthy human populations, and vibrant quality of life.

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Vital Signs are measured using indicators. We work collaboratively with individual reporting leads to report the current status and changes over time of each Vital Sign indicator. Established monitoring programs managed by a variety of organizations typically collect and report the data for Vital Sign indicators.

Vital Signs and indicators answer the following types of science and management questions:

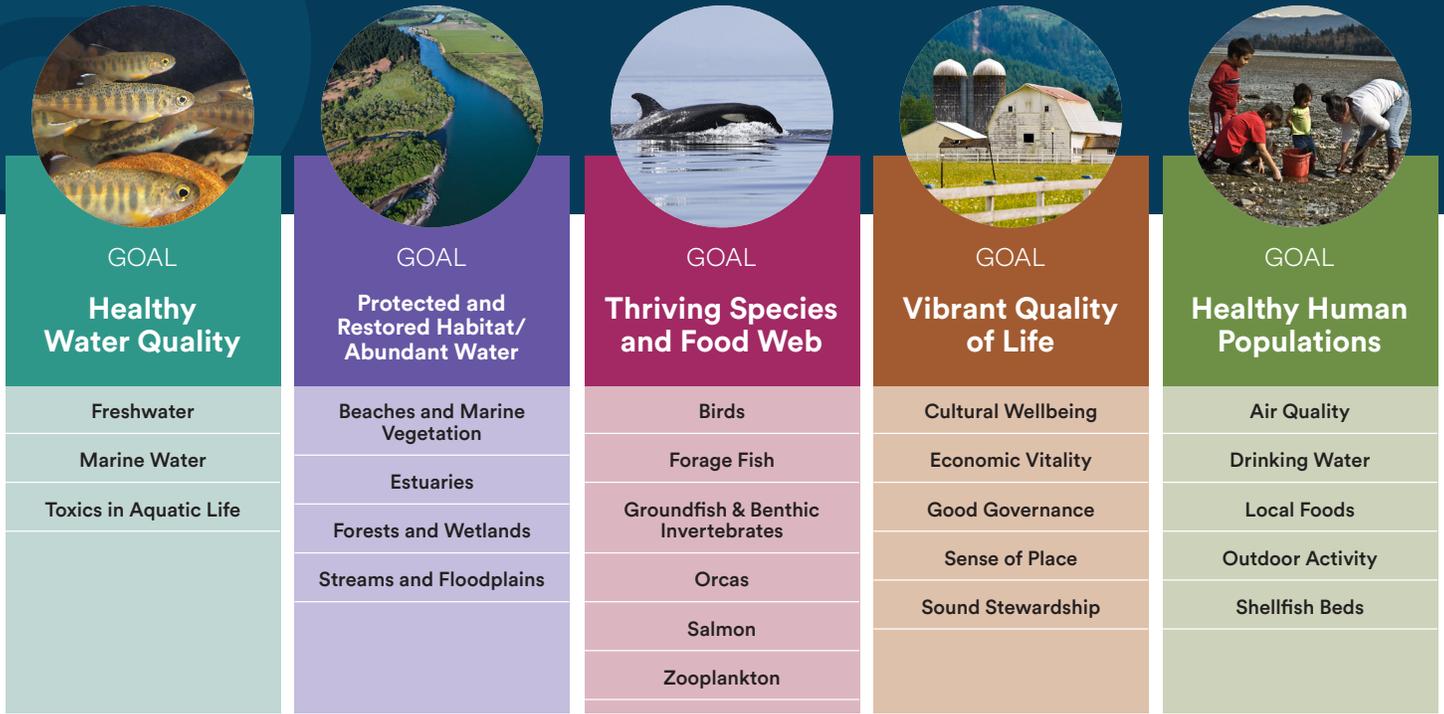
- Is the condition of the Vital Sign improving or not? How certain are we?
- Are we meeting the goals for ecosystem recovery?
- Are we reaching a tipping point or some other trigger for more assertive actions?

As the backbone state agency coordinating ecosystem recovery efforts in Puget Sound, we seek to drive action based on results. We use a system of [Puget Sound Indicators](#) designed to give us timely feedback on our collective progress to recover Puget Sound. Puget Sound Indicators are fundamental to our accountability role. In this system of measures, the Vital Signs and their indicators represent the measures of “ultimate outcomes” shared and embraced by the whole of the Puget Sound recovery community.

HIGHLIGHTS OF THE REVISED VITAL SIGNS

Building off a solid foundation for Vital Signs, we retained many of the existing Vital Sign indicators, while improving and adding new Vital Signs and indicators in a way that represented more aspects of the ecosystem and that is consistent with our system of progress measures.

- We re-framed Vital Signs and their indicators to represent the measures of ultimate outcomes of Puget Sound recovery shared and embraced by the whole of the Puget Sound recovery community.
- Given their more recent adoption in 2015, Vital Signs for healthy humans and vibrant quality of life remained largely intact except where a change was needed to align with the overall progress measures framework.
- Thanks to focus group work, we renamed some Vital Signs so that they represented concepts, places, or species that could be easily imagined. For example, *Forests and Wetlands and Beaches and Marine Vegetation*.
- We combined the habitat and abundant water goals and their representative Vital Signs.
- We retained and improved many of the Vital Signs and gained new ones.
 - » Five continue existing Vital Signs: *Freshwater, Marine Water, Toxics in Aquatic Life, Orcas, and Birds*.
 - » Three re-frame existing Vital Signs to present the topic more cleanly as an ecosystem condition and to avoid tracking pressures or activities at the Vital Sign level: *Forests and Wetlands, Streams and Floodplains, and Beaches and Marine Vegetation*.
- Vital Signs have more scope
 - » *Chinook Salmon* becomes more broadly Salmon and includes more species indicators; Pacific herring becomes more broadly Forage Fish and includes more species; and Estuaries expanded to track both large and small estuaries and pocket estuaries and embayments.
 - » Two Vital Signs, *Groundfish and Benthic Invertebrates and Zooplankton*, are new.



Revised Vital Sign portfolio organized by ecosystem recovery goals from Washington State statute (RCW 90.71.300)



Carol Maloy

How did we choose Vital Signs and indicators?

In 2019, we undertook a collaborative effort to revise the Puget Sound Vital Signs and indicators to address longstanding concerns and critiques with the help of Ross Strategic as our consultant team. We initiated revisions to the water quality and quantity, habitat and species and food webs goals by incorporating scientific and institutional information gained since the indicators were selected 10 years ago.

The revisions effort relied mainly on expert judgment from science and policy experts from throughout the Puget Sound recovery community, along with recommendations from previous studies and analyses, and conceptual models¹. Throughout the process there was an emphasis on working iteratively with the Puget Sound recovery community and on moving forward Vital Signs and indicators that were supported by relevant scientific and policy experts.

On June 10th, 2020, the Vital Signs revisions project team presented recommendations for revised Vital Signs and indicators to the Leadership Council, who unanimously adopted 13 Vital Signs and 34 indicators. Nineteen more indicators were flagged for future development.

¹O'Neill et al. (2018). *Evolving the Portfolio of Indicators to Assess and Report on the Condition and Recovery of the Puget Sound Ecosystem: Moving from Theory to Practice Puget Sound Partnership was a key study for the revisions effort.*



What are some key next steps?

We plan to begin monitoring and reporting on the revised Vital Signs and indicators after January 2022 in the Puget Sound Info platform. The reporting will include data, maps, and key results.



Vital Signs and their indicators are a core element of the Puget Sound Ecosystem Monitoring Program (PSEMP). To prepare for the transition to revised Vital Signs, we will continue to work collaboratively with the monitoring community through PSEMP. As we step into conversations with partners, we recognize that individual monitoring efforts are often embedded in a complex suite of ongoing programs. Supporting the organizations that lead those programs and helping them achieve their goals is central to attaining the monitoring and reporting goals for the Vital Signs.

Key next steps include:

- Incorporate the revisions into the development of the Action Agenda and associated Intermediate Action Agenda Progress Indicators.
- Engage PSEMP partners in developing expectations and agreements for monitoring and reporting. Identify indicator leads where needed.
- Work with PSEMP work groups and partners to identify data gaps and document resources and capacity needs.
- Develop monitoring and reporting protocols.
- Set targets for a selection of Puget Sound Indicators.
- Connect the Vital Signs and indicators with the Puget Sound Science Panel work on alternative future scenario analysis.
- In the longer term, synthesize results from indicator reports and broader monitoring findings into meaningful information for science-based decision making and management.

The revised Vital Signs and indicators are the result of countless hours of time and expertise volunteered by science and policy experts from throughout the Puget Sound recovery community. The Partnership is grateful for the time and expertise that the Puget Sound recovery community gave to creating these shared measures.

For more information on the Vital Signs and indicators revision effort, see the [technical report](#).

| GOAL : Healthy Water Quality | GOAL : Protected and Restored Habitat/ Abundant Water | GOAL : Thriving Species and Food Web |
|--|--|---|
| Freshwater | Beaches and Marine Vegetation | Birds |
| Freshwater Benthic Index of Biotic Integrity (B-IBI) | Eelgrass Area | Abundance of marine bird populations |
| Water temperature in streams and rivers | Extent of forest cover in nearshore marine riparian areas* | Abundance of terrestrial bird populations |
| Nutrient concentration in streams and rivers | Floating kelp canopy area | <i>Estuarine birds</i> |
| Marine Water | Percent of feeder bluffs in functional condition* | Forage Fish |
| Dissolved oxygen in marine waters | Short and long-term eelgrass site status | Biomass of spawning Pacific herring |
| Marine Benthic Index | <i>Drift cells in functional condition</i> | <i>Regional index of the stock presence and health of forage fish such as Sand Lance, Surf Smelt, and Anchovy</i> |
| Marine water temperature | <i>Miles of intertidal beach in functional condition</i> | Groundfish and Benthic Invertebrates |
| Nutrient balance in marine water | <i>Understory kelp abundance and condition</i> | Abundance and biomass of benthic marine invertebrates |
| Ocean acidification | Estuaries | Abundance and biomass of groundfish |
| Sediment Chemistry Index | Percent of estuaries habitat area in functional condition* | Orcas |
| <i>Marine Benthic Index, phase 2</i> | <i>Number of accessible pocket estuaries and embayments</i> | Number of Southern Resident killer whales |
| <i>Noise in marine water</i> | Forests and Wetlands | Occupancy/residency of orcas in Puget Sound |
| <i>Primary production in marine water</i> | Extent of forest cover in the upper, middle, and lower areas of watersheds | Salmon |
| Toxics in Aquatic Life | <i>Forest condition</i> | Number of natural origin Chinook salmon on spawning grounds |
| Contaminants in adult salmon | <i>Wetlands extent and condition</i> | Number of natural-origin Coho salmon on spawning grounds |
| Contaminants in English sole | Streams and Floodplains | Number of natural-origin Puget Sound Steelhead on spawning grounds |
| Contaminants in juvenile salmon | Floodplain function in large and small river systems* | Number of natural-origin Summer Chum salmon on spawning grounds |
| Contaminants in Pacific herring | Summer low flows in streams and rivers | Zooplankton |
| <i>Contaminants in caged mussels</i> | <i>Changes in hydrologic regime in streams and rivers</i> | Average zooplankton biomass |
| | <i>Extent of forest cover in freshwater riparian zones*</i> | <i>Integrated annual zooplankton biomass</i> |
| | <i>Frequency of flood events</i> | <i>Zooplankton index</i> |

| GOAL : Vibrant Quality of Life |
|--|
| Cultural Wellbeing |
| Participation in cultural practices |
| Economic Vitality |
| Employment in natural resource industries |
| Natural resource industry output |
| Percent of employment in natural resource industries |
| Good Governance |
| Good Governance Index |
| Sense of Place |
| Overall life satisfaction |
| Psychological Wellbeing Index |
| Sense of Place Index |
| Sound Stewardship |
| Engagement in stewardship activities |
| Sound Behavior Index |

| GOAL : Healthy Human Populations |
|---|
| Air Quality |
| Exposure to impaired air quality |
| Drinking Water |
| Index of Vulnerability for Elevated Nitrates in Groundwater |
| Nitrate concentration in source water |
| Local Foods |
| Bivalve harvester-days |
| Locally harvestable foods |
| Recreational Dungeness crab catch |
| Outdoor Activity |
| Condition of swimming beaches |
| Nature-based recreation |
| Nature-based work |
| Shellfish Beds |
| Area of harvestable shellfish beds |

Bold black text = Vital Sign
Black text = existing

Blue text = new indicator
Italics = potential future indicator

* Chinook Common Indicator