

PUGET SOUND  
**VITAL SIGNS**

VITAL Sign  
BEACHES AND MARINE VEGETATION



A functioning, resilient Puget Sound includes dynamic shorelines and extensive kelp forests and eelgrass meadows. The Beaches and Marine Vegetation Vital Sign tells us about the condition of these nearshore habitats and helps us understand whether restoration and protection efforts are working in Puget Sound.

Beaches and marine vegetation are among the most valuable and fragile of our natural resources. They are critical to iconic species like salmon and orcas and hold great cultural importance to indigenous peoples. Shoreline armor disrupts the natural supply of sediment and can lead to the loss of beaches and degraded nearshore habitat while increasing water temperatures and climate change are emerging concerns for marine vegetation health and viability.



Bull kelp forest near Ebey's Landing. Photo credit: Rich Yukubousky.

- Related Strategies
- Awareness of Effects of Climate Change
  - Climate Adaptation & Resilience
  - Education Partnerships
  - Floodplains & Estuaries
  - Funding
  - Greenhouse Gas Emissions & Carbon Sequestration
  - Healthy Shorelines
  - Invasive Species
  - Research & Monitoring
  - Riparian Areas
  - Smart Growth
  - Stewardship & Motivating Action
  - Stormwater Runoff & Legacy Contamination
  - Strategic Leadership & Collaboration
  - Submerged Aquatic Vegetation
  - Wastewater Systems
  - Working Lands Runoff

Vital Sign Reporter

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| VITAL SIGN > INDICATOR                                    | PROGRESS                  | STATUS       |
|---|---------------------------|--------------|
| Beaches and Marine Vegetation                             |                           |              |
| Eelgrass Area   | MIXED RESULTS             | NO TARGET    |
| Short and long-term change at eelgrass sites              | MIXED RESULTS             | BELOW TARGET |
| Floating kelp bed area                                    | GETTING WORSE             | NO TARGET    |
| Feeder bluffs in functional condition                     | LIMITED DATA              | NO TARGET    |
| Extent of forest cover in nearshore marine riparian areas | INDICATOR TO BE DEVELOPED | NO TARGET    |
| Drift cells in functional condition                       | INDICATOR TO BE DEVELOPED | NO TARGET    |
| Understory kelp abundance and condition                   | INDICATOR TO BE DEVELOPED | NO TARGET    |
| Miles of intertidal beach in functional condition         | INDICATOR TO BE DEVELOPED | NO TARGET    |

## KEY VITAL SIGN MESSAGES

- Puget Sound shorelines offer habitat for small fish such as juvenile salmon migrating along the shores to reach the ocean, and beach spawning forage fish like surf smelt. Shoreline armor reduces habitat for fish and blocks the movement of sand and sediment, disrupting natural beach processes, and can block safe and easy access to the water.
- Shoreline armor is present on 715 miles (29%) of Puget Sound shorelines and on 224 miles (34%) of feeder bluff shorelines.
- Feeder bluffs and the use of soft shoreline techniques are getting significant attention for targeted restoration and best practices, respectively, but quantifying restoration actions and impacts is a challenge. Examples meant to overcome this challenge include Ecology's [web app](#) for soft shore projects and restoration effectiveness efforts compiled at the [Shoreline Monitoring Database](#).
- Like terrestrial forests, kelp forests form extensive living structures that provide an array of valuable ecosystem goods and services. Monitoring results show stark contrasts in the [status of floating kelp](#) in different areas of Washington State. Floating kelp status ranges from stable to substantial documented decline.
- There are approximately 55,000 acres of eelgrass in greater Puget Sound. Approximately half of all eelgrass grows in small beds that fringe the shoreline. The remainder grows on broad tidal flats. The largest eelgrass beds are found in Padilla, Samish and Skagit Bays.
- Soundwide eelgrass area has been relatively stable since 2000, as has overall eelgrass area in [herring](#) spawn locations during the last forty years. This is reassuring and sets Puget Sound apart from other developed areas where large scale declines are ongoing.
- Although eelgrass populations appear to be stable soundwide, there is greater variability at smaller spatial scales, with individual sites increasing or decreasing. Eelgrass declines in the San Juan Islands are concerning. Heads of bays and inlets, where water exchange is reduced, are locations of particular concern. Local declines are likely due to a variety of stressors, such as physical damage, local water quality impairments, and eelgrass wasting disease.
- Eelgrass health is linked to the [Marine Water Vital Sign](#). Excessive input of nutrients and organic matter can lead to algae blooms, and overgrowth by epiphytes and nuisance macroalgae. These organisms shade eelgrass beds, and lower density and the maximum depth to which eelgrass grows. Additionally, loss of eelgrass to eelgrass wasting disease has the potential to become a major stressor under increasing climate change, as the severity of outbreaks has been linked to warmer water temperatures.

## BACKGROUND DOCUMENTS

### Implementation Strategy

The Partnership and its affiliated network of researchers works with the three Strategic Initiative Lead Teams on Implementation Strategy development and operationalization. Please read more about these teams and our shared work at <https://pugetsoundestuary.wa.gov/recovering-puget-sound/>

- [Habitat Strategic Initiative](#)
  - [Marine Vegetation Implementation Strategy](#)
  - [Shoreline Armoring Implementation Strategy](#)

### Indicator Targets

- [Eelgrass 2030 and 2050 Recovery Target Fact Sheet](#)
- 2020 Ecosystem Recovery Targets
  - [Leadership Council Resolution 2011-01: Adopting a 2020 ecosystem recovery target for eelgrass](#)
  - [Leadership Council Resolution 2011-15: Adopting a 2020 ecosystem recovery target for shoreline armoring](#)
  - [Eelgrass 2020 Target briefsheet](#)
  - [Shoreline Armoring 2020 Target briefsheet](#)
  - [Developing Indicators and Targets for Eelgrass in Puget Sound: A Science Assessment \(2010\)](#)

## OTHER RESOURCES

### Marine Vegetation

- The Kelp Forest Monitoring Alliance of Washington State ([KelpForestsWA](#))
- [Puget Sound Kelp Conservation and Recovery Plan](#) (2020)
- [Puget Sound Eelgrass Recovery Strategy](#). Washington State Department of Natural Resources (2015)
- [Eelgrass Restoration in Puget Sound](#). Washington State Department of Natural Resources (Gaeckle, 2019)

### Beaches and Shoreline Armor

- [Functions of Feeder Bluffs in the Salish Sea: Prioritizing Beach Restoration and Protection](#)
- [Net change in permitted shoreline armor](#), formerly a Vital Sign indicator is now a (draft) Action Agenda Progress Indicator
- [Armoring on Puget Sound Feeder Bluffs: Implications for the Vital Sign](#) (Shipman, 2017)
- [The Use of Soft Shoreline Techniques: Implications for the Shoreline Armor Vital Sign](#) (Shipman 2017)
- [Relationship between shoreline armor and sense of place in Puget Sound](#) (Trimbach, 2019)
- [Shore Friendly Program](#): Protecting your Property and Puget Sound
  - [Shore Friendly regional effort](#), Northwest Straits Foundation Nearshore Restoration

### Data and Mapping Resources

- [Beach Strategies Phase 1 and Phase 2 Reports](#), prepared by Coastal Geologic Services, Inc.
  - [Armor survey methods](#)
- [WA Department of Ecology Coastal Atlas map of drift cells, latest armor, and shoreforms](#), based on the Beach Strategies program data
- [WA Department of Ecology Examples of Puget Sound Soft Shore and Armor Alternative Projects](#)
- [Puget Sound Eelgrass Monitoring Data Viewer](#), Washington Department of Natural Resources

## CONTRIBUTING PARTNERS



TO LEARN MORE ABOUT THE VITAL SIGNS VISIT: [vitalsigns.pugetsoundinfo.wa.gov](https://vitalsigns.pugetsoundinfo.wa.gov) OR CONTACT: [vitalsigns@psp.wa.gov](mailto:vitalsigns@psp.wa.gov)