PUGET SOUND
VITAL SIGNS

VITAL SIGN
SHORELINE ARMORING

A functioning, resilient Puget Sound ecosystem is defined to include dynamic shorelines maintained by coastal processes such as shoreline erosion and ecological exchange between terrestrial and aquatic systems. Shorelines are among the most valuable and fragile of our natural resources. 29 percent of the shoreline has been armored to protect public and private property, ports and marinas, roads and railways, and other uses. Shoreline armoring, the practice of constructing bulkheads (also known as seawalls) and rock revetments, disrupts the natural process of erosion, which supplies much of the sand and gravel that forms and maintains our beaches and creates habitat for many other species. This Vital Sign tells us how the Puget Sound recovery community is doing to reduce the total amount of shoreline armoring, particularly in those areas along feeder bluffs, and to replace hard armoring practices with soft-shore techniques in our effort to restore the natural processes and function of shorelines.

Vital Sign Reporter

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VITAL SIGN > INDICATOR	PROGRESS	STATUS
Shoreline Armoring		
Armor on feeder bluffs	GETTING BETTER	NEAR OR AT 2020 TARGET
Net change in permitted shoreline armor	GETTING BETTER	BELOW 2020 TARGET
Use of soft shore techniques	INSUFFICIENT OR NO DATA	BELOW 2020 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.
- Some progress has been made to reduce the impact of armor. The removal of armor permitted through Hydraulic Project Approvals (HPAs) administered by the Washington Department of Fish and Wildlife is increasing and the pace of permitting new armor is slowing.
- Replacement of existing shoreline armor remains the most common practice to protect public and private property, according to the HPA permitting activities record. Some information about the use of materials shows that practices are shifting toward using soft shoreline techniques for new construction and replacement armor.

Seahurst after restoration. Photo H. Shipman

- Feeder bluffs (34 percent of which have been armored) 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 the PSEMP Shoreline Restoration list of projects (see Other Resources below).
- Work with landowners on replacement armor methods may be an opportunity to gain shoreline function. The Shore Friendly program provides waterfront homeowners with information about how to protect their property with minimal impact to the ecology of Puget Sound. The Shoreline Armoring Implementation Strategy identifies that the greatest near-term opportunities for armoring removal and natural shoreline protection are on residential shorelines, but initiating efforts on non-residential shorelines is also crucial for long-term gains. Public lands continue to provide opportunities to demonstrate successes with removing armor or using soft shore protection methods.

Strategies, Actions, And Effectiveness

- Shoreline Armoring is a priority focus area for the Partnership's 2018 Action Agenda (*scroll to the bottom of the page to view and download activities in the 2018 Action Agenda*).
- Shoreline Armoring Implementation Strategy
- Restoration and protection projects funded by the National Estuary Program that are associated with the Shoreline Armoring Vital Sign *(in the Puget Sound Info National Estuary Atlas)*
- Shore Friendly program
- What is working to improve nearshore habitat in Puget Sound? View effectiveness fact sheets for nearshore restoration and protection activities.

Background Documents

- Leadership Council Resolution 2011-15, Adopting a 2020 ecosystem recovery target for shoreline armoring
- Shoreline Armoring Target briefsheet

Other Resources

- Beach Strategies Phase 1 and Phase 2 Reports, prepared by Coastal Geologic Services, Inc.
  - Armor survey methods
- Washington Department of Ecology Coastlal Atlas map of drift cells, latest armor, and shoreforms (based on the Beach Strategies program data)
- Shoreline Armoring in Puget Sound, Reporting on the Chinook Salmon Recovery Common Indicators
- The PSEMP Nearshore Work Group's list of shoreline armor restoration and monitoring projects
- Ecology's web app for soft shore projects
  - New app shows the softer side of Puget Sound, August 2019 blog post
  - Flickr album of before and after photos
- Puget Sound Nearshore Chinook Salmon Strategies
- State of our Watersheds Report by the Northwest Indian Fisheries Commission
- Relationship between shoreline armor and sense of place
- Washington Department of Fish and Wildlife Your Marine Waterfront
- Story board about Shore Friendly efforts produced by the Northwest Straits Foundation
- Articles related to shoreline armoring in the Encyclopedia Of Puget Sound

Contributing Partners

Washington Department of FISH and WILDLIFE

DEPARTMENT OF ECOLOGY State of Washington