Shoreline Restoration Effectiveness in Puget Sound

Monitoring Program Summary

Nearly one third of Puget Sound's shorelines are armored (e.g., seawall, bulkhead, riprap). Armoring has documented negative impacts on the flora and fauna that benefit from healthy intertidal beaches. Recent beach restoration efforts have focused on removing armor to recover natural function. Through regular monitoring, we can determine the effectiveness of these restoration efforts and their value to the nearshore ecosystem, applying what we learn to future management scenarios.

Armor before restoration

1 year after restoration

14 years after restoration

Armor removal and restoration at Seahurst Park, a site of longer-term monitoring as highlighted in the [press](#).

Summary of Monitoring Efforts The Puget Sound Ecosystem Monitoring Program (PSEMP) [Nearshore work group](#) recently [compiled a list of sites](#) that have been restored and monitored since 2005. The focus was on sites where shoreline armor has, or will be removed, and also included techniques from the [Marine Shoreline Design Guidelines (MSDG)](#) and [Your Marine Waterfront](#): sediment nourishment, log placement, and vegetation planting. The list details 54 sites, of which 38 had armor removed as of February 2020, totaling 21,132 feet of armor removed. 26 different groups helped with monitoring efforts, a striking demonstration of the participation breadth across Puget Sound. Further information on armor removal can be found at the [Shoreline Armoring Puget Sound Vital Sign](#), and [Ecology's web app for soft shore projects](#).


Map of PSEMP monitoring sites

Monitoring at Bowman Bay

Organizations Involved in Funded Near Term Actions (NTA) Current funding for groups involved with this memo supports coordination of data collection, stewardship, and analysis. These NTAs implement priorities of the [2018 action agenda](#). [NTA 2018-0219](#) has supported data collection at 22 sites, training over 50 volunteers, and recording over 470 volunteer hours. [NTA 2018-0525](#) enables anyone to upload data to a centralized Shoreline Monitoring Database ([shoremonitoring.org](#)), which combines multiple datasets and ensures data longevity and compatibility across groups. Ongoing efforts support addition of more protocols to the database, incorporation of historical data, improvement to database features, addition of data visualizations, and analysis of data to evaluate restoration effectiveness. So far, 12 organizations – citizen science groups, agencies, and academics – have uploaded and downloaded data.

Funding is instrumental for shoreline monitoring, as successful volunteer and student involvement requires ongoing training, staff time for organizational support, and stewardship and analysis of the data. With continued funding, we will expand efforts to include new sites, and incorporate additional data and protocols to the centralized database. Expansion of data collection and interpretation will provide an adaptive management framework to evaluate restoration project effectiveness, and will generate information that can inform future armor removals. Partners for both of these NTAs include the Northwest Straits Foundation, University of Washington, Washington Sea Grant, Washington Department of Fish and Wildlife, Friends of the San Juans, Sound Data, Salish Sea Stewards, Sound Water Stewards, Vashon Nature Center, and Marine Resources Committees for Whatcom, Skagit, Island, Snohomish, and Jefferson Counties.
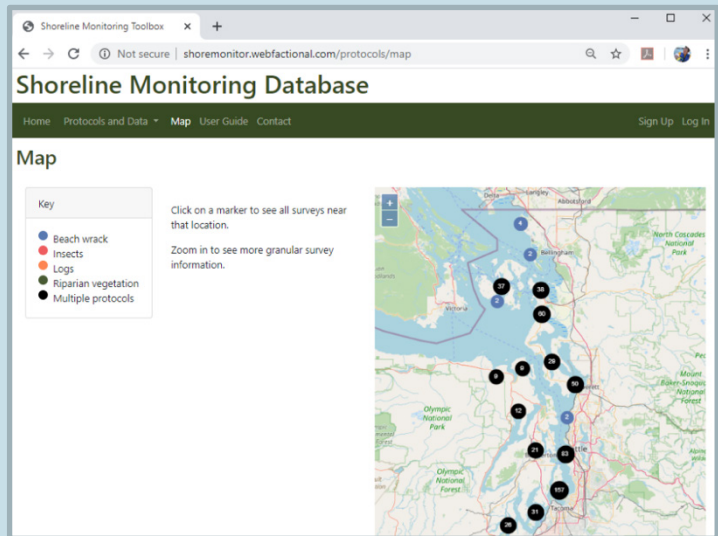
Citizen Science Spotlight As an example of citizen science engagement, the Northwest Straits Foundation has been leading volunteer surveys at Bowman Bay since 2013, documenting success stories such as forage fish spawning 4 years after restoration. Overall, 87 volunteers have contributed over 1,980 hours monitoring the project. The **Vashon Nature Center** BeachNET program engaged 177 volunteer hours in 2019, monitoring restoration effectiveness across five sites. These citizen scientists were a mix of community volunteers, students, and land trust interns, and have changed the views of local citizens.

Monitoring at Dockton Park

Current Gaps and Priorities for Future Monitoring Ongoing funding is vital for continued data collection using consistent protocols. Funding has varied over the years depending on availability, and long-term funding would enable more efficient monitoring efforts, without having to piece together short-term funding opportunities to maintain a consistent monitoring program. Although we have made large strides in recent years in coordinating efforts and standardizing protocols across diverse groups, given the range of organizations and geographic scope involved, continued support would help make levels of effort consistent across regions. Future efforts should focus on maintaining long-term monitoring of before and after restoration data, in order to learn from the temporal trends that can inform management actions. Restoration sites are often unique in their setting and design application. New sites should be incorporated to expand our spatial framework for analysis, and address specific design details from the MSDG. By addressing both physical and ecological functions of beach restoration, we will be able to better plan for restoration actions that will be sustainable, especially when faced with coastal resiliency and sea level rise.