Shoreline Restoration Effectiveness in Puget Sound

Recommendations for Improving Project Design

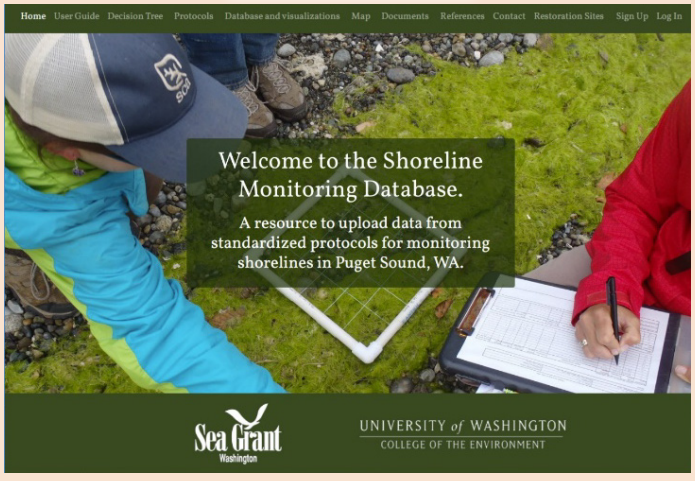
Target audience: project sponsors, design and engineering consultants, and funders

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 removal and restoration at Seahurst Park, a site of longer-term monitoring.

Summary of Monitoring Efforts Our focus is on sites where shoreline armor has, or will be removed, including additional techniques from the Marine Shoreline Design Guidelines (MSDG) and Your Marine Waterfront: sediment nourishment, log placement, and vegetation planting. Our goal is to evaluate effectiveness of restoration projects and generate information that can be used in guidance to inform future armoring removals. Main Partners include the University of Washington, Washington Sea Grant, Northwest Straits Foundation, Washington Department of Fish and Wildlife, the Vashon Nature Center, and Sound Data.

Shoremonitoring.org

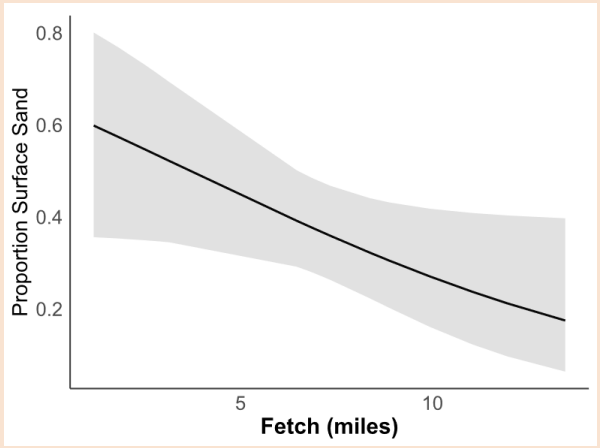


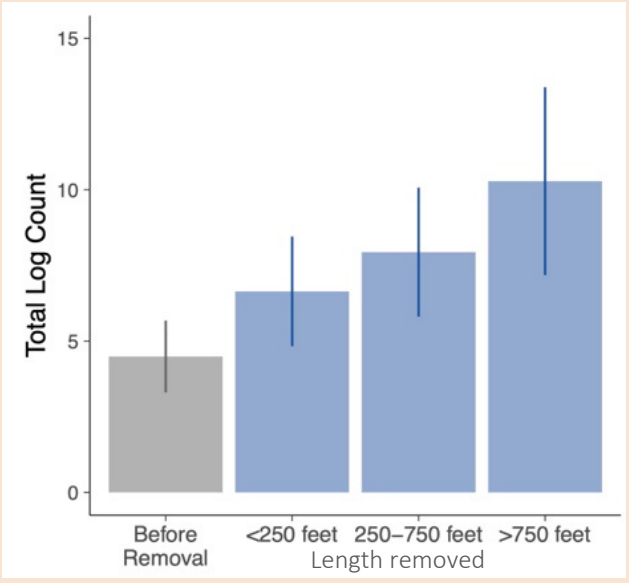
Organizations Involved in Funded Near Term Actions (NTA) Current funding for groups involved with this memo supports coordination of data collection, stewardship, and analysis. These NTAs through the Habitat Strategic Initiative Lead (HSIL) implement priorities of the Action Agenda. NTA 2018-0219 has supported data collection at 28 sites, with over 100 volunteers trained, recording more than 2,700 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.

Analyses to Inform Project Design Data collection and interpretation provide a framework to evaluate restoration project effectiveness and generate information that can inform future armor removals. Key messages and example figures that will help guide future restoration design and implementation are:

Restored sites were generally improved in ecological response post armor removal and approached "natural" levels. However, natural beaches had more overhanging vegetation, fallen trees, and insect taxa richness. This suggests that more time is necessary for growth and maturation of vegetation at restored sites, relative to rapid responses like wrack and logs.

Shoretype can influence restoration response: Feeder bluffs had a higher proportion of surface sand and number of fallen trees than accretion shoreforms and pocket beaches, coinciding with the erosion of bluff material. Natural pocket beaches within bordering rocky headlands had higher insect densities.

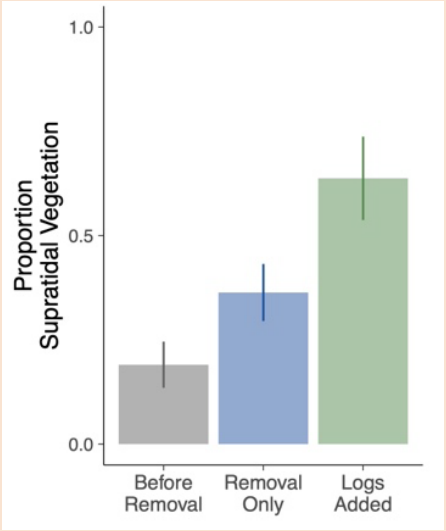




Sites with a large fetch had higher input of deposited wrack and logs from external marine sources, while sites with a small fetch had higher input of fallen trees and eroding sand from localized terrestrial sources.

Length of armor removed had varying effects depending on the ecological response variable measured. Total log count increased with length of armor removed, whereas insect abundance was highest for the shortest lengths of armor removed.

Log addition is an important restoration action when partnered with armor removal. Total log count, proportion of wrack cover, supratidal vegetation, and surface gravel were all significantly higher when logs were added.



Time since armor removal affected a few ecological variables depending on additional restoration actions taken. Wrack depth increased through time when logs were added. Insects increased through time only when supplemental vegetation did not need to be planted, suggesting correlation with some other variable such as pre-existing natural vegetation and colonization.

More information on monitoring efforts and interpretation can be found at the Shoreline Monitoring Database.

Funded wholly or in part by EPA under grant #PC-01J22301 (NEP Habitat Strategic Initiative).