

Shore Stewards News

GUIDELINES AND RESOURCES FOR LIVING NEAR WATER | ESTABLISHED 2003

Spring 2022

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Shoreline Armor: 101



Figure 1: Soft shoreline armor encourages a healthy marine ecosystem by providing natural habitat for fish, seabirds, and other native species. Iverson Preserve on Camano Island. **Image Credit:** Kristine Vannoy

Introduction

As a lifetime resident of Greater Puget Sound, I have enjoyed many walks along public and private beaches. As a child, my favorite beaches seemed to have endless supplies of sand, shells, and marine life. My sisters and I would spend hours building sandcastles, finding tiny crabs under rocks, searching for clams and other treasures. As an adult, it was interesting to notice how the beaches were different from each other; some were very rocky with little natural marine debris while others were sandy with drift logs and seaweed as far as the eye could see. It made sense to me that shorelines around Puget Sound would look different based on various environmental influences, such as location and tides. What did not occur to me was the effect that shoreline property owners had on the beaches in front of their homes, specifically whether their property had shoreline armor.

“Approximately 200 times each year, someone in Puget Sound applies for a permit to either build a new bulkhead or replace an existing one” (Carman, et al., 2010, as cited in Barnard, 2010). A bulkhead is a type of hard shoreline armor built parallel to the shore to control soil erosion from wind, tides, and waves. Hard

shoreline armor is traditionally an engineered structure of sizeable length and includes bulkheads, seawalls, riprap, concrete, steel, aluminum, and creosote wood pilings. Shoreline property owners in Puget Sound have been using hard shoreline armor for hundreds of years dating back to the European settlers. Still, today, they have more to consider before building or replacing shoreline armor.

Hard Shoreline Armor

Although hard shoreline armor has been the traditional method to protect upland property against erosion, flooding, and exposure to the elements, it can cause severe erosion of nearshore marine habitat. As waves strike the armor, the water is often diverted in a downward motion toward the beach which scoops away sand, gravel, and natural sediment. In time, the beach will erode leaving a coarse substrate unsuitable for some species of forage fish, which require sand and small gravel for spawning. Forage fish are a necessary part of the marine food chain providing forage for marine mammals and other larger fish. In addition, seabirds and other native species can be affected as the sand and gravel are significantly reduced and clams and other shellfish disappear. Hard shoreline armor creates an unnatural hard stop to the normal ebb and flow of tides. Driftwood, algae, and other marine debris brought in by the tide cannot accumulate which causes a decline in the necessary habitat and food sources needed by fish, birds, and other small shoreline creatures.

The ecological impact of hard armor is an important consideration for shoreline property owners but there are other practical points to consider:

- Beach access could be limited in a way that may be difficult and unsafe if obstructed.
- The cost to maintain could be expensive as the gradual loss of sand and gravel may undermine the structure causing it to lean toward the water.
- It may not provide the same protection against erosion or flooding as sea levels continue to rise.
- The loss or narrowing of the beach due to structure placement.
- It may not be necessary depending on the home's proximity to the shoreline.
- Existing armor on a neighbor's property may influence the type of armor needed.



Figures 2-3: Despite hard shoreline armor, this waterfront community has flooded from high tides for the last two years. Maple Grove on Camano Island. Image Credit (left): Kristine Vannoy. Image Credit (right): Christine Lund

Soft Shoreline Armor

Soft shoreline armor is a bioengineered method used to protect and stabilize the shoreline with natural materials. It creates a living beach to minimize the impact of armoring and encourages a healthy marine

ecosystem. Hard armor may be removed and replaced with sand and gravel combined with root wads, native plants, and drift logs to mimic a natural beach. Replacing the unnatural hard stop of bulkheads and seawalls with soft recontoured slopes would allow tides to roll onto the shore leaving algae, seagrass, leaf litter, and other marine debris to accumulate. Drift logs and other organic beach debris harbor insects that become food for birds and other wildlife while shallow waters provide necessary habitat, food, and shelter for shellfish, forage fish, and salmon populations.



Figures 4-5: Hard shoreline armor is removed and regraded with sand and gravel to match the natural beach slope. Cornet Bay on Whidbey Island. Image Credit: Sarah Schmidt

As more waterfront property owners become interested in environmental stewardship and soft shoreline armor, the survival of our native fish and wildlife is improved. In return, homeowners enjoy the many benefits of waterfront living, such as:

- An open shoreline provides easier access to beach activities like wading, strolling, swimming, and flying kites.
- Better erosion control as native plants, sand and gravel absorbs wave energy increasing beach resilience to storms and rising sea levels.
- Greater opportunities for marine life discovery and interaction.
- Lower cost to maintain than hard shoreline armor.

What can you do?

Removing hard shoreline armor and creating new soft shoreline armor requires a bioengineered approach that should be carefully designed by an experienced professional. Not all locations will benefit from soft shoreline armor, and it is not always advantageous to remove existing bulkheads. An experienced professional would help the homeowner decide if changes are necessary and what would be practical. Changes to existing shoreline armor can vary from limited to no action up to full hard armor removal. If a waterfront property cannot become completely natural, soft shore improvements can still be made with native plants, site recontouring, log berms, or other soft shore protection. Permits are necessary before building or replacing shoreline armor and homeowners should not attempt to make changes on their own. Poorly planned or inexperienced changes to the shoreline could result in damage to the ecosystem or fail to protect the property from erosion and flooding.



Figures 6-7: Hard shoreline armor is removed and regraded to protect and stabilize the shoreline. Cornet Bay on Whidbey Island. **Image Credit:** Sarah Schmidt

Resources

The most crucial step that a waterfront homeowner can take to protect both the delicate marine ecosystem and their own shoreline property is to consult with an expert before making any changes. There are several resources available that offer more information, expert advice, and potential funding sources.

The Department of Fish and Wildlife, in coordination with others, has launched a new website at: www.shorefriendly.org. This resource is designed to help waterfront property owners with everything they need to know about maintaining their shorelines. A new booklet can also be ordered through the website called, *Your Marine Waterfront: A guide to protecting your property while promoting healthy shorelines*.

The [Northwest Straits Foundation](http://www.northweststraitsfoundation.org) is also working with Shorefriendly.org to offer many different services to waterfront homeowners. In addition, shoreline property owners can contact their local WSU Extension office or Conservation District for more information and resources.

Bibliography

Arber, L., Burcar, J., Carman, R., Faghin, N., Hart, A., Hunter, M., Jewett, J., Key, S., Mitchell, T., & Shipman, H. (2016). *Your Marine Waterfront, A guide to protecting your property while promoting healthy shorelines*. Washington Department of Fish and Wildlife. <http://wdfw.wa.gov>

Barnard, Bob (2010) Developing a guidance document for Puget Sound marine shorelines, in Shipman, H., Dethier, M.N., Gelfenbaum, G., Fresh, K.L., and Dinicola, R.S., eds., 2010 *Puget Sound Shorelines and the Impacts of Armoring – Proceedings of a State of the Science Workshop*, May 2009: U.S. Geological Survey Scientific Investigations Report 2010-5254, p. 205-212.

Bly, S., & Sandy Welch. (2020). *Nearshore Living, A guide to creating better ground in our community*. Whidbey Conservation District. <http://betterground.org>

Brincka, M., McNamara, D., & Simmons, B. (2015). Reducing Erosion & Landslides. In S. Chase (Ed.), *Shore Stewards Guide for Shoreline Living* (pp. 39–48). essay, Washington State University. <http://shorestewards.cw.wsu.edu/guidelines/>

Carman, R., Taylor, K., and Skowlund, P., 2010, Regulating Shoreline Armoring in Puget Sound, in Shipman, H., Dethier, M.N., Gelfenbaum, G., Fresh, K.L., and Dinicola, R.S., eds., 2010, *Puget Sound Shorelines and the Impacts of Armoring—Proceedings of a State of the Science Workshop*, May 2009: U.S. Geological Survey Scientific Investigations Report 2010-5254, p. 49-54

Johannessen, Jim and Andrea MacLennan (2007) *Beaches and Bluffs of Puget Sound*, Puget Sound Nearshore Partnership Report No. 2007-04. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.
<http://pugetsoundnearshore.org>.

Williams, D. B. (2021, March 30). *Is shoreline armoring becoming a relic of the past?* Salish Sea Currents Magazine. Retrieved April 5, 2022, from <https://www.eopugetsound.org/magazine/IS/shoreline-armoring-relic-past>



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