

Regulating Shoreline Armoring in Puget Sound

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Introduction

Bordered by approximately 2,500 mi of shoreline, Puget Sound contains a rich array of marine habitats that support diverse populations of fish, shellfish, birds, marine mammals and other wildlife. For humans, Puget Sound provides a recreational playground, support for waterborne commerce, and outstanding waterfront properties for residential development. Concurrent with increasing population levels in Puget Sound, shoreline development for single-family residences has substantially increased. Moreover, approximately half of the shoreline modifications on saltwater shorelines are associated with single-family residences (Berry and Kazakov, 2004). In addition, single-family residential development on Puget Sound shorelines commonly involves the installation of some form of shoreline armoring.

Armoring of marine shorelines is not unique to Puget Sound. In California for example, 10 percent, or 110 miles of the coastline, has now been armored. In the State's most developed counties (Ventura, Los Angeles, Orange, and San Diego), approximately 33 percent of the shoreline is armored with seawalls or riprap (Griggs, 2010).

Locally, Morrison (2001) estimated that 36.6 percent of the marine shoreline in Thurston County, WA had been armored. His analysis, however, indicated that the rate of new armoring declined between 1995 and 1999, from 874 ft to 29 ft/yr.

More recent data based on Hydraulic Project Approvals (HPAs) issued by the Washington Department of Fish and Wildlife (WDFW) indicate that construction of bulkheads in Puget Sound is occurring at a brisk pace. These data indicate that 233 new bulkheads were constructed on Puget Sound shorelines between January 2005 and December 2007 (Brian Benson, Washington Department of Fish and Wildlife, unpub. data). Assuming a hypothetical average length of 100 ft, this equates to approximately 4.4 mi of new shoreline armoring over this 3-year period, or slightly less than 1.5 mi/yr. During this same timeframe, a total of 389 existing bulkheads were replaced on Puget Sound shorelines due primarily to deterioration of the structures. On the plus side of the equation, 11 bulkheads were removed over the three years, primarily as components of shoreline restoration projects incorporating beach contour and riparian vegetation rehabilitation.

Regulation of shoreline modifications in Puget Sound, including armoring installation, is administered primarily through two state laws, due in large part to the fact that the U.S. Army Corps of Engineers (COE) does not assert regulatory authority above Mean Higher High Water (MHHW) in marine waters in Washington State (Jeffrey Dillon, U.S. Army Corps of Engineers, oral commun., January 15, 2010). Because most new shoreline armoring takes place above MHHW in Puget Sound, the Hydraulic Code (Code) administered by WDFW and the Shoreline Management Act (SMA) administered by the Washington Department of Ecology (Ecology) are the two principal regulatory authorities for shoreline armoring in the state.

Washington Hydraulic Code

The Hydraulic Code (RCW 77.55.100), established in 1943 by the Washington Legislature, was originally a simple, one-paragraph law that focused on protection of fish life from impacts resulting from in-water construction activities. It required that any person that desires to conduct a "...project that will use, divert, obstruct, or change the natural flow or bed of any river or stream, or that will utilize any of the waters of the state...", must submit plans to the Departments of Fisheries (WDF) and Game (now merged into WDFW) for approval prior to commencing construction. Permits issued for such in-water work are referred to as Hydraulic Project Approvals. The Code has undergone many changes through the years, in both substance and length; the Revised Code of Washington (RCW) for WDFW now contains 23 pages (<http://apps.leg.wa.gov/RCW/default.aspx?cite=77.55>), and the Washington Administrative Code (WAC) contains 78 pages of implementing language (<http://apps.leg.wa.gov/WAC/default.aspx?cite=220-110>).

Bulkhead criteria for projects in Puget Sound were originally developed by WDF in 1971, and subsequently revised in 1974 to address the need for protection of surf smelt spawning areas in the upper intertidal zone. The WDF, however, did not exert regulatory authority in marine waters until March of 1977, following a decision by the Pollution Control Hearings Board that ruled in favor of the agency in its issuance of a permit for the East Bay Marina in Olympia (PCHB No. 1032). In subsequent years, WDFW sought to

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minimize impacts from bulkheads by requiring placement as near to the bankline or Ordinary High Water (OHW) as possible. Some bulkheads, however, encroached up to 10 ft horizontally onto the beach below OHW, resulting in substantial loss of upper beach area and function. Improved understanding of the importance of marine shorelines for juvenile salmon and other species of fishes during the mid to late 1980s led to more (resource) protective approaches by WDFW during the review and permitting of marine shoreline bulkheads (Small and Carman, 2005).

In 1991, at the request of a lobbyist hired by a local bulkhead contractor, the Washington Legislature passed the Marine Beach Front Protective Bulkhead law (RCW 75.20.160, now RCW 77.55.141). This new law severely restricted the ability of WDFW to deny permits for single-family residential bulkheads by stating "...the department shall issue a permit...". The law also allowed for protection of marine waterfront "property," indicating that the presence of a structure was not necessary to justify the need for a bulkhead. At the request of WDF, some specific language was included regarding: (a) how far waterward from OHW a new bulkhead could be placed, (b) the location for replacement bulkheads, and (c) prohibition of "...permanent loss of critical foodfish or shellfish habitat" (for example, forage fish spawning areas, eelgrass, juvenile salmon migration corridors).

Following passage of the marine bulkhead law, issuance of permits by WDFW frequently became highly politicized, and attempts to rigorously apply existing regulations often resulted in legislative scrutiny and actions to diminish regulatory authority. In addition, contractors were frequently successful in arguing that, due to geological, engineering, or safety issues, 6 ft of encroachment waterward of OHW (the maximum allowed under the law) was necessary for bulkhead construction. Construction of a 100-ft bulkhead

could therefore result in the unmitigated loss of 600 ft² of upper beach area. The difficulty in preventing this type of beach loss arises, in large part, from an inherent conflict between protecting shoreline habitat while still allowing for the protection of shoreline property and human safety. In essence, WDFW faces conflicting mandates: to ensure no net loss of habitat function and value (WDFW POL – M5002) while issuing approvals for marine bulkheads without the authority to examine need, request an alternatives analysis, or require adequate mitigation for adverse impacts (site specific or cumulative).

WDFW recently conducted a pilot study of the effectiveness of HPAs at achieving no net loss of fish habitat (Quinn and others, 2007). The study reviewed a total of 58 recently issued HPAs, 14 of which were for marine bank protection. Individual projects were reviewed for compliance with permit provisions and permits were judged qualitatively according to three measures of effectiveness (ability of the permit to protect public resources, to meet no net loss, and to mitigate impacts). Among all project types reviewed, HPAs for marine bank protection contained the highest number of protective provisions, had relatively high compliance rates (a measure of how well applicants/contractors followed provision language), and had relatively high implementation rates (a measure of outcomes against a hypothetical permit that contained all appropriate provisions).

Overall permit compliance was judged relatively high for marine bank protection projects, yet there was a large disparity between overall permit compliance and ability of the permit to achieve high effectiveness (fig. 1). More than 50 percent of the permits reviewed received less than a medium score for ability to meet no net loss. Similarly, scores for the permit's ability to mitigate impacts were clustered in the low to medium range.

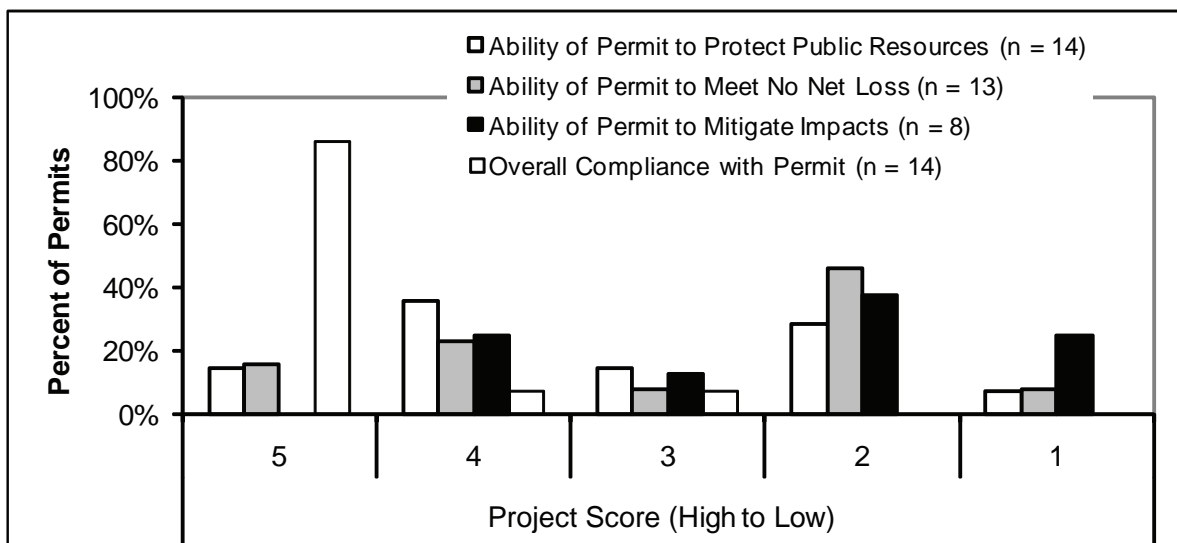


Figure 1. Three qualitative measures of HPA permit effectiveness (protect public resources, meet no net loss and mitigate impacts) and overall permit compliance for marine bank protection (from Quinn and others, 2007).

The report concluded "...achieving no net loss standards was difficult probably because of the nature of the HPA projects. Even when well-implemented (high provision, compliance, and implementation rates), projects were often judged to decrease fish habitat function, albeit in small quantities. Part of our inability to meet "no net loss" is undoubtedly related to the dual nature of the Hydraulic Code (Chapter 77.55 RCW), to protect fish life while allowing for the protection of personal property and human health." The report also concludes "...without the HPA program, we would see substantially more loss of fish life or habitat associated with the 4,000 projects permitted annually. However, the agency's goal of achieving no net loss of habitat function and values (WDFW POL-M5002) is difficult to attain solely through the HPA permit process."

A number of issues continue to limit the effectiveness of the HPA at protecting shorelines within the context of shoreline armoring. WDFW currently lacks regulatory authority to: (1) address the "need" for a bulkhead (that is, perceived need for armoring continues to supersede protection of shoreline functions); (2) require alternatives to traditional bulkheads, even in low-energy environments; and (3) address cumulative impacts or impacts that continue beyond the longevity of the permit (typically 5 years). Protection of personal property continues to supersede protection of shoreline processes and function along marine shorelines. The political will to implement a balanced approach to shoreline management is sorely needed to protect and perpetuate natural shoreline functions. For example, WDFW needs to develop alternative shoreline protection techniques appropriate for specific types of shorelines and wave environments that protect private property while minimizing the negative impacts of armoring. Finally, existing WDFW regulations are "reactive" and apply to individual project sites, which makes it difficult to address shoreline problems at larger spatial scales (for example, at the drift cell scale). Cumulative and ecosystem impacts (for example, downdrift loss of sediment supply) typically occur at this larger spatial scale and therefore cannot be adequately addressed on a site-by-site basis. Local assessment and planning efforts could prove valuable to addressing this need.

Some improvements to the Code and implementation of shoreline protection may be realized in the near future. WDFW is currently working on the preparation of a Habitat Conservation Plan (HCP) for the HPA program. Current work on the HCP includes compilation of the scientific literature on several topics, including shoreline armoring. The process is scheduled to be completed in 2011 and could lead to important changes in the Code that will afford increased protection for aquatic resources and habitats in Puget Sound. WDFW is also providing technical assistance to local jurisdictions in cooperation with the Aquatic Habitat Guidelines workgroup (<http://wdfw.wa.gov/hab/ahg/index.htm>).

A recent publication: "Protecting Nearshore Habitat and Functions in Puget Sound, An Interim Guide" (<http://wdfw.wa.gov/hab/ahg/>), provides an analysis of impacts from shoreline armoring as well as recommendations for minimizing impacts through alternative design and construction techniques.

In addition, executive level management and scientific staff from WDFW have discussed the results of the pilot study on HPA effectiveness with legislative representatives. To improve effectiveness of the Code and outcomes for fish and their habitat, WDFW provided three specific recommendations:

- Provide funding to WDFW to conduct compliance and effectiveness monitoring wherein projects are followed through completion to determine if permit conditions are sufficiently protecting fish habitat;
- Provide WDFW civil authority for HPA violations, as opposed to the current system of jurisdiction within county courts as criminal offenses, to improve follow through and outcomes for violations; and
- Investigate WDFW statutory authority under RCW 77.55 to determine which statutes restrict the department's authority to meet the "no net loss" goal (since the passage of 77.55 RCW in 2000, numerous statutory changes have weakened the department's ability to protect fish life.

More recent discussions have included the need to require long term mitigation that remains in effect for the duration of the project impacts.

Numerous improvements to the Code will obviously be necessary to move toward meeting goals such as no net loss of shoreline habitat function. Clearly, actions including implementing permit compliance and effectiveness monitoring, increasing enforcement authority, and reducing impediments to effective regulation of impacts are needed in the near future. It is unfortunately true, however, that positive movement on these issues faces many challenges. As noted, changes to the Code by the legislature have historically tended to be regressive.

Shoreline Management Act

The Washington Hydraulic Code is not the only authority by which shoreline armoring is regulated. Washington's Shoreline Management Act (SMA) was approved by the public in a 1972 referendum "*to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.*" The SMA has three broad policies: (1) encourage water-dependent uses, (2) protect shoreline natural resources, and (3) promote public access (RCW 90.58.020). The SMA establishes a balance of authority between local and state government (RCW 90.58.050). Cities and counties are the primary regulators but the Washington Department of Ecology has authority to approve local Shoreline Master Programs (SMPs) and some permits.

The SMPs are based on the SMA and state guidelines (WAC 173-26 Part III) and are tailored to the specific needs of the community. More than 200 cities and all 39 counties in the state of Washington have SMPs. Local SMPs include both plans and regulations. The plans constitute a comprehensive vision of how shoreline areas will be used and developed over time and the regulations are the standards that shoreline projects and uses must meet.

The SMA establishes a system of permitting for shoreline development (RCW 90.58.140). Substantial Development Permits are needed for many projects costing more than \$5,718, or those interfering with the public's use of the waters. Many common shoreline uses are exempt from obtaining a Substantial Development Permit, including bulkheads necessary to protect existing single-family residences, normal maintenance and repair of existing structures, and emergency construction needed to protect property.

Even if a bulkhead project meets the criteria for exemption, it must still comply with the SMA and all applicable regulations and design standards contained in the local SMP. The local SMP may require conditional use permits for bulkheads, soft approaches as an alternative to hard armoring, or may prohibit bulkheads entirely.

Existing structures may be replaced if there is a demonstrated need to protect principal uses or structures from erosion. However, these must be designed, located, sized, and constructed to assure no net loss of shoreline ecological functions and cannot encroach waterward of the Ordinary High Water Mark (OHWM) unless the single-family residence it protects was built prior to 1992, and only if there are overriding safety concerns. If leaving an existing structure in place would cause net loss of shoreline ecological functions, it must be removed as part of the replacement. Additions or increases to an existing bulkhead are considered new structures.

Comprehensive updates of local SMPs are required of all Puget Sound jurisdictions by 2012. Currently, 36 cities and counties with Puget Sound marine shorelines are in the process of updating their SMPs. An additional 71 Puget Sound jurisdictions will be updating their SMPs this biennium. These comprehensive updates must:

1. Be based on local inventory and characterization of shoreline ecological processes and functions.
2. Identify location of existing land uses, including structures, bulkheads, and shoreline modifications.
3. Identify shoreline areas with degraded ecological functions and sites with restoration potential.
4. Determine that new SMP regulations, including those relating to bulkheads, "assure that shoreline modifications individually and cumulatively do not result in a net loss of ecological functions."
5. Limit the size of new shoreline stabilization structures to the minimum necessary and apply soft approaches unless demonstrated not to be sufficient to protect primary structures.
6. Ensure publicly financed erosion control structures incorporate public access improvements and ecological restoration into project design.
7. Mitigate new erosion control measures, including replacement structures on feeder bluffs that affect sediment producing functions.
8. Where beach erosion is threatening existing development, adopt provisions for a beach management district to provide comprehensive mitigation for adverse impacts.
9. Prepare a shoreline restoration plan with policies, priorities, and actions for ecological restoration. This may include removal of armoring.

Regarding Shoreline Stabilization, SMP updates must (WAC 173-26-231(2):

1. Allow structural shoreline modifications only where they are demonstrated to be necessary to protect a primary structure.
2. Reduce the adverse effects of new shoreline modifications as much as possible, limiting their number and extent.
3. Give preference to types of shoreline modifications that have a "lesser impact on ecological functions" and require mitigation of identified impacts resulting from shoreline modifications. Impacts may include:
 - a. beach starvation,
 - b. habitat degradation,
 - c. sediment impoundment,
 - d. exacerbation of erosion,
 - e. hydraulic impacts,
 - f. loss of vegetation,
 - g. loss of large woody debris, and
 - h. restriction of channel movement.
4. Where justified, give priority to "soft" over "hard" shoreline modifications, starting with:
 - a. vegetation enhancement,
 - b. upland drainage control,
 - c. biotechnical measures,
 - d. beach enhancement,
 - e. anchor trees,
 - r. gravel placement,
 - g. rock revetments,
 - h. gabions,
 - i. concrete groins,
 - j. retaining wall and bluff walls,
 - k. bulkheads, and
 - l. seawalls.

New shoreline development is addressed in (WAC 171-26-231(3)(a)(III)). To summarize, new development should be located and designed to avoid the need for future shoreline stabilization based on “geotechnical analysis”, new subdivisions of land must assure that the lots created will not require shoreline stabilization during the life of the development, and new or enlarged structural stabilization shall not be allowed except in cases meeting specific criteria. Replacement of erosion control structures must be designed, located, sized, and constructed to assure no net loss of shoreline ecological functions. Replacement erosion control structures cannot encroach waterward of the Ordinary High Water Mark, unless it is protecting a single-family residence built prior to 1992, and only if there are overriding safety concerns.

Most of the cities and counties in Puget Sound are in the process of updating their SMP regulations. Whatcom County is one of the few Puget Sound jurisdictions to have completed an SMP update. The 2008 Whatcom County SMP sets clear policies and regulations limiting new or expanded structural shore stabilization. As more cities and counties complete SMP updates, there will be more regulation of erosion control structures on Puget Sound shorelines. This sets in motion a more systematic approach to analyzing existing shoreline conditions and emphasizes a set of priorities to avoid interruption of processes that may be caused by armoring, unless it can be demonstrated that armoring is necessary to protect a primary structure. This, in turn, should limit the number and extent of future shoreline modifications. It is premature to arrive at any conclusion regarding the success of these efforts until the process is complete and the results have been evaluated.

References Cited

- Berry, H., and Kazakov, N., 2004, Shoreline modification associated with single family residences—A policy gap? [abs]: Pacific Estuarine Research Society Annual Meeting, 2004, Port Townsend, Wash.
- Griggs, G.B., 2010, The effects of armoring shorelines—The California experience, *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. 77-84.
- Morrison, S.W., 2001, Bulkheading—A habit we just can’t kick, *in* Puget Sound Georgia Basin Research Conference, 2001, Seattle, Wash.: Olympia, Wash., Puget Sound Partnership.
- Quinn, T., Kalinowski, S., Bicknell, R., Olds, C., Schirato, M., Price, D., Byrnes, C., Kloempkin, D., and Barnard, R., 2007, A pilot study of hydraulic permit compliance, implementation, and effectiveness in Region 6 during 2006: Olympia, Wash., Washington Department of Fish and Wildlife, 34 p.
- Small, D., and Carman, R., 2005, Marine shoreline armoring in Puget Sound and the Washington State Hydraulic Code, *in* Puget Sound Georgia Basin Research Conference, 2005, Seattle, Wash.: Olympia, Wash., Puget Sound Partnership.

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