Appendix 5: Review of Regulatory Protection Programs

I. Introduction

This paper identifies regulatory issues, overlaps and gaps for protecting shoreline resources. It describes the characteristics of potentially high impact shoreline structures and how current regulatory programs at the state and county level reduce their impact either through outright prohibition or through permit requirements. The San Juan Initiative Science Committee defined the characteristics of potentially high impact shoreline structures and provided the scientific rationale and references for why a structure can have a potentially high impact.

The San Juan County Unified Development Code (County Code) and the Washington Department of Fish and Wildlife Hydraulic Permit Approval program (HPA) and the Department of Natural Resources regulatory programs were reviewed by San Juan Initiative staff for the ability to limit harm caused by shoreline modification from shoreline structures.

For instance, if a dock is allowed over an eelgrass bed, does the county or the state require the dock to be oriented North/South to reduce shading?

County and state regulatory staff reviewed the initial findings of this analysis and provided specific information for how their programs are implemented. Staff at Department of Natural Resources and the Department of Fish and Wildlife (DFW) provided significant contributions to this analysis. DFW also conducted an independent review of their HPA program. Findings from this report, "A 2006 Pilot Study of Hydraulic Permit Compliance, Implementation and Effectiveness in Region 6" and another by WDFW staff members Doris Small and Randy Carman, "Marine Shoreline Armoring in Puget Sound and the Washington State Hydraulic Code" were extremely valuable for this assessment.

Even though a U.S. Corps of Engineers permit is required for bulkheads below the Mean Higher High Water and for docks, they did not participate in this assessment. They issue permits to non-Federal entities based on their application under several long-standing laws. Since the laws are national in scope, regional or localized variations are very limited. They are convinced that local regulations that conform to broader laws are a much more effective way to accomplish the intent of the San Juan Initiative than attempting to redirect national scale implementation, at least in the short-term. However, landowners and trade professionals have a very different perspective. They believe the Corps process is the most onerous and needs to be addressed if there is going to be substantive change in the overall process.

II. Major Findings and Conclusions

A: Findings and Conclusions that apply to all shoreline structures:

~There are no regulatory programs addressing cumulative impacts though this is a state requirement in the County's update of the Shoreline Master Program. A model or tool that quantitatively assesses cumulative impacts at a landscape level that can be applied to individual projects does not exist to our knowledge in Washington.

~There are a number of cases where the administrative practice is much more specific than the adopted code. This can cause confusion for the landowner and could be resolved if the County and State codes were updated.

~Recent research by the Washington Department of Fish and Wildlife states that the agency goal of achieving no net loss of habitat function and values is not being attained though the process has greatly reduced impacts to fish and fish habitat.[1]

~Regulations are not tailored to address specific habitats and impacts. For instance, the same County requirements apply to a forage fish beach as those that apply to a rocky outcropping. This limits the ability to protect the most sensitive habitats.

~The county and the State are reviewing over water structures and bulkheads for essentially the same impacts. The State has a more narrow authority to condition the permit to insure no net loss to critical fish habitat whereas the County has broader authority to consider impacts to all critical areas and to condition upland practices.

B: Over Water Structures:

~Implementation practices by WDFW specifically condition over water structures to reduce impacts.

~County codes lack specificity to reduce harm caused by over water structures: requirements for orientation of float/pier, maximum height, length and width are missing.

~Though the county requires mitigation there is little guidance about requirements of mitigation. Due to the lack of monitoring, mitigation is often temporary while the impacts are continual and long-lasting

~County requires demonstration of need but the guidance is unclear and subject to broad interpretation.

[1] Quinn, T., S.Kalinowski, R. Bicknell, C. Olds, M, Schirato, D. Price, C. Byrnes, D. Kloempkin, R. Barnard, 2007. A 2006 Pilot Study of Hydraulic Permit Compliance, Implementation and Effectiveness in Region 6.

C: Bulkheads:

~Although feeder bluffs are explicitly protected through county and state regulation, they are not currently mapped, making their protection less certain.

~Although there is a stated requirement to consider nonstructural solutions or soft shore protection, there is no standardized methodology for evaluating the suitability of shoreline reaches for soft shore alternatives.

~There is a stated requirement to mitigate impacts of bulkheads but there are no regional mitigation strategies or sites to address bulkhead impacts. Due to the lack of monitoring, mitigation is often temporary while the impacts are continual and long-lasting.

~The county's administrative method for managing exemptions for bulkheads limits the natural resource review of impacts. Substantial Shoreline Development Permits provide a more rigorous review including geological technical reports and more substantive conditioning of construction.

~Exemption permits for single-family residential bulkheads do not need to document immediate danger to an existing structure from coastal erosion.

~Conflicting requirements allow bulkheads on feeder bluffs to arrest recession of bluff so long as the bulkhead does not disrupt the feeder action.

D: Shoreline Vegetation:

~Regulatory protection of shoreline vegetation is vested almost exclusively at the county level. The county does not currently have regulatory language that protects the ecological value of shoreline vegetation. Setbacks are not currently designed to maintain vegetation; they are designed to reduce the visual impact of homes seen from the water.

~Protection of overhanging vegetation is absent from county regulatory language resulting in a high uncertainty that this vegetation is being maintained during and after development.

E: Mooring Buoys:

~DNR has authority to license all existing mooring buoys though there is not a complete survey of where they all are. Older mooring buoys that have substantial impacts on eelgrass need to be identified. DNR does not have the authority to require upgrades to a less harmful system. A program providing incentives to

mooring buoy owners to replace existing system with less harmful systems would be helpful.

III. Detailed Analysis of Regulatory Programs

A. Shoreline Armoring

Overview

Structures of wood, cement or rocks used to armor a bank and prevent land erosion have an increasing level of impact the lower into the intertidal zone the structure is placed. The magnitude of impact is also affected by the type of shoreline and the presence of forage fish spawning habitat. The common elevation points measured downward on the beach from the edge of the bank to below the intertidal zone are ordinary high water (OHWM), mean higher high water (MHHW), mean high water (MHW), mean sea level (MSL), and mean lower low water (MLLW). The OHWM is defined as a mark on the shore by the action of water upon the soil or vegetation distinct from that of the abutting upland. These terms are used in the regulatory process and are mentioned in the analysis below.

Scientific Rational

Shoreline armoring impacts sediment supply, beach loss, reduction in beach access and could accelerate erosion. (Griggs, 2005; Johannessen and MacLennan, 2007).

Structures below MHHW/MHW/MSL, are progressively more likely to change sediment transport, cause beach loss and accelerate erosion (Miles et al., 2001; Tait and Griggs, 1991).

Impacts may increase if structure is on a documented forage fish or mapped potential forage fish habitat. Shoreline armoring may be a primary threat to forage fish. (Thom et al, 1994; Rice 2006).

<u>Requirements, Issues and Analysis</u>

Requirements and Practices: County

~There is a stated requirement to consider non-structural solutions or soft shore protection.

~Structures on feeder bluffs are prohibited except where there is clear danger to established development and it will work to arrest bluff recession and will not seriously disrupt feeder action or drift way. Unstable bluffs are mapped but not feeder bluffs.

~No requirement or preference for structure to be placed above MHW, if possible, to protect structure.

~There is no review for cumulative impacts though it is a requirement by the State when the Shoreline Master Program (SMP) is updated by the County.

~Forage fish consideration is not specific.

~No requirement to retain vegetation listed with the bulkhead section, though requirements to protect the land surface are in other sections of the SMP and could be applied.

~Bulkheads on single-family residential parcels do not need to document immediate danger to structure from coastal erosion.

Analysis and Conclusions: County

~Most new bulkheads are exempted by the County from getting a substantial development permit and it appears from the permit files that few if any of the County standards are applied in the review and authorization of the exemption.

~Repair/replacement of existing structure structures is permitted by the County through a shoreline exemption. From the permit files it appears there is no review or documentation of the old structure or requirements for the repair or replacement.

Department of Natural Resources Lease Approval for Use of Tidelands

Bulkheads are mostly installed on private tidelands or shorelands or on uplands abutting the shore where they can affect state-owned aquatic lands. DNR does not have direct authority over construction on these lands, but provides comment/input during permit review processes. No authorization can occur on state owned lands until all required permits are obtained.

Department of Fish and Wildlife (WDFW) Hydraulic Permit Approval

Requirements and Practices: WDFW

~Critical shorelines (feeder bluffs) have not been defined and identified and there is no permit application review for impacts of structure to feeder bluff.

~Bulkheads are required to be at or above Ordinary High Water line. In practice, though, new bulkheads are almost always sited waterward of MHHW and therefore can be within forage fish spawning habitat. Construction safety concerns and type of bulkhead materials determine how far a bulkhead extends waterward of OHW up to a maximum of 6 feet. To safely construct a stable rock bulkhead, up

to 6 feet is required. Vertical bulkheads of concrete, logs or timbers typically are allowed to be 2-4 feet waterward of the Ordinary High Water Mark.

~WDFW can and has required geotechnical evaluation of project sites and promotes soft shore approaches for shoreline protection.

~The Hydraulic Code omits the mitigation language that is common for other marine project WACs, i.e., "shall incorporate mitigation measures as necessary to achieve no-net-loss of productive capacity of fish and shellfish habitat."

~WDFW does not support the statement that all beaches with suitable forage fish spawning substrate support forage fish spawning. Therefore, WDFW only requires the placement of gravels or "smelt mix" on the beach after construction of bulkheads along shorelines adjacent to documented surf smelt spawning habitat.

~Construction is conditioned to ensure it is not occurring when fish are present.

~WDFW may require the replacement of native vegetation that is removed from the shoreline for the purpose of constructing a bulkhead. WDFW's authority to regulate activities on upland areas is restricted to those that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state. While WDFW is not restricted to regulating work waterward of the OHWL, it becomes more difficult to tie impacts to the bed or flow of state waters the further project activities get from OHWL. Some biologists are reluctant to condition upland work in an HPA.

Analysis and Conclusions: WDFW

~The HPA Code (see appendix 1) broadly states the requirement for no net loss of habitat and includes specific requirements for bulkheads. These code provisions have not been amended for a number of years and DFW staff have continued to develop the science that informs their decision-making process. In practice, WDFW's Area Habitat Biologists apply new science that was not considered at the time Chapter 220-110 WAC was last modified to develop unique site specific provisions to achieve no-net-loss of fish life or productive fish or shellfish habitat. The unique site-specific provisions are only applied on a site by site basis. WDFW does not create policy and formal guidelines based on these unique site-specific provisions.

~A model or tool that quantitatively assesses cumulative impacts and that is applicable to individual project decisions does not currently exist. WDFW does not review individual projects for cumulative impacts. In the independent report by WDFW they state, "Our judgment of permit effectiveness suggested that achieving "no net loss" standards was difficult probably because of the nature of 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. We conclude that the HPA program currently protects fish and fish habitat in large measure, and 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".

~In applying mitigation requirements for bulkheading of feeder bluffs, there are a number of constraints that limit effectiveness: long term beach nourishment has significant cost, long term beach nourishment is impossible to regulate, on site mitigation is unavailable due to small sites, no regional mitigation strategies are available.

~DFW Area Habitat Biologists dependent on coastal geologists for guidance. There can be conflicting interpretations of analysis.

B: Docks

Overview

Over water structures can have a direct impact on submerged vegetation like eelgrass and algae by shading these aquatic plants from their needed sunlight. To reduce shading, the height, length and material of the pier and the length, orientation, amount of grating, and width of the float can be designed to mitigate some of the impacts to eelgrass. Construction materials that are inert have less impact than materials like creosote.

Scientific Rationale

Docks have a documented negative effect on eelgrass survival. Eelgrass provides habitat, food, spawning substrate, a safe migration corridor and stabilizes sediment. (Mumford, 2007)

Treated wood decreases water quality and could increase contaminants in biological tissue of marine animals and in sediment. (Poston, 2001)

Light can reach further under docks that are situated N/S rather than E/W. Orientation plays a significant role in retaining eelgrass (Burdick & Short, 1999)

The height of docks has a significant impact on eelgrass. The width and length of docks determines the total amount of shading. (Kelty & Blivin, 2003.) (Shafer, 2002) (Kearney et al, 1983)

Juvenile fish have increased travel distance and time for in deeper water, increasing predation risk. (Williams et al, 2003).

Grating of less than 50% of the float deck has not been shown effectively retain eelgrass vegetation under a float deck. (Fresh, et al, 2006)

Requirements, Issues and Analysis

Requirements and Practices: County

~Docks that interfere with normal erosion-accretion process associated with feeder bluffs shall not be permitted. (Feeder bluffs are not mapped in County)

~The County code requires that the design of docks "mitigate significant adverse impacts to habitat functions and values by 1. Avoiding action, 2. Minimizing impacts, 3, Restoring." The code offers no specifics about how docks could be constructed to minimize impacts and provides no guidance for restoration.

~No review for cumulative impacts.

~The code does not specifically address how docks on or near eelgrass or kelp would need to be built to reduce impacts to eelgrass or kelp habitats nor does the code provide guidance for restoration or mitigation

~There are length and width requirements for floats but no height or orientation requirements are specifically mentioned for areas of eelgrass.

~Max dimension for pier, float and ramp is 700 (1,400 for shared dock) square feet and no more than 115 feet (300 feet for shared dock) for single-family residence.

~Chemically treated materials used in construction requires approval by the EPA.

~Although the code states that "Boating facilities shall be designed to minimize adverse impacts on marine life and the shore process corridor and its operations system" there are no specifics provided in the code nor is there a standard that property owners must meet to "minimize adverse impacts."

Analysis and Conclusions: County

~Docks in areas with and without submerged aquatic vegetation are treated the same in county codes.

~Although there is reference to mitigation the code is not clear or specific in its direction.

~The code encourages docks that serve multiple landowners and requires a demonstration of need but the code does not provide guidance on how to encourage or define need.

Department of Fish and Wildlife Hydraulic Permit Approval

Requirements and Practices: WDFW

- ~Piers, docks, floats, rafts, ramps, boathouses, houseboats, and associated moorings shall be designed and located to avoid shading of eelgrass (Zostera spp) and to avoid impacts to the bed, eelgrass, kelp, Pacific herring spawning beds and rockfish and lingcod settlement and nursery areas, salmon, though still allowed. The Washington Administrative Code gives WDFW the ability to condition their approval of piers, docks, floats, rafts, ramps, and associated moorings on structure width and/or incorporation of materials that allow adequate light penetration (i.e., grating) for structures located landward of -10.0 feet MLLW.
- ~In an effort to avoid and minimize potential natural resource impacts, WDFW works with dock proponents to reduce and minimize the foot print of the pier, ramp and float structures though there are no explicit requirements in the WAC.
- ~WDFW requires through individual permit review that pier structures greater than 6 feet in width incorporate light permeable grating into the deck of the pier. WDFW currently only allows the construction of 8-foot wide and 10-foot long moorage floats, regardless of deck grating or orientation, over eelgrass if approved concurrent mitigation is implemented. If impacts to eelgrass occur as demonstrated by the impact monitoring and float owner does not implement the approved mitigation plan, then WDFW requires the float owner to remove the float.
- ~WDFW currently only allows the construction of moorage floats, regardless of width, deck grating or orientation, over eelgrass habitat that has been documented by WDFW as herring spawning substrate if successful advanced mitigation has been provided.
- ~WDFW currently only approves the construction of moorage floats within 10 feet of eelgrass habitat if impact monitoring is implemented and an approved mitigation plan is implemented in the event that the monitoring demonstrates impacts to the eelgrass habitat. If impacts to eelgrass occur as demonstrated by the impact monitoring and float owner does not implement the approved mitigation plan, then WDFW requires the float owner to remove the float. WDFW currently only allows the construction of moorage floats, regardless of width, deck grating and orientation over eelgrass in water depths that require float stops to prevent the float from grounding during low tide cycles if approved concurrent mitigation is implemented.
- ~If eelgrass, kelp and/or macro algae habitats are adversely impacted during project construction, it shall be replaced using proven methodology.

~WDFW currently only allows single piles for anchoring residential moorage floats. WDFW does not allow creosote treated piling or lumber to be used for dock construction.

Analysis and Conclusions: WDFW

~Since 2000, WDFW has permitted only 2 new docks over eelgrass both of which required impact monitoring and mitigation for identifiable impacts to eelgrass habitat.

~Through the authority given to WDFW through the Washington Administrative Code, WDFW has the ability to mitigate impacts for over water structures. WDFW has incorporated best available science into a standard practice that reduces the overall footprint of over water structures. This standard practice (ie: piers greater than 6 feet have grating) is not listed in the Washington Administrative Code, which means that project proponents won't know what is required of them until they are in the process of getting a permit.

~A model or tool that quantitatively assesses cumulative impacts and that is applicable to individual project decisions does not currently exist. WDFW does not review individual projects for cumulative impacts.

Department of Natural Resources

Requirements are being developed for aquatic lands which will recommend conservation measures to reduce impacts to listed species and critical habitat.

C: Shoreline Vegetation

Overview

Removal of vegetation within 100 feet of the top of the bank, bank face, or backshore can change the natural productivity and function associated with ecosystem functions and processes. Removal of this vegetation can reduce the ability of the soil to clean out pollutants, reduces wildlife corridors, reduces the benefits of shading and reduces the food supply to the nearshore.

Scientific Rationale

Vegetation within 100 feet of the shoreline provides bank stability, reduces pollutants and sediment in water, provides food source to marine animals and provides shade to

the nearshore. It also provides a source of woody debris to the shoreline, which produces homes for marine animals, provides temperature regulation, better sediment control, and wildlife habitat. Much of this research comes from the benefits of buffers to freshwater systems, included in the references are papers specifically addressing marine systems. (May 2003), (FEMAT, 1993), (Knutson & Naef, 1997) (Brennan and Culverwell, 2004)

Requirements, Issues and Analysis

Requirements and Practices: County

~Regulations for vegetation state, "all shorelines shall be protected from modification of the land surface," and "restoration of any shoreline…shall be done with native plant material."[2] There is no standard defined for "degradation."

~New homes are required to be set back 100 feet from OHWM, top of bank or berm, whichever is greater or 50 feet if there is adequate screening between the new home and the shoreline. Setbacks can be reduced to an average of neighboring properties if the neighboring structures are less than 50 feet back. Clearing that is not "excessive" is allowed to maintain views.

~Clearing and grading is allowed landward of setback.[3]

~No review for cumulative impacts

~There are no regulations limiting clearing, if it is less than 500 cubic yards (50 dump trucks), before or after construction.

Analysis and Conclusions: County

~Although there is little clarity within county codes to retain vegetation for ecological purposes, county planners often condition new development to maintain natural vegetation as part of the Residential Pre-Application Approval.

~Given the dual objectives of screening and allowing for views in regulatory codes regarding vegetation there is high uncertainty that current practices will effectively maintain the functions provided by shoreline vegetation.

Department of Fish and Wildlife Hydraulic Permit Approval

~Does not regulate shoreline vegetation, unless it is a component of a hydraulic project, or directly uses, diverts, obstructs, or changes the natural flow or bed of any of the salt or fresh waters of the state.

[2] UDC, 10/7/2003, SJCC Chapter 18.50.130
[3] UDC, 10/7/2003, SJCC Chapter 18.50.060

D: Mooring Buoys

Overview

Designs that do not incorporate a sub-surface buoy that keeps line, cable, and/or chain off the bottom during low tides can have a potentially high impact on submerged aquatic vegetation like eelgrass and kelp.

Scientific Rationale

Chain drags on seafloor and disturbs aquatic vegetation. (WDFW publication)

Requirements, Issues and Analysis

Requirements and Practices: County

~Boating facilities shall be designed to minimize adverse impacts on marine life and shore process corridor." Little guidance to planners about how to minimize adverse impacts or how to site mooring buoys in areas of aquatic vegetation.

~No guidance about buoy design to minimize adverse impacts on marine life. No preference for low impact buoy design or requirement for low impact buoy design.

~Mooring buoys are conditioned through shoreline exemptions permits

~No review for cumulative impacts.

Department of Fish and Wildlife Hydraulic Permit Approval

~WDFW does require an HPA for new mooring buoys per RW 77.55.021 and generally requires the mooring have a mid-line float and must have an embedment style anchor in areas of eelgrass. To put in a concrete base, applicant must prove that there is no eelgrass.

~No review for cumulative impacts.

Analysis and Conclusions: WDFW

~Existing mooring buoys that are more than 2 years old installed without HPA are not susceptible to enforcement action due to expiration of statute of limitations.

Department of Natural Resources

~ DNR requires low impact mooring buoy design including the use of mid-line floats and embedded anchors when issuing authorizations in areas of eelgrass. DNR follows WDFW requirements for determining the need for eelgrass surveys or

the use of embedded anchors in lieu of eelgrass surveys. DNR mooring buoy brochures for potential applicants discuss low impact buoy design.

~ Washington State law provides that residential property owners with property abutting state-owned aquatic lands install a mooring buoy on state-owned aquatic lands without charge (RCW 79.105.430) Although DNR is prohibited from charging rent for these mooring buoys, all applicable local, state and federal rules and regulations concerning design and construction still apply.

~ DNR has authority to authorize or require removal of mooring buoys. New mooring buoys are required to have County shoreline, WDFW HPA, and ACOE permits prior to DNR authorization and installation. Existing unauthorized mooring buoys may not need all regulatory permits to become authorized by DNR.

Analysis and Conclusions: DNR

~Department of Natural Resources has begun surveying the presence of existing mooring buoys and offered an amnesty program for shoreline property owners to register their buoys.

References

Brennan, J.S., and H. Culverwell, 2004. Marine Riparian: An assessment of riparian functions in marine ecosystems. Published by Washington Sea Grant Program Copyright 2005, UW Board of Regents, Seattle, WA. 27p.

Burdick, D.M., and F.T. Short. 1999. the effects of boat docks on eelgrass beds in coastal waters of Massachusetts. Environmental Mangement 23:231-240.

Fresh KL, Wyllie-Echeverria T, Wyllie-Echeverria S, Williams, B.W. 2006. Using light-permeable grating to mitigate impacts of residential floats on eelgrass *Zostera marina* L. in Puget Sound, Washington. Ecological Engineering 28 (4): 354-362.

Forest Ecosystem Management Team. Forest Ecosystem Management: an ecological economic and social assessment. 1993. Report of the Forest Ecosystem Management Assessment Team. 1993-793-071. United States Government Printing Office.

Griggs, G. B. , 2005. The impacts of coastal armoring, Shore and Beach, 73 (1): 13-22.

Johannessen, J and A. MacLennan, 2007. Beaches and Bluffs of Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-04. Published by US Army Corps of Engineers, Seattle, WA.

Kelty, R.A., and S. Bliven. Environmental and Aesthetic Impacts of Small Docks and Piers, Workshop Report; Developing a Science Based Decision Support Tool for Small Dock Management, Phase 1: Status of the Science. 2003 NOAA Coastal Ocean Program Decision Analysis Series NO 22. National Centers for Coastal Ocean Science, Silver Spring, MD 69pp.

Knutson, K.C. and V.L. Naef. Management Recommendations for Washington's Priority Habitats: Riparian, 1997 Washington Department of Fish and Wildlife, Olympia, Washington.

May, C.W.. Stream –Riparian Ecosystems in the Puget Sound Lowland Eco-Region: a review of best available science.2003 Office of Natural Resources Coordinator, Kitsap County, Washington.

Mumford, T.F., 2007. Kelp and eelgrass in Puget Sound. Puget Sound Nearshore Partnership Report NO 2007-05. Published by Seattle District, US Army Corps of Engineers, Seattle Washington wwww.pugetsoundnearshore.org/technical_reports.htm

Poston, T. 2001. Treated wood issues associated with over-water structures in marine and freshwater environments. White Paper prepared for Washington Department of Fish and Wildlife, Ecology and Transportation. Battelle Marine Sciences Laboratory, Pacific Northwest National Laboratory. 90pp. www.wdfw.wa.gov/hab/ahg/finaltw.pdf.

Rice, C. 2006 Effects of Shoreline Modification on a Northern Puget Sound Beach: Microclimate and Embryo Mortality in Surf Smelt (Hypomesus pretiosus) Estuaries and Coasts Vol 29, NO 1 p 63-71.

Shafer, D.J., 2002. Recommendations to minimize potential impacts to seagrasses from single-family residential dock structures in the Pacific Northwest. Prepared for US Army Coprs of Engineers, Seattle District. 28p.

Tait, J.F., and Griggs, G.B., 1991. Beach response to the presence of a seawall: a comparison of field observations. US Army Engineers Waterways Experiment Station, Contract Report CERC 91-1 60 pp.

Thom R., D. Shreffler, K. MacDonald, 1994. Shoreline armoring effects on coastal ecology and biological resources in Puget Sound, Washington. Coastal Erosion Management Studies, Vol.7. Washington Department of Energy, Pub no> 94-80, 1

Williams, G. D., R. M. Thom, J.A. Southard, L.K. O'Rourke, S.L. Sargant, V. I. Cullinan, R. Moursund, M. Stamey. Assessing overwater structure - related predation risk on juvenile salmon: field observations and recommended protocols. 2003 PNNL-14435. Prepared for the Washington State Department of Transportation. Prepared by the Pacific Northwest National Laboratory's Marine Sciences Laboratory, Sequim, Washington, in collaboration with Sheffler Environmental, Sequim, Washington and the University of Washington, Seattle, Washington.

Appendix A:

Washington Department of Fish and Wildlife Staff Recommendations for Improving Protection of Shoreline Resources

The following recommendations are from WDFW staff following their review of regulations and implementation practices for the Hydraulic Permit Approval process in San Juan County. These recommendations come from an in depth understanding of the San Juan ecosystem needs and administrative challenges specific to San Juan County, The recommendations should not be construed as state wide policy recommendations **or official agency positions.**

Bulkhead Related Recommendations:

~San Juan County feeder bluffs need to be identified and mapped.

~A standardized methodology for evaluating the suitability of shoreline reaches for soft shore protection alternatives needs to be developed and adopted.

~Shoreline reaches suitable for soft shore protection alternatives need to be identified.

~Regional mitigation strategies and sites that address bulkhead impacts needs to be developed.

~A mitigation tool needs to be identified, developed and implemented that allows parties incurring bulkhead impacts the opportunity to pay into a regional mitigation strategy and site.

~A model or tool that quantitatively assesses cumulative impacts at a landscape level and that can be applied to individual project decisions should be explored. .

~There needs to be greater political support for regulations that protect feeder bluffs, emphasize soft shore protection where suitable and regional mitigation strategies for unavoidable bulkhead impacts.

~Update Chapter 220-110 WAC.

~The San Juan County permit requirements for bulkhead should be modified to require Substantial Shoreline Permit and SEPA compliance.

~Support ongoing efforts to survey and document forage fish spawn on all beaches with suitable spawning substrates.

Mooring Buoy Related Recommendations:

~Complete a mooring buoy inventory. The inventory should establish a GPS coordinate and water depth corrected to MLLW for each mooring buoy.

~Support DNR's effort to license all existing mooring buoys.

~Support DRN's effort to implement the following mooring buoy design elements during the licensing process.

~The line between the anchor and surface float shall not exceed the water depth as measured at extreme high tide plus a maximum of 20% additional line for scope.

~The buoy system shall include a subsurface float designed to keep the line between the anchor and surface buoy from contacting the bottom during low tide cycles. The subsurface float shall be located off the bottom a distance equal to 1/3 the line length as defined above in item 1.

~Only an embedment style anchor shall be used in eelgrass habitat. In order to use a concrete anchor, the applicant must contract a qualified diver/biologist to document the absence of eelgrass at the mooring buoy site.

~Support funding for a community based incentive program that cost shares the design upgrade of existing mooring buoys.