THURSTON COUNTY RESOURCE STEWARDSHIP DEPARTMENT
SHORELINE MASTER PLAN MEETING
SIGN IN SHEET
November 30, 2017

Please print your name below and give your complete address (including city and zip code)

#	Name (Please print clearly)	Mailing Address City State Zip	Email Address
	Mike Beehler	7308 Fair Oaks Rd SE Oly 98513	—
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#	Name (Please print clearly)	Mailing Address City State Zip	Email Address
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#	Name (Please print clearly)	Mailing Address City State Zip	Email Address
	Connie Soiberg	P.O. Box 15210 Tumwater, WA 98513	constance.ervsoiberg@gmail.com
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Preliminary Comments on
Thurston County Shoreline Master Plan Update Draft

November 30, 2017

Dear SMP committee members:

Please find attached our comments on sections 100 and 200 of the draft Thurston County SMP update. We would like to have a written response to these comments before the County proceeds to the review other sections of the SMP.

On the issue of the completeness of the SMP draft: as of Tuesday, November 28, 2017 the Appendices are still not published for review. The first two sections, 100 and 200, make reference to terms such as "no net loss" that are defined in the missing appendices. It is not acceptable to refer us to the Department of Ecology's SMP Handbook that provides guidance on this subject. Leeway is given to counties in how topics in the handbook are implemented. The actual proposed language for the Thurston County SMP update is needed for review. The wording in the SMP matters and we will have to live with it for a long time. Therefore its absence makes it impossible to comment fully on sections 100 and 200 at this time.

It is our position that until the following are successfully achieved, the SMP review process should be extended every month by one month beyond the original time period allotted for public review:

1. All relevant materials and documents are available.
2. All organizations listed as "Stakeholders" in the Department of Ecology Shoreline Master Program Update Handbook, pg 4 – 6 are contacted and personally invited to participate in the SMP update process: http://www.ecy.wa.gov/programs/sea/shorelines/smp/handbook/Chapter6.pdf

Contrary to the recommendations of the Washington State Department of Ecology, public participation in the early phases of the SMP update has not been achieved. Critically important constituents have been excluded from the process, and the fairness of the process has been compromised by the presence of commercial interests involved in the creation of the draft SMP. The current version of the draft SMP cannot garner the trust of the citizens of Thurston County. The process should be restarted with proper engagement of the public.

Sincerely,

Patrick and Kathryn Townsend

Cc: Thurston County Planning Commission

7700 Earling ST NE
Olympia, WA 98506
kath.townsend@gmail.com

Preliminary Comments

on the

Draft Thurston County Master Program Update

Chapter 19.100

By

Patrick and Kathryn Townsend

Kathy Knight

Other Boston Harbor Residents

November 30, 2017

THURSTON COUNTY SHORELINE MASTER PROGRAM

PREPARED FOR:

Thurston County Board of County Commissioners

PREPARED BY:

Thurston County Resource Stewardship

THURSTON COUNTY
WASHINGTON
SINCE 1852

_____, 2017

11/30/2017 Comments from Kathryn and Patrick Townsend, Kathy Knight and other Boston Harbor residents.

Chapters:

19.100	Introduction
19.150	Definitions
19.200	Shoreline Jurisdiction and Environment Designation
19.300	General Goals and Policies
19.400	General Regulations
19.500	Permit Provisions, Review and Enforcement
19.600	Shoreline Use and Modification Development Standards
19.700	Special Reports
Appendix A	Shoreline Environment Designations Map
Appendix B	Mitigation Options to Achieve No Net Loss for New or Re-Development Activities
Appendix C	Shoreline Restoration Plan
Appendix D	Channel Migration Zone Maps
Appendix E	Critical Area Regulations Incorporated By Reference

Acknowledgements:

The Thurston County Comprehensive Plan explains that Thurston County's shorelines provide valuable habitat for fish and wildlife, economic diversity, and recreational opportunities used by residents of all ages. Shorelines play an important role in enhancing the quality of life for our County's citizens.

Therefore, the purpose of the Master Program is to guide the future development of the shorelines in Thurston County in a manner consistent with the Shoreline Management Act of 1971, hereinafter the "Act." The Act and this Program comprise the basic state and county law regulating use of shorelines in the county and is the regulating document for critical areas within shoreline jurisdiction.

Thurston County utilizes a variety of other regulations, policies, plans, and programs to supplement the goals and regulations contained within the Shoreline Master Program, and to manage shoreline resources and regulate development near the shoreline. All development projects are reviewed for compliance with the Thurston County Code (TCC) including but not limited to: Thurston County Comprehensive Plan, Zoning Ordinance (TCC 20, 21, 22, and 23); Critical Areas Ordinance (TCC 24); Thurston County Stormwater Standards (TCC 15.05); Platting and Subdivisions (TCC 18); and the State Environmental Policy Act (SEPA) Ordinance (TCC 17.09.). The County works with other entities such as the Thurston Conservation District, Stream Team, South Sound Salmon Recovery Group and watershed lead entities to promote awareness of shoreline issues. In addition, the County has developed Shellfish Protection Districts, Basin Plans, and Capital Facilities Plans to further the goals and the policies of the Shoreline Master Program and promote wise shoreline usage.

Although critical areas in shoreline jurisdiction are identified and designated under the Growth Management Act (GMA), they must also be protected under the Shoreline Management Act (SMA). The Washington State Legislature has determined that local governments must adopt Programs that protect critical areas within shorelines at a level that assures no net loss of shoreline ecological functions (ESHB 1653 Sec. 2(4)). Although Washington's shorelines may contain critical areas, the shorelines themselves are not critical areas by default as defined by GMA.

Please provide a link to ESHB 1653. Critical Areas Act. 1990

The provisions of this title for regulating critical areas shall apply to all land, all water areas and all structures, and all uses irrespective of lot lines in the unincorporated territory of Thurston County, Washington, except for existing and on-going agricultural activities. Agricultural activities meeting the requirements of TCC Section 17.15.110 shall be regulated by Chapter 17.15 TCC (as updated) or by the Voluntary Stewardship Program (VSP) once a VSP Workplan is adopted.

Add "upslope". Should read: "...except for existing ***upslope*** ongoing agricultural activities."

Existing aquaculture, but fin fish aquaculture and shellfish aquaculture should **not** be exempt.

11/30/2017 Comments from Kathryn and Patrick Townsend, Kathy Knight and other Boston Harbor residents.

Chapter 19.100 Introduction

19.100.105 Title

The goals, policies and regulations herein shall be known as the Thurston County Shoreline Master Program, and may be referred to as the "Master Program", "Program", or the "SMP".

19.100.110 Purpose and Intent

19.100.115 Adoption Authority

This Master Program is adopted pursuant to the authority granted under the Shoreline Management Act of 1971, Chapter 90.58 Revised Code of Washington (RCW) and Chapter 173-26 of the Washington Administrative Code (WAC).

19.100.120 Applicability

A. Unless specifically exempted by statute, all proposed uses and development occurring within shoreline jurisdiction must conform to Chapter 90.58 RCW, the Act, this Master Program and Thurston County Code (TCC), whether or not a permit is required. This Master Program applies to every person, firm, corporation, government agency, or department who or which:

1. Proposes any new use, activity, development or structure within the unincorporated area of Thurston County subject to the Act, as now or hereafter amended; or
2. Proposes a change, modification, addition or alteration to a legally existing use, activity, development or structure within the unincorporated area of Thurston County subject to the Act, as now or hereafter amended.

B. Direct federal agency activities affecting the uses or resources subject to the Act must be consistent to the maximum extent practicable with the enforceable provisions of the Act and with this Master Program as required by WAC 173-27-060.

C. The Act and this Program, including the permit system, shall apply to all non-federal developments and uses undertaken on federal lands and on lands subject to non-federal ownership, lease or agreement, even though such lands may fall within the external boundaries of a federal ownership.

D. This Master Program shall apply to all unincorporated rural and urban lands until such time as a city incorporates land into their city boundaries through annexation.

19.100.125 Relationship to Other Plans and Regulations

A. Uses, developments, and activities regulated by the Master Program may be independently subject to the Thurston County Comprehensive Plan, the Washington State Environmental Policy Act, the Thurston County Code (TCC) Zoning (Title 20, 21, 22, and 23), Platting and Subdivisions (Title 18), Environment (Title 17), the Critical Areas Ordinance (Title 24), and various other provisions of federal, state, and county laws. The applicant must comply with all applicable laws prior to commencing any use, development, or activity.

B. Should a conflict occur between the provisions of this Program or between this Program and the laws, regulations, codes or rules promulgated by any other authority having jurisdiction within Thurston County, the more restrictive requirements shall apply, except when constrained by federal or state law, or where specifically provided otherwise in this Program.

C. When achieved in accordance with Title 20, 21, 22, or 23 TCC (Zoning), building and lot dimension flexibility may be allowed on shorelines within Urban areas or Limited Areas of More Intensive Rural Development (LAMIRDs) when consistent with the Act and all other applicable requirements of this Program, including the requirement to achieve no net loss of shoreline ecological functions.

Further, in order to preclude fragmentation of review and the necessity for individual shoreline permits, a combined shoreline permit is encouraged for proposed activities within the shoreline jurisdiction where feasible.

Please give citations for the source of this paragraph.
Please give examples of a "combined shoreline permit."
Please define the term "where feasible."
Please define when a combined permit would not be allowed. For example, are there proximity restrictions to the combined permit?

The language of this paragraph appears to be vague. Examples of potential problems: One lot has a salmon bearing stream, another combined lot does not. One shoreline lot has migrating salmon, another does not. One shoreline plot has strong tidal flows, the other does not. All shoreline lots vary to a smaller or greater degree. A shoreline permit should be based on the unique individual characteristics of the site.

We strongly disagree with the issuance of aquaculture permits by type of use for multiple properties/land owners. Because of varying conditions, individual permit applications must be required.

D. Consistent with RCW 36.70A.480, the goals and policies of this Master Program approved under Chapter 90.58 RCW shall be considered an element of the County's comprehensive plan, including Chapter 19.300 (General Goals and Policies). All regulatory elements of this Program, including, but not limited to Chapter 19.100 (Introduction), Chapter 19.150 (Definitions), Chapter 19.200 (Shoreline Jurisdiction and Environment Designations), Chapter 19.400 (General Regulations), Chapter 19.500 (Permit Provisions, Review and Enforcement), Chapter 19.600 (Shoreline Use and Modification Development Standards), Chapter 19.700 (Special Reports), Appendix A (Shoreline Environment Designations Map), Appendix B (Mitigation Options to Achieve No Net Loss for New or Re-Development Activities), and Appendix D (Channel Migration Zone Maps) shall be considered a part of the County's development regulations. Certain non-regulatory elements of this Master Program, including, but not limited to Appendix C (Shoreline Restoration Plan), may be updated and amended at any time without requiring a formal Master Program amendment.

As of 11/29/17, the Appendices C and B are still not available on the County SMP website. Full comment cannot be made until these are available to the public.

E. Where this Program makes reference to RCW, WAC, or other state or federal law or regulation, the most recent amendment or version shall apply.

F. This Program will be applied consistent with all applicable federal, state and local laws affecting tribal rights.

G. Coastal Zone Management Act Consistency reviews for sites within federal jurisdiction shall apply the Environment Designation criteria in Chapter 19.200 that most closely correspond to the project site in order to determine applicable Program policies.

19.100.130 Governing Principles

The following governing principals, along with the policy statement of RCW 90.58.020, the principles of WAC 173-26, and purpose statements in Title 24.01.010 & 24.01.015 TCC, establish the basic concepts of this Program.

A. Any inconsistencies between this Program and the Act must be resolved in accordance with the Act.

B. The policies of this Program may be achieved by diverse means, one of which is regulation. Other means authorized by the Act include, but are not limited to: acquisition of lands and/or easements by purchase or gift, incentive programs, and implementation of capital facility and/or non-structural programs.

C. Protecting the shoreline environment is an essential statewide policy goal. Permitted and/or exempt development, actions taken prior to the Act's adoption, and/or unregulated activities can impair shoreline ecological processes and functions. This Program protects shoreline ecology from such impairments in the following ways:

1. By using a process that identifies, inventories, and ensures meaningful understanding of current and potential ecological functions provided by shorelines.
2. By including policies and regulations that require mitigation of all adverse impacts in a manner that ensures no net loss of shoreline ecological functions. The required mitigation shall include avoidance, minimization, and compensation of impacts in accordance with the policies and regulations for mitigation sequencing. This Program and any future amendment hereto shall ensure no net loss of shoreline ecological functions and processes on a programmatic basis in accordance with the baseline functions present as of the date of adoption of this Program.

   A clear definition of "no net loss on a programmatic basis" is required to make full comment. This definition would be in Appendix B, which is still not available.

3. By including policies and regulations that ensure that the cumulative effect of exempt development will not cause a net loss of shoreline ecological functions, and by fairly allocating the burden of addressing such impacts among development opportunities.

   (1) Thurston County cannot implement this policy when the county does not have knowledge of the current aquaculture projects. The fact that Thurston County does not have knowledge of all aquaculture operations in the County was provided in recent testimony by Thurston County planner, Tony Kantas, during the Jensen/Townsend vs. Sohn hearing before the Hearing Examiner.

   (2) If Thurston County does not have knowledge of all aquaculture operation, we question the County's grasp and/or knowledge of other types of operations within the County that would impact ecological function.

   (3) To implement this policy, a complete written accounting, including but not limited to start date of operation, whether the operation is ongoing, whether the operation has a permit, who runs the operation, what types of structures are used, etc. would be required.

   (4) Description/definition of "exempt development" along with specific examples of "exempt development" is needed.

(5) A detailed description of the existing baselines on which the County measures cumulative impact for each type of project is needed.

(6) The term "development opportunities" needs definition. If there is a definition related to this term it should be cited or, preferably, re-stated within the context of this paragraph including examples.

(7) This paragraph is basically "gobbledygook, i.e., "inflated, jargon-cluttered prose that fails to communicate clearly."

4. By including regulations and regulatory incentives designed to protect shoreline ecological functions, and restore impaired ecological functions where such opportunities have been identified, consistent with the Shoreline Restoration Plan (Appendix C) developed by Thurston County.

Please provide Appendix C so that we can provide comment.

D. Regulation of private property to implement Program goals, such as public access and protection of ecological functions and processes, must be consistent with all relevant constitutional and other legal limitations. These include, but are not limited to the protections afforded by the federal and state constitutions, and federal, state and local laws.

Please provide detailed information/references to the relevant federal, state, local laws and other "protections."

E. Regulatory or administrative actions contained herein must be implemented with consideration to the Public Trust Doctrine, regulatory takings, and other applicable legal principles as appropriate.

Please provide examples of how the Public Trust Doctrine applies to regulatory or administrative actions. Public Trust Doctrine: https://fortress.wa.gov/ecy/publications/documents/93054.pdf

F. Regulatory provisions of this Program are limited to Shorelines of the State, whereas the planning functions of this Program may extend beyond the designated shoreline boundaries.

G. Consistent with the policy and use preferences of RCW 90.58.020, Thurston County should balance the various policy goals of this Program along with giving consideration to other relevant local, state, and federal regulatory and non-regulatory programs.

19.100.135 Liberal Construction

As provided for in RCW 90.58.900, the Act is exempted from the rule of strict construction. Therefore, the Act and this Program shall be liberally construed to give full effect to the purposes, goals, objectives, and policies for which the Act and this Program were enacted and adopted, respectively.

Please provide the County's definitions of "strict construction: and "liberal construction."

19.100.140 Severability

Should any section or provision of this Program be declared invalid, such decision shall not affect the validity of this Program as a whole.

Chapter 19.150 Definitions

Where terms, phrases and words are not defined, they shall have their ordinary accepted meanings within the context with which they are used. The most current version of the English Webster's Dictionary shall be considered as providing ordinary accepted meanings. In addition, where available, the definitions provided in WAC 173-26-020, WAC 173-27-030, Chapter 90.58 RCW, TCC 20.03, or TCC Title 24.03 shall be applied in the interpretation and administration of this Program. The definition of various terms as presented in this section does not necessarily represent the same definitions as may be found for the same terms in other chapters of the Thurston County Code.

19.150.100 Abandonment: cessation or vacation of a permitted use or structure through non-action for a period of one year or longer.

Please provide reference to the "one-year" baseline requirement. Please provide the definition of "cessation" as it relates to upland and shoreline permits.

19.150.105Accessory use or accessory structure - any use or structure customarily incidental and accessory to the principal use of a site or a building or other structure located upon the same lot.

19.150.110 Accessory Structure -View Blockage: as it relates to view blockage, buildings and other structures encompassing less than 200 square feet and less than twelve feet in height from grade level, and fences which are six feet, or less in height from grade level do not constitute view blockage.

There should be a "view degradation" definition for activities that are not defined under 19.150.110 but nevertheless cause view degradation to properties, such as waterfront properties, that pay taxes based in part on the "view." Commercial operations on the tidelands would fall under this definition.

19.150.115 Accretion: the growth of a beach by the addition of material transported by wind and/or water. Included are such shore forms as barrier beaches, points, spits, and hooks.

PT: Accretion can occur due to activities other than wind and/or water. This should include accretion due to development activities, including commercial activities on the tidelands as well as the uplands, etc.

19.150.120 Adaptive Management: a process of evaluating data acquired through project monitoring relative to a developed plan with goals or benchmarks, and taking action based on the results in order to reduce uncertainty with regard to adverse ecological impacts and improve outcomes over time.

How would "adaptive management" be implemented once permits are given for aquaculture activities or other activities on the shoreline? How would "adaptive management" be implemented if tideland/shoreline activities are allowed without a permit? Please give examples (including but not limited to) of activities/operations that are subject to "adaptive management."

19.150.125 Adjacent Principle Building: a principle building on a lot abutting the applicant's lot.

19.150.130 Agriculture: uses and practices, primarily commercial in nature, which are in support of agricultural activities, agricultural products, agricultural equipment and facilities, and agricultural land, as defined in WAC 173-26-020(3). This excludes activities typically associated with single-family residences, such as gardening activities primarily for on-site consumption. Such uses may still be subject to other provisions of this Program, Title 24 TCC, or Title 17.15 TCC.

19.150.135 Amendment: a revision, update, addition, deletion, and/or reenactment to an existing shoreline master program.

19.150.140 Anchor: a device used to secure a vessel

19.150.145 Appurtenance: structures and development necessarily connected to the use of a single family residence, and located within contiguous ownership of the primary residential use: Common appurtenances include a garage, deck, driveway, fences, utilities, septic tanks and drain-fields, officially registered historic structures, and grading which does not exceed two hundred fifty cubic yards and which does not involve placement of fill in any wetland or waterward of the OHWM. Appurtenances do not include bulkheads and other shoreline modifications or over-water structures, including tower stairs with landings at or below the ordinary high water line.

RCW 90.58.030 states development is "substantial development" and thus subject to "substantial development" scrutiny except for normal repair and maintenance of residences and their appurtenance, and repair and maintenance of bulkheads.

The question is, what is regarded as "normal repair and maintenance" and who decides what is "normal repair and maintenance?" If what a homeowner needs to do is not considered "normal," then a full-blown Substantial Development Permit process with a hearings examiner, appeal so the SHB, may be triggered.

RCW 90.58.030 (e) "Substantial development" means any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state. The dollar threshold established in this subsection (3)(e) must be adjusted for inflation by the office of financial management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. "Consumer price index" means, for any calendar year, that year's annual average consumer price index, Seattle, Washington area, for urban wage earners and clerical workers, all items, compiled by the bureau of labor and statistics, United States department of labor. The office of financial management must calculate the new dollar threshold and transmit it to the office of the code reviser for publication in the Washington State Register at least one month before the new dollar threshold is to take effect. The following shall not be considered substantial developments for the purpose of this chapter:

(i) Normal maintenance or repair of existing structures or developments, including damage by accident, fire, or elements;

(ii) Construction of the normal protective bulkhead common to single-family residences;

19.150.150 Aquaculture: the culture or farming of fish, shellfish, or other aquatic plants and animals. Aquaculture does not include the harvest of wild geoduck associated with the state and tribal co-managed wild-stock geoduck fishery.

Does aquaculture include net pens? Does aquaculture include floating rafts or similar methods?

The phrase, "and tribal co-managed," was inserted by Thurston County into the Ecology WAC definition. This needs an explanation.

19.150.155 Aquatic Lands: the bed-lands (submerged at all times) and tidelands (submerged lands and beaches that are exposed and submerged with the ebb and flow of the tides) beneath the waters of lakes, rivers and marine waters and along their shores.

19.150.160 Associated Wetlands: those wetlands which are in proximity to and either influence or are influenced by tidal waters or a lake or stream subject to the Act.

19.150.165 Barrier Structure: any shoreline or in-water structure that has the primary purpose of diverting, capturing or altering the natural flow or transport of water or sediment. These include breakwaters, jetties, groins and weirs.

19.150.170 Best Management Practices: those practices determined to be the most efficient, practical and cost-effective measures identified to reduce or control impacts to water bodies from a particular activity, most commonly by reducing the loading of pollutants from such sources into stormwater and water bodies.

Reference should be made to the source(s) of the definition of "best management practices." Where specifically are "best management practices defined?"

19.150.175 Boat House: a structure built for and with a continued primary purpose to store aquatic vessels and usually associated with a single-family residence.

19.150.180 Boat Launch or Ramp: a solid ramp, usually made of concrete, used for the purpose of placing watercraft in and out of the water.

19.150.185 Boating Facilities: public and private mooring structures and related services serving five or more boats, including piers, docks, buoys, floats, marinas, and facilities for the use of boat launching, boat storage, or for the service and maintenance of pleasure or commercial craft.

19.150.190 Breakwater: a protective structure usually built off-shore to protect beaches, bluffs, or harbor areas from wave action.

19.150.195 Buffer: a non-clearing area established to protect the integrity, functions and values of the affected critical area or shoreline, so that no net loss of critical area or shoreline ecological functions occurs. Under optimal conditions, buffers are composed of intact native vegetation. Buffer widths are measured horizontally.

What "buffers" will be required around aquaculture installations? The issue of "buffers" around aquaculture installations need to be specifically detailed in this SMP document because aquaculture installations are subject to tides, currents and lack of obvious boundaries such as fences.

How will aquaculture operators guarantee that vegetation/sea life in buffers around aquaculture installations remain intact? Unlike upland areas that can be fenced, the tides and the current inevitably cause sediments from, for example, geoduck harvesting, to fall on neighboring tidelands. Since there are no fences, workers, barges, PVC pipes, netting will inevitably encroach on neighboring tidelands. This has happened in the past in Totten Inlet (Taylor Shellfish encroaching on state-owned tidelands) and lawsuits ensued.

19.150.200 Building: any structure used or intended for supporting or sheltering any use or occupancy.

19.150.205 Building Line: the perimeter or that portion of a building closest to the ordinary high water mark (OHWM), including (but not limited to) decks, balconies, open steps, architectural features (such as cornices), utilities, and roof overhangs.

19.150.210 Bulkhead: a "normal protective" bulkhead includes those structural and nonstructural developments installed at or near, and parallel to, the OHWM for the sole purpose of protecting an existing single-family residence and appurtenant structures from loss or damage by erosion.

19.150.215 Buoy: an anchoring device with a float used to secure a vessel. For the purposes of this program, the term "buoy field" refers to more than one buoy per parcel.

19.150.220 Census-defined Urban Areas: Territories that consist of areas of high population density and urban land use resulting in a representation of "urban footprint". The territories include residential, commercial and other non-residential urban land uses. Defined by U.S. Department of Commerce and the U.S. Census Bureau Tigerline Shapefile 2012: *http://www.census.gov/geo/www/ua/2010urbanruralclass.html*.

19.150.225 Certified Local Government: a local government that establishes a historic preservation program meeting federal and state standards, and is eligible to apply to the State Historic Preservation Officer (SHPO) and the National Park Service for certification.

19.150.230 Clearing: the destruction, removal, or disposal of vegetation by manual, mechanical, or chemical methods. Clearing includes logging, even when the understory of vegetation is not being removed.

This definition must include "clearing" the tideland of unwanted native sea life and creatures for commercial geoduck, clam and oyster operations.

19.150.235 Commercial, Commercial Development: a use that involves wholesale or retail trade, or the provision of services.

19.150.240 Compensatory Mitigation: compensatory mitigation is the stage of mitigation sequencing where unavoidable impacts to shoreline ecological functions are offset by restoring, creating, enhancing, or preserving critical habitat within a specific watershed or geographic area.

How does this encourage overall recovery of Puget Sound? Compensatory mitigation appears to undermine recovery of ecological conditions.

Please provide citations within the WAC's that define all elements of compensatory mitigation and "no net loss."

Commercial aquaculture operations on the tidelands, which cannot be mitigated on their own, are not "unavoidable" activities. Please provide citations within the WAC's that define "commercial aquaculture" as an "unavoidable" activity.

19.150.245 Conditional Use Permit (CUP): a permit for a use, development, or substantial development that is classified as a conditional use or is not a listed use in the Use and Modifications Matrix in Chapter 19.600.

CUP's will be applied at the County to aquaculture installations and approved by ECY per this draft. The ruling by Judge Bjorgen in 2011 defines a geoduck operation, because of the tubes/nets, as a "structure" and the operations are deemed "developments" under the SMA. Does this not require a substantial development permit?

19.150.250 Critical Areas: As defined in Title 24 (Critical Areas) of the Thurston County Code which is adopted by reference as though set forth herein in full, (as amended) provided that the reasonable use provisions set forth in TCC 24.45, and 24.17, shall not be available within the shoreline jurisdiction. Instead, applicants may apply for a shoreline variance when seeking relief from critical areas regulations within shorelines.

Please provide citations from TCC 24.45, and 24.17 and from the Critical Areas Ordinance (CAO) that refer to and/or describe any rules, exclusions and/or the relationship of commercial/industrial shellfish aquaculture and/or net pen aquaculture to Critical Areas.

19.150.255 Critical Habitat: Habitat areas within which endangered, threatened, sensitive or monitored plant, fish, or wildlife species have a primary association (e.g., feeding, breeding, rearing of young, migrating). Such areas are identified herein with reference to lists, categories, and definitions promulgated by the Washington Department of Fish and Wildlife as identified in WAC 232 12 011 or WAC 232 12 014; in the Priority Habitat and Species (PHS) program by the Department of Fish and Wildlife; or by rules and regulations adopted by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, or other agency with jurisdiction for such designations.

Please provide reference to any discussion in the SMP Update regarding Critical Habitat areas, as identified in WAC 232-12-011 and WAC 232-12-014, regarding rules, regulations and in general the relationship of "Critical Habitat" to commercial/industrial shellfish aquaculture and net pen aquaculture.

19.150.260 Critical Freshwater Habitats: includes those portions of streams, rivers, wetlands, lakes and their associated channel migration zones and flood plains that provide habitat for priority species at any stage in their life cycles, and provide critical ecosystem-wide processes, as established in WAC 173-26-221(2)(c)(iv). This is distinguished from the term "Critical Habitat" as utilized in relation to the Endangered Species Act.

19.150.265 Critical Saltwater Habitats: as defined in WAC 173-26-221(2)(c)(iii), include all kelp beds; eelgrass beds; spawning and holding areas for forage fish, such as herring, smelt and sand lance; subsistence, commercial and recreational shellfish beds; mudflats; intertidal habitats with vascular plants; and areas with which priority species have a primary association. See this chapter for definitions of each type of critical saltwater habitat. This is distinguished from the term "Critical Habitat" as utilized in relation to the Endangered Species Act.

Commercial shellfish beds are an industrial use of aquatic habitat and are not a "Critical Saltwater Habitat," however they have previously been defined. We believe any definition including commercial shellfish beds" as critical saltwater habitat were developed before the advent of commercial/industrial geoduck aquaculture and aquaculture that utilizes plastic tubs, bags or any other man-made structures.

We believe this document must distinguish the harvesting from "natural shellfish beds," from "commercial shellfish beds" that are planted. Commercially planted shellfish beds devastate critical saltwater habitats (and certainly over-harvesting does as well).

19.150.270 Cumulative impacts or cumulative effects: the impact on the environment or other shoreline functions or uses which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a long period of time. See WAC 173 26 186(8)(d).

Please provide a citation to the definition of "cumulative impacts" in ECY materials and to baseline information regarding cumulative impacts.

Cumulative impacts can only be determined when there is a clear baseline. The Thurston County baseline should be included in this description, but as Thurston County does not have knowledge of all aquaculture activities (testimony by Thurston County in the Sohn hearing), it obviously has no means of determining cumulative impacts.

19.150.275 Department: for the purposes of this program, means the Thurston County Resource Stewardship Department (or as amended).

19.150.280 Development: means any human-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, clearing, paving, excavation or drilling operations, storage of equipment or materials, bulkheading, driving of piling, placing of obstructions, or any project of a permanent or temporary nature which interferes with the normal public use of the surface waters overlying lands subject to the Act at any stage of water level.

19.150.285 Development Regulation Standards: controls placed on development or land uses, including, but not limited to, zoning ordinances, critical areas ordinances, all portions of a shoreline master program other than goals and policies approved or adopted under Chapter 90.58 RCW, planned unit development ordinances, subdivision ordinances, and binding site plan ordinances together with any amendments thereto.

19.150.290 Dock: the collective term for a moorage structure that typically consists of a nearshore fixed-pile pier, a ramp (or gangway), and a float that is used as a landing place for marine transport or for recreational purposes. It does not include recreational decks, storage facilities or other accessory structures.

19.150.295 Dredge: the removal of earth, gravel, sand or other mineral substances from the bottom of a stream, river, lake, bay, or other waterbody, including wetlands.

The commercial/industrial shellfish industry not only frequently scrapes the beach before planting, but at harvest dredges the entire areas to 3 feet in depth. However "nicely" this has been worded, the impact exists.

19.150.300 Ecological Functions: the work performed or role played by the physical, chemical, and biological processes that contribute to the maintenance of the aquatic and terrestrial environments that constitute the shoreline's natural ecosystem.

19.150.305 Ecologically Intact: those shoreline areas that retain the majority of their natural shoreline functions, as evidenced by the shoreline configuration and the presence of native vegetation. Generally, but not necessarily, ecologically intact shorelines are free of structural shoreline modifications, structures, and intensive human uses. In forested areas, they generally include native vegetation with diverse plant communities, multiple canopy layers, and the presence of large woody debris available for recruitment to adjacent water bodies. Recognizing that there is a continuum of ecological conditions ranging from near natural conditions to totally degraded and contaminated sites, this term is intended to delineate those shoreline areas that provide valuable functions for the larger aquatic and terrestrial environments which could be lost or significantly reduced by human development. Whether or not a shoreline is ecologically intact is determined on a case-by-case basis.

In the first sentence, in addition to vegetation this sentence should include the presence of native vertebrate and invertebrate wildlife. Vegetation is only one aspect of the ecology of the shoreline.

19.150.310 Eelgrass: a flowering plant adapted to the marine environment that roots in sand or mud in shallow waters where waves and currents are not too severe. Eelgrass beds require high ambient light levels. Where eelgrass beds are disputed as a critical saltwater habitat, appropriate state agencies and co-managing tribes shall be consulted in order to assist with the determination.

19.150.315 Emergency: an unanticipated and imminent threat to public health, safety, or the environment which requires immediate action within a time too short to allow full compliance with this program. All emergency construction is construed narrowly and shall be consistent with the SMA and this Program (RCW 90.58.030 (3eiii)). See also emergency exemption procedures in WAC 173-27-040(2)(d).

19.150.320 Endangered Species Act (ESA) - a federal law intended to protect any fish or wildlife species that are threatened with extinction throughout all or a significant portion of its range.

19.150.325 Enhancement: to improve the ecological functions at the site or landscape scale. This includes physical, biological and chemical processes which contribute to the maintenance of the aquatic and terrestrial environments.

This should be "improve the ***natural*** ecological functions, if any still exist, or to attempt to recreate natural ecological functions"

19.150.330 Environmental Limitations: limiting factors to new modifications or development, such as floodplains or unstable slopes.

19.150.335 Excavation: the mechanical removal of earthen material.

19.150.340 Exemptions: uses and development, set forth in WAC 173-27-040 and RCW 90.58.030 (3)(e), 90.58.140(9), 90.58.147, 90.58.355, and 90.58.515, that are not required to obtain a Substantial Development Permit, but which must otherwise comply with applicable provisions of the Act and this Program. Certain exemption developments must obtain a letter of exemption (see Section 19.500.100(C)(4)).

19.150.345 Existing Lots: lots, tracts, parcels, sites or other fractional part of divided land that was legally established in accordance with local and state subdivision requirements prior to the effective date of this Program.

19.150.350 Existing Structures: structures that were legally constructed prior to the effective date of this Program in accordance with the requirements in effect at the time of construction.

19.150.355 Existing Uses: uses that were legally established prior to the effective date of this Program in accordance with the applicable regulations at the time established.

19.150.360 Facilities: defined per 19.600.115(3)

19.150.365 Feasible: an action, such as a development project, mitigation, or preservation requirement, that meets all of the following conditions:

A. The action can be accomplished with technologies and methods that have been used in the past in similar circumstances, or studies or tests have demonstrated in similar circumstances that such approaches are currently available and likely to achieve the intended results;

B. The action provides a reasonable likelihood of achieving its intended purpose; and

C. The action does not physically preclude achieving the project's primary intended legal use.

The burden of proving infeasibility is on the applicant. In determining infeasibility, the reviewing agency may weigh the action's relative public costs and public benefits, considered in the short- and long-term

time frames.

19.150.370 Fill: the addition or redistribution of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the OHWM, within a one-hundred year floodplain; or within an important habitat, lake, pond, stream, wetlands, or shorelands (and their associated buffers) in a manner that changes the elevation or creates dry land. Large woody debris or other native materials approved as a part of a habitat restoration project shall not be considered fill.

Based on aerial photos of sediment flow from geoduck harvest operations, there should be a definition of "sediment dispersal" from aquaculture operations such as geoduck harvesting. Sediment so disrupted cannot be kept off of adjoining neighbor tidelands. This would be unacceptable for upland properties.

19.150.375 Float: an anchored (not directly to the shore) floating platform THAT IS FREE TO RISE AND FALL WITH WATER LEVELS AND IS USED for water-dependent recreational activities such as boat mooring, swimming or diving. Floats may stand alone with no over-water connection to shore or may be located at the end of a pier or ramp.

19.150.380 Forage Fish: small, schooling fishes that are key prey items for larger predatory fish and wildlife in a marine food web. Puget Sound species include, but are not limited to, Pacific herring, surf smelt, Pacific sand lance and northern anchovy. Each species has specific habitat requirements for spawning, such as sediment grain size, tidal heights, or vegetation types. Known spawning and holding areas have been mapped by the Department of Fish and Wildlife.

19.150.385 Forest Practices: any activity conducted on or directly pertaining to forestland and relating to growing, harvesting or processing timber, including, but not limited to:

A. Road and trail construction;

B. Harvesting, final and intermediate;

C. Pre-commercial thinning;

D. Reforestation;

E. Fertilization;

F. Prevention and suppression of diseases and insects;

G. Salvage of trees; and

H. Brush control.

Forest practices shall not include preparatory work such as tree marking, surveying and road flagging; or removal or harvest of incidental vegetation from forest lands such as berries, ferns, greenery, mistletoe, herbs, mushrooms and other products which cannot normally be expected to result in damage to forest soils, timber or public resources.

19.150.390 Groin: barrier-type structures extending waterward from the back shore across the beach to interrupt and trap sand movement.

19.150.395 Guidelines (WAC): those standards adopted by the Department of Ecology pursuant to

RCW 90.58.200 to assist in the implementation of Chapter 90.58 RCW for the regulation of shorelines of the state. The standards may be referenced at WAC 173-26 and 173-27.

19.150.400 Hard Surface: An impervious surface, a permeable pavement, or a vegetated roof.

19.150.405 Impervious Surface: A non-vegetated surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A non-vegetated surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

19.150.410 Industrial, Industrial Development: facilities for processing, manufacturing, and storing finished or partially finished goods; heavy vehicle dispatch and maintenance facilities; and similar facilities.

This definition should be labeled "Industrial Facilities" rather than "Industrial Development" which has an entirely different meaning than "Facilities."

If this topic is indeed about "Industrial Development," it should include commercial aquaculture, which is an industrial development on the tidelands.

19.150.415 In-lieu Fee (Fee In-Lieu): a fee paid to a sponsor (e.g., Thurston County,) to satisfy compensatory mitigation requirements when mitigation is precluded from being completed on-site due to site development or physical constraints, is part of a habitat conservation plan, or when the permitting agencies determine that ILF is more environmentally preferable over proposed permittee responsible mitigation.

This should include references to "no net loss" on a site-specific basis. Some examples here are needed. There needs to be a definition of what is "preferable." This provision seems particularly susceptible to corrupt practices.

19.150.420 Invasive exotics/non-native vegetation: see Chapters 17.10.010 RCW and WAC 16-750-003

19.150.425 In-stream Structure: structure placed by humans within a stream or river waterward of the ordinary high water mark that either causes or has the potential to cause water impoundment or the diversion, obstruction, or modification of water flow. In-stream structures may include those for hydroelectric generation, irrigation, water supply, flood control, transportation, utility service transmission, fish habitat enhancement, or other purpose.

19.150.430 Jetty: barrier-type structures designed to modify or control sand movement and usually placed at inlets to improve a navigable channel.

19.150.435 Kelp: a plant generally attaching to bedrock or cobbles in shallow waters, especially in areas with moderate to high waves or currents. Kelp beds generally require high ambient light levels. Kelp includes both floating and non-floating species. Where kelp beds are disputed as a critical saltwater habitat, appropriate state agencies and co-managing tribes shall be consulted in order to assist with the determination.

A clear definition related to "disputed kelp bed" is needed.

19.150.440 Landscaping/Landscape materials:

19.150.445 Land-disturbing Activity: Any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening, are not considered land-disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.

Land disturbance examples should include commercial geoduck and other aquaculture on the tidelands that utilizes unnatural structures, such as PVC tubes (43,500 per acre equaling about 7 miles of PVC weighing approximately 16 tons) as well as non-natural oyster and clam bags.

19.150.505 Limited Area of More Intense Rural Development (LAMIRD): locally designated rural areas authorized to accept more intense, urban-like development under RCW 36.70A.070(5)(d) and Title 20 TCC.

19.150.510 Live Aboard: use of a vessel as a residence, meaning full time occupancy in a single location, for an uninterrupted period exceeding 60 days in any calendar year.

19.150.515 Lot: a fractional part of divided lands having fixed boundaries, being of sufficient area and dimension to meet minimum zoning requirements for width and area. The term shall include tracts, or parcels. Where the context so indicates, lots, tracts or parcels may refer to subdivided lands not conforming to, or in violation of, zoning or subdivision regulations.

19.150.520 Lot Coverage: the percent or square footage of a lot that will be covered by a modification to impervious or hardened surfaces.

19.150.525 Low Impact Development (LID): a stormwater management strategy that that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

19.150.530 Low-intensity: activities which do not adversely alter natural ecosystem functions.

Examples should be given.

19.150.535 Macroalgae: Marine algae visible to the naked eye, such as kelp or other seaweeds.

19.150.540 Marina: a public or private water dependent wet moorage and/or dry boat storage facility for 10 or more pleasure craft and/or 10 or more commercial craft, and generally including goods or services related to boating. Marinas also include wet moorage facilities where boat moorage slips may be leased or rented to individuals who are not a member owner of an associated residential development. Launching facilities may also be provided. Marinas may be open to the general public or restricted on the basis of property ownership or membership.

19.150.545 Marine rail system: a pair of sloping tracks which extends into the tidelands, used for the purpose of placing watercraft in and out of the water.

19.150.550 May: a permissive term that means the action is acceptable, provided it satisfies all other provisions of this Program.

19.150.555 Mining: the removal of sand, soil, minerals, and other naturally occurring materials from the earth for commercial or economic use.

19.150.560 Mitigation Sequencing: Mitigation actions associated with development proposals impacting critical areas shall adhere to the following mitigation sequence:

A. Avoiding the impact altogether by not taking a certain action or parts of an action;

B. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

C. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

D. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

E. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or

Compensatory mitigation seems to allow for a "no net gain" in ecological function of the marine and shoreline environment. What areas would be included or excluded in the definition of "environments"? Where does this language come from?

Does the County have a plan for actual improvement of the shoreline environment and if so, where is it articulated?

The "Shoreline Restoration Plan" is Appendix C which is not yet published to our knowledge.

F. Monitoring the impact and taking appropriate corrective measures.

Please define "monitoring the impact" and give examples of "appropriate corrective measures."

19.150.565 Modification: those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such as a dike, breakwater, pier, weir, dredged basin, fill, bulkhead, or other structure. They can include other actions, such as clearing, grading, or application of chemicals.

The PVC pipes and nets used in geoduck aquaculture have been defined as "structures." This should be included in the examples of "modification."
https://protectourshoreline.org/thurston/SDP/110121_ThurstonCnty_HearingExaminer_Order_SDP.pdf

MR: Will look up 1990 plan definition of "modification."

19.150.570 Mooring Structures: includes piers, docks, floats and buoys and their associated pilings, ramps, lifts and railways, as well as modifications that support boating facilities and marinas. Any mooring structure or grouping of structures that provide docking space for 10 or more boats is considered

a marina.

19.150.575 Mudflats: a low-lying land of fine sediments and silt that is exposed at low tide and covered at high tide.

19.150.580 Must: a mandatory term that means an action is required.

19.150.585 Natural hydrographic conditions: the natural conditions for a particular time of year of water delivery and movement through a system.

19.150.590 No Net Loss: the maintenance of the aggregate total of the County's shoreline ecological functions. The no net loss standard requires that the impacts of shoreline development and/or use, whether permitted or exempt, be identified and prevented or mitigated such that there are no resulting adverse impacts on ecological functions or processes. Each project shall be evaluated based on its ability to meet the no net loss requirement. The no net loss standard applies at multiple scales, starting at the project site. Compensatory mitigation standards include sequencing guidelines to ensure the most appropriate mitigation type and site are selected, as close to the impacted location as possible.

This definition of "No Net Loss" seems to be an actual "No Net Gain" provision. The definition of "Compensatory mitigation" allows for mitigation in unrelated areas. For example, I want to do development on an acre of tideland. The owner of an unrelated tideland removes a bulkhead as compensatory mitigation. There is no gain in ecological function as the benefits of the bulkhead removal are lost to the new development.

If one of the main compensatory mitigation strategies is restoration in an area of Puget Sound in Thurston County, this would mean that taxpayers would be paying for "No net loss." While the shoreline development is for someone's financial or personal benefit, taxpayers would be subsidizing that financial or person benefit. This is an example of "robbing Peter to pay Paul."

19.150.595 Normal Maintenance: those usual acts necessary to prevent a decline, lapse or cessation from a lawfully established condition.

19.150.600 Normal Repair: to restore a development to a state comparable to its original condition, including, but not limited to, its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, except where repair causes substantial adverse effects to a shoreline resource or environment. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance and the replacement does not cause substantial adverse effects to shoreline resources or environment.

19.150.605 Noxious Weeds: see Chapters 17.10.010 RCW and WAC 16-750-003.

19.150.610 Ordinary High Water Mark (OHWM): the mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition existed on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by the County or Ecology provided, that in any area where the OHWM cannot be found, the OHWM adjoining salt water shall be the line of mean higher high tide and the OHWM adjoining fresh water shall be the line of mean high water.

19.150.615 Pervious Surface: Any surface material that allows stormwater to infiltrate into the ground.

Examples include lawn, landscape, pasture, native vegetation areas, and permeable pavements.

19.150.620 Pier: a rigid structure built over the water and typically constructed on piles, attached to the shore and used as a landing place for marine transport or for recreational purposes.

19.150.625 Platted: land that has been divided following the applicable laws for divisions of land under Title 18 TCC, including land subject to a current application for such division.

19.150.630 Predator Exclusion: an object or activity used to implement pest management in aquaculture practices with the intent of deterring or excluding predators such as moon snails, sea star, crabs, diving ducks, burrowing shrimp or sand dollars. Common methods include, but are not limited to, large canopy nets, mesh, PVC tubes with net caps, flexar plastic tunnels, oyster bags and suspended culture systems.

"Predator Exclusion" is shellfish industry concept. "Predator exclusion" is an environmentally disruptive process of excluding wildlife from certain aquaculture installations. Such an industry definition has no place in a governmental regulation that is specifically designed to protect and preserve natural ecological conditions. It should also be noted that "predator exclusion" almost certainly includes endangered, sensitive, and/or threatened species.

Further, the use of language including "Predator Exclusion" is a way of normalizing concepts that are abnormal and favors the viewpoint of a specific industry rather than the citizens of Thurston County. Are we to take our children down to the beach and see starfish and crabs and explain to them that they are "bad" because they are predators of the commercially grown geoduck? Enshrining this in county documents is unacceptable and counter-productive.

"Predator Exclusion" is not a term that ordinary people use. It is a term that comes directly from the shellfish industry. It does not belong in the Thurston County SMP that is presumably written for the citizens of Thurston County and not simply to benefit the shellfish industry.

The term should be changed to "Wildlife Exclusion." This more accurately defines the meaning.

19.150.635 Principle Building: the primary structure on a lot closest to the ordinary high water mark excluding accessory structures.

19.150.640 Priority Species: species requiring protective measures and/or management guidelines to ensure their persistence at genetically viable population levels. Priority species are those that meet any of the criteria listed below.

A. State-listed or state proposed species. State-listed species are those native fish and wildlife species legally designated as endangered (WAC 232-12-014), threatened [WAC 232-12-011(1)], or sensitive (WAC 232-12-011). State proposed species are those fish and wildlife species that will be reviewed by the Washington Department of Fish and Wildlife (POL-M 6001) for possible listing as endangered, threatened, or sensitive according to the process and criteria defined in WAC 232-12-297.

B. Vulnerable aggregations. Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to congregate. Examples include heron colonies, seabird concentrations, and marine mammal congregations.

Examples should include wild salmon and orca whales.

Please provide references to the meaning of this term in WAC's, RCW's, Handbooks, etc.

C. Species of recreational, commercial, and/or tribal importance. Native and nonnative fish, shellfish, and wildlife species of recreational or commercial importance and recognized species used for tribal ceremonial and subsistence purposes that are vulnerable to habitat loss or degradation.

Species of "commercial" importance should not be included in this list because there is frequently a habitat conflict between "commercial" species and native species. Changing the balance of native species (such as in Willapa Bay and Grays Harbor) by introducing non-native species will inevitably lead to disruption of the ecosystem.

Non-native fish and shellfish should not be included in this list. For example, would non-native Atlantic salmon be included in this list? An argument could be made that they are commercially important. But another argument can be made that allowing Atlantic salmon is a flawed strategy, outlawed in California and Alaska.

D. Species listed by the National Marine Fisheries Service or the U.S. Fish and Wildlife Service under the federal Endangered Species Act as either proposed, threatened, or endangered.

19.150.645 Prohibited: not permitted to occur in a particular designation.

19.150.650 Public Access: the ability of the general public or, in some cases, a specific community, to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations.

19.150.655 Qualified Professional or Qualified Consultant: in accordance with WAC 365-195-905(4), a qualified professional must have obtained a B.S. or B.A. or equivalent degree in biology, soil science, engineering, environmental studies, fisheries, geology, geomorphology or related and relevant field to the subject in question, have related work experience and meet the following criteria:

A. A qualified professional for wetlands must have a degree in biology, ecology, soil science, botany, or a closely related field and a minimum of five years of professional experience in wetland identification and assessment associated with wetland ecology in the Pacific Northwest or comparable systems.

B. A qualified professional for habitat management plans or shoreline mitigation plans must have a degree in wildlife biology, ecology, fisheries, or closely related field and a minimum of five years professional experience related to the subject species/habitat type.

Shoreline mitigation requires professional expertise in marine biology independent from industry interests.

MR: In ECY Guidelines – WACs.

C. A qualified professional for geologically hazardous areas, geotechnical and hydrogeological reports must be a professional engineering geologist or geotechnical engineer, licensed in the state of Washington. In designing soft armoring techniques, a qualified professional may also have similar qualifications as that required for habitat management plans.

D. A qualified professional for critical aquifer recharge areas means a Washington State licensed hydrogeologist, geologist, or an engineer qualified in experience and training in aquifer recharge.

There should be disclosure requirements for any possible conflict of interest. This would include taking compensation from an interested party to render an opinion, or working for a company or organization which has taken compensation for an affected project or similar projects.

19.150.660 Ramp (or gangway): a structure between a pier and float which adjusts its angle based on the tidal elevation, allowing access to the float at all times.

19.150.665 Recreation: the use and enjoyment of the shoreline by the public, including but not limited to fishing, hiking, swimming and viewing.

19.150.670 Recreational Development: development that provides opportunities for the use and enjoyment of the shoreline by the public, including but not limited to fishing, hiking, swimming and viewing. This includes both commercial and public recreational facilities.

19.150.675 Residential Development: development for the purpose of human habitation. Residential development includes the construction or modification of one- and two-family detached structures, multi-family structures, condominiums, townhouses, mobile home parks, and other similar group housing, together with accessory dwelling units, accessory uses and structures common to residential uses. Residential development also includes the creation of new residential lots through the subdivision of land. Residential development does not include hotels, motels, bed and breakfasts, or any other type of overnight or transient housing or camping facilities.

19.150.680 Resource-based Uses: low-intensity uses, which may include agriculture, aquaculture, forestry, recreation and designated open-space.

The term "low-intensity" is not defined. Aquaculture, particularly geoduck aquaculture using tons of PVC along with nets on the tideland is not "low intensity." The tidelands are the "nurseries" of Puget Sound and industrial aquaculture on the tidelands has a high intensity impact.

19.150.685 Restoration: the reestablishment or upgrading of impaired ecological shoreline processes and functions. This may be accomplished through measures including, but not limited to, revegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

There should be a more comprehensive definition of "restoration". For example, activities which negatively impact native wildlife species should not be included as a restoration activity. Additional restoration activity in one area should be the basis for justifying development in another location. Restoration should stand alone as just that—restoration.

19.150.690 Revision: the modification or change to a permit authorized under this Program.

19.150.695 Setback: the distance a use or development must be from the edge of a buffer to prevent construction and other activities from intruding into the buffer.

19.150.700 Shall: a mandatory term that means an action is required.

19.150.705 Shellfish Beds: a general area of shoreline, both intertidal and subtidal, where shellfish

congregate. This includes natural subsistence, recreational and commercial beds. Shellfish include, but are not limited to, abalone, hardshell clam, subtidal clam, dungeness crab, geoduck clam, manila clam, oysters, razor clam, pandalid shrimp and red urchin. Where disputed as a critical saltwater habitat, appropriate state agencies and affected tribes shall be consulted in order to assist with the determination.

In the case of disputed critical saltwater habitat, wouldn't the Army Corps of Engineers also be consulted? Also EPA, NMFS and other federal agencies?

Definition of "shellfish beds" should not combine definitions of natural and commercial shellfish beds. There should be two separate definitions: "shellfish beds natural" and "shellfish beds commercial." Commercial/industrial shellfish and net-pen aquaculture cannot be equated with natural processes.

This definition does not appear to be in any WAC's.

19.150.710 Shorelands: those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the department of ecology.

19.150.715 Shoreline Management Act (Act): the Washington State Shoreline Management Act, Chapter 90.58 RCW.

19.150.720 Shoreline Stabilization: actions taken to address erosion impacts to property and dwellings, businesses, or structures caused by natural processes, such as current, flood, tides, wind or wave action.

These actions include structural and nonstructural methods. Nonstructural methods, for example, include approaches such as building setbacks, structure relocation, groundwater management, and land use planning. Structural methods can be "hard" or "soft". "Hard" structural stabilization measures refer to those with solid, hard surfaces, such as concrete bulkheads, while "soft" structural measures rely on less rigid materials, such as bioengineering vegetation measures or beach enhancement. "Hybrid" structures are a composite of both soft and hard elements along the length of the armoring. Generally, the harder the construction measure, the greater the impact on shoreline processes including sediment transport, geomorphology, and biological functions.

It is important to note that the harder the construction measure, the more impact on the environment and biological functions. This principle should also be applied to development and structures applied to the tidelands.

For example, 16 tons of PVC pipe per acre, shellfish industry tractors on the tidelands are "hard" structural methods on the tidelands.

There are a range of measures for shoreline stabilization, varying from soft to hard that include, but are not limited to:

A. Soft
1. Vegetation enhancement;
2. Beach enhancement;
3. Bioengineering measures;
4. Anchor logs and stumps; and

5. Gravel placement/beach nourishment.

B. Hard
1. Rock revetments;
2. Gabions;
3. Groins;
4. Bulkheads; and
5. Seawalls.

19.150.725 Shoreline Structure Setback Line: the closest distance measured on a horizontal plane between the ordinary high water mark and the building line.

19.150.730 Shorelines of the State: includes all "shorelines" and "shorelines of statewide significance" within the state, as defined in RCW 90.58.030.

19.150.735 Shorelines: means all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except (i) shorelines of statewide significance; (ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and (iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes;

19.150.740 Shorelines of Statewide Significance: shorelines in Thurston County designated as shorelines of statewide significance are:

A. Nisqually Delta – from DeWolf Bight to Tatsolo Point, between the ordinary high water mark and the line of extreme low tide, together with shorelands associated therewith per RCW 90.58.030(2)(f)(vi).

B. Puget Sound – seaward from the line of extreme low tide.

C. Lakes, whether natural or artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark.

D. Natural rivers or segments thereof downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more.

E. Shorelands and wetlands associated with A through D above.

19.150.745 Should: a term that means a particular action is required unless there is a demonstrated, sufficient reason, based on a policy of the Act or this Program, for not taking the action.

19.150.750 State Environmental Policy Act (SEPA): An environmental review process designed to work with other regulations to provide a comprehensive review of a proposal. Most regulations focus on particular aspects of a proposal, while SEPA requires the identification and evaluation of probable impacts for all elements of the environment. See Chapter 197-11WAC.

19.150.755 Streams: means those areas of Thurston County where surface waters flow sufficiently to produce a defined channel or bed. A "defined channel or bed" is an area which demonstrates clear evidence of the passage of water and includes but is not limited to bedrock channels, gravel beds, sand and silt beds and defined-channel swales. The channel or bed need not contain water year-round. This

definition is not meant to include irrigation ditches, canals, storm or surface water runoff devices or other entirely artificial watercourses unless they are used by salmon or used to convey streams naturally occurring prior to construction.

"Stream and water body types" means as follows:

1. **Type S waters** include all aquatic areas inventoried as "shorelines of the state," in accordance with Chapter 90.58 RCW, including segments of streams where the mean annual flow is more than twenty cubic feet per second, marine shorelines and lakes twenty acres in size or greater.

2. **Type F waters** include all segments of aquatic areas that are not type S waters and that contain fish or fish habitat including waters diverted for use by a federal, state or tribal fish hatchery from the point of diversion for one thousand five-hundred feet or the entire tributary if the tributary is highly significant for protection of downstream water quality.

3. **Type N waters** include all segments of aquatic areas that are not type S or F waters and that are physically connected by an above-ground channel system, stream or wetland to type S or F waters.

19.150.760 Stormwater Facility: A constructed component of a stormwater drainage system designed or constructed to perform a particular function, or multiple functions. Stormwater facilities include, but are not limited to, pipes, swales, ditches, culverts, street gutters, detention ponds, retention ponds, constructed wetlands, infiltration devices, catch basins, oil/water separators, and biofiltration swales. An engineered or natural dispersion area that is dedicated to strormwater use is also considered a stormwater facility for purposes of this Program.

19.150.765 Structure: a permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner, whether installed on, above, or below the surface of the ground or water, except vessels.

Permanently moored vessels would meet this criteria, so we question the purpose of the exclusion of vessels. The definition of vessels should be modified to "except vessels moored or anchored less than seven days."

PVC pipes with nets for geoduck aquaculture have been defined as a "structure." See 2011 ruling of Judge Thomas Bjorgen which defines a geoduck operation as a "structure" and a development under the SMA.
https://protectourshoreline.org/thurston/SDP/110121_ThurstonCnty_HearingExaminer_Order_SDP.pdf

19.150.770 Substantial Development: any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state. The dollar threshold must be adjusted for inflation every five years, as defined in WAC 173-27-040(2). On September 15, 2012, the amount was increased to six thousand four hundred and sixteen dollars ($6,416).

See 2011 ruling of Judge Thomas Bjorgen which defines a geoduck operation as a "structure" and a development under the SMA.
https://protectourshoreline.org/thurston/SDP/110121_ThurstonCnty_HearingExaminer_Order_SDP.pdf

Please include a definition for the term, "materially interferes."

19.150.775 Substantial Development Permit: a permit for any substantial development.

19.150.780Transportation: systems for automobiles, public transportation, pedestrians, and bicycles. This includes, but is not limited to, roads, parking facilities, bridges, sidewalks and railroads.

19.150.785 Urban Growth Area (UGA): those areas designated by Thurston County pursuant to RCW 36.70A.110 for urban development.

19.150.790 Use: the end to which a land or water area is ultimately employed.

19.150.795 Utilities: services and facilities that produce, convey, store or process electric power, gas, sewage, water, communications, oil, stormwater, and waste. This includes drainage conveyances and swales.

19.150.800 Variance: granting relief from specific bulk, dimensional or performance standards set forth in this Master Program and not a means to vary a use of a shoreline.

19.150.805 Vascular Plants: all seed-bearing plants that have vascular tissue (xylem and phloem).

19.150.810 Vegetation, Native: Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include, but are not limited to, trees such as Douglas Fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

What is the time frame for the definition of "indigenous"?

19.150.815 WAC: Washington Administrative Code.

19.150.820 Water-Dependent Use: a use or portion of a use that cannot exist in a location that is not adjacent to the water and that is dependent on the water by reason of the intrinsic nature of its operations.

19.150.825 Water-Enjoyment Use: a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment.

The last sentence is overly restrictive. A boat launch may have a primary use of allowing recreational boats to launch on Puget Sound waters, but may have a secondary use of allowing kayakers, paddle-boarders, canoers, and others to also access the sound.

19.150.830 Water-Oriented Use: a use that is water dependent, water-related, or water-enjoyment, or a combination of such uses.

19.150.835 Water-Related Use: a use or portion of a use that is not intrinsically dependent on a waterfront location, but whose economic viability is dependent upon a waterfront location because:

A. The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or

B. The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

19.150.840 Weir: a structure that impounds, diverts or uses water for hydraulic generation and transmission, flood control, irrigation, water supply, recreational or fisheries enhancement.

19.150.845 Wetlands: areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Preliminary Comments

on the

Draft Thurston County Master Program Update

Chapter 19.200

By

Patrick and Kathryn Townsend

Kathy Knight

Other Boston Harbor Residents

November 30, 2017

Chapter 19.200 Shoreline Jurisdiction and Environment Designation

19.200.100 Shoreline Jurisdiction

A. The Shoreline Master Program jurisdiction applies to all shorelines of the state in Thurston County and their associated shorelands. This includes:

1. All marine waters;
2. Rivers and streams with more than 20 cubic feet per second (cfs) mean annual flow;
3. Lakes and reservoirs 20 acres and greater in area;
4. Associated wetlands;
5. Shorelands adjacent to these waterbodies, typically within 200 feet of the ordinary high water mark (OHWM);
6. Buffers necessary to protect critical areas that are located within shoreline jurisdiction as described in this program.*
   - optional jurisdiction

There is no mention of "buffers necessary to protect critical areas" in any section except the Mining section as cited in the following:

19.200.100Shoreline Jurisdiction
Buffers necessary to protect critical areas that are located within shoreline jurisdiction as described in this program.*
- optional jurisdiction

There is no mention of "buffers" on the tidelands related to commercial/industrial shellfish aquaculture and the consequent worker trampling, sediment transport, moorage of boats and barges on neighboring tidelands and on the tideland in question.

B. Associated estuarine wetlands: the jurisdictional boundary shall extend 200 feet landward of the delineated edge of the wetland.

C. Associated wetlands that extend greater than 200 feet landward of the OHWM of the shoreline: the jurisdictional boundary shall extend to the delineated edge of the wetland.

D. Critical areas designated pursuant to Chapter 36.70A RCW and located within shoreline jurisdiction shall be subject to the regulations of this Program.

Overall, in this document, there is an emphasis on the shoreline as a resource. "Resource," as defined by the Oxford Dictionary, means, "a stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively," or "local authorities complained that they lacked resources". *Synonyms*: assets, funds, wealth, money, capital.

We would hope that the emphasis related to the Thurston County SMP update would be on preservation of the natural character and ecology of the shoreline, not on the shoreline as a resource. Words do matter, and anyone reading this draft document could easily take the meaning to be a deference to utilization of the shoreline for profit rather than to protect it. At odds with this utilization of the shoreline are the new restrictions on upland shoreline home owners in order to "protect" the shoreline. We would therefore

suggest caution in using the word "resource" to make sure whatever meaning is intended is perfectly clear and is not misconstrued. And we would suggest making protection of the tidelands as restrictive as the rules for the uplands. In other words, re-think your policy of unlimited commercial/industrial aquaculture development on the tidelands. There is an obvious double-standard that is insupportable.

19.200.105 Shoreline Environment Designations

In order to plan and manage shoreline resources effectively and to provide a uniform basis for applying policies and regulations within distinctively different shoreline areas, a system of categorizing shoreline areas is necessary. Under the following system, shoreline environment designations are given to specific areas based on the existing development pattern, the biophysical capabilities and limitations of the shoreline being considered for development, the provisions of WAC 173-26-211 and the goals and aspirations of the citizens of Thurston County as expressed in the Comprehensive Plan. The existing development pattern and the biophysical information of the shoreline was compiled in a *Thurston County Shoreline Master Program Update Inventory and Characterization Report* (Thurston County 2013) and was included as the basis for the environment designations.

The term "resources" related to the shoreline is inadequate because "resources" in this context implies a commodity to be used for personal or corporate financial gain. The SMA specifically states that we must **protect** the resources and ecology of the shoreline.

RCW 90.58.020 states:

(4) Protect the resources and ecology of the shoreline;

Change the sentence "Uses should be limited to those which sustain the shoreline area's physical and biological resources" to "Uses should be limited to those which preserve the natural character and ecology of the shoreline."

Environment designation assignment to shoreline reaches must assure the protection of existing shoreline ecological functions with the proposed pattern and intensity of development as well as be consistent with policies for restoration of degraded shorelines [WAC 173-26-211 (4) (b)].

Please define the phrase "assure the protection of existing shoreline ecological functions."

Thurston County is using five of the six Ecology recommended Shoreline Environment Designations (SED's) and criteria consistent with Ecology's provided criteria for each of the environment designations:

Aquatic, Natural, Urban Conservancy, Rural Conservancy, and Shoreline Residential [WAC 173-26-211(5)]. Thurston County does not have any "High Intensity" shorelines within its jurisdiction. In addition to the five Ecology recommended SEDs, Thurston County is proposing to use one additional SED: Mining (*Shoreline and Environmental Designations Report*, Thurston County 2013). A map of the environment designations can be found in Appendix A.

This Program is designed to encourage, in each environment, uses which enhance the character of that environment. At the same time, the Program imposes reasonable standards and restrictions on development so that such development does not disrupt or destroy the character of the environment or result in a net loss of shoreline ecosystem functions.

In fact, this program apparently allows in many if not most areas, commercial/industrial shellfish aquaculture on the tidelands without restriction, particularly in the most sensitive areas—estuaries.

Estuaries are the nurseries of Puget Sound. Scraping the beach/estuary to get rid of sand dollars, crabs and other species (this is photo documented) that interfere with the commercial/industrial geoduck monoculture, as well as harvesting old time geoducks which live up to 168 years (since before statehood) and thus changing the balance of species, along with 43,560 PVC tubes (approximately 7 miles/16 tons), covered with plastic nets and utilizing rebar, DOES disrupt/destroy "the character of the environment" and DOES "result in a net loss of shoreline ecosystem functions." Any idea that this can be mitigated with a few rules is fallacious.

The shoreline environment designations are not intended to be land use designations. They do not imply development densities, nor are they intended to mirror the Comprehensive Plan designations. The system of categorizing shoreline environment designations is derived from Chapter 173-26 WAC.

The basic intent of this system is to utilize performance standards that regulate activities in accordance with goals and objectives defined locally rather than to exclude any use from any one environment. Thus, the particular use or type of developments placed in each environment must be designed and located so that there are no effects detrimental to achieving the objectives of the shoreline environment designations and local development criteria.

This approach provides an "umbrella" environment class over local planning and zoning on the shorelines. Since every area is endowed with different resources, has different intensities of development and attaches different social values to these physical and economic characteristics, the environment designations should not be regarded as a substitute for local planning and land-use regulations.

We assume that "local planning" involves citizen/neighborhood collaboration as to "land-use regulations." This is currently lacking and the involvement of the public should be spelled out related to implementation of the approach in this section.

In the phrase "Since every area is endowed with different resources," the word "resources" should be changed to "characteristics." The term "resources" applied to "every area" implies that every area is primarily for utilization for financial gain.

The Oxford Dictionary: Resource(s)
plural noun: **resources**
Main definition:

1. A stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively. "local authorities complained that they lacked resources". *Synonyms*: assets, funds, wealth, money, capital;

See also:
http://www.learnersdictionary.com/definition/resource

19.200.110 Mining

A. Purpose. To protect shoreline ecological functions in areas with mining activities within shoreline jurisdiction. To provide sustained resource use, and protect the economic base of those lands and limit incompatible uses.

Mining should be defined as to all types of mining that this section refers to, i.e., coal, oil, sand and gravel, etc.

B. Designation Criteria.

1. Outside incorporated municipalities and outside urban growth areas, AND:

2. Contains shorelines created from mining activity in areas where no previous naturally occurring SMA shoreline existed.

C. Management Policies.

1. First priority should be given to water-dependent uses. Second priority should be given to water-related and water-enjoyment uses.

Examples of mining related to water-dependent, water-related and water-enjoyment uses need to be stated. Is this in reference to pools of water caused by mining that kids may swim in? Is this in reference to hazards created by mining on the shorelines? This section requires more explanation about what it is specifically referring to. As it is now, it is simply a words without context.

2. Non-water-oriented uses should not be allowed except:
   a. As part of mixed used development;
   b. In limited situations where they do not conflict with or limit opportunities for water-oriented uses; or
   c. On sites where there is no direct access to the shoreline.

Same problem as in #1. Examples of mining related to water-dependent, water-related and water-enjoyment uses need to be stated.

3. Policies and regulations shall assure no net loss of shoreline ecological functions as a result of new development. Where applicable, new development shall include environmental cleanup and restoration of the shoreline to comply with any relevant state and federal law.

4. Where feasible, visual and physical public access should be required.

Visual and physical public access to what? Old mines? Or is this meant to say that mining should not interfere with visual and physical public access to lakes, rivers, streams and salt water? This needs to be clearly stated.

5. Aesthetic objectives should be implemented by means such as sign control regulations, appropriate development siting, screening and architectural standards, and maintenance of natural vegetative buffers.

- What are the specific "aesthetic objectives?" This need to be defined.
- How will "sign control regulations" help to implement "aesthetic objectives?"
- What would be an example of "appropriate development siting and screening?
- What are the "architectural standards?"
- Define more clearly the meaning of "maintenance of natural vegetative buffers." What is the definition of "maintenance" in this context and who will provide the "maintenance?"

6. Full utilization of existing urban areas should be achieved before further expansion of intensive development is allowed. Consideration should be given to the potential for displacement of non-water-oriented uses with water-oriented uses when analyzing full utilization of urban waterfronts and before considering expansion of such areas.

This paragraph is gobbledyguck, i.e., "language that is meaningless or is made unintelligible by excessive use of abstruse technical terms; nonsense."
https://en.oxforddictionaries.com/definition/gobbledygook
Please rephrase.

19.200.115 Shoreline Residential

Industrial/commercial aquaculture should be limited/restricted in residential and natural shorelines.

"Water enjoyment uses" must be distinguished from industrial/commercial development such as industrial/commercial aquaculture.

Throughout Chapter 19.200, water enjoyment uses are lumped in with broad water related uses. Water related uses include aquaculture which in fact competes with water enjoyment uses. "Water related" should be separated out from "water enjoyment" as aquaculture is a competing use that has significant impacts to the shoreline, both recreationally and aesthetically.

No fence can preclude the impacts of commercial/industrial shellfish operations on neighboring tideland properties. It would not be acceptable for one upland neighbor to dump a load of sediment on his/her neighbor's yard.

Following is for informational purposes for anyone reading this document and our comments:
Definitions for water enjoyment, water related, water dependent are found in:
http://apps.leg.wa.gov/WAC/default.aspx?cite=173-26-020

(41) "Water-dependent use" means a use or portion of a use which cannot exist in a location that is not adjacent to the water and which is dependent on the water by reason of the intrinsic nature of its operations.

(42) "Water-enjoyment use" means a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment.

(43) "Water-oriented use" means a use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.

(45) "Water-related use" means a use or portion of a use which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because:

(a) The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or

(b) The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

A. Purpose. To accommodate residential development and appurtenant structures that are consistent with this Program, and to provide appropriate public access and recreational uses.

B. Designation Criteria.

1. Does not meet the criteria for the Natural or Rural Conservancy Environments.
2. Predominantly single-family or multifamily residential development or are planned and platted for residential development.
3. Majority of the lot area is within the shoreline jurisdiction.
4. Ecological functions have been impacted by more intense modification and use.

C. Management Policies.

1. Standards for buffers, shoreline stabilization, vegetation conservation, critical area protection, and water quality should be set to assure no net loss of shoreline ecological functions.

The term "no net loss" occurs frequently in the SMP update draft. Since "no net loss" is defined in Appendix B and the County has not provided us with a copy of Appendix B, it is impossible to fully comment on this.

However, "No Net Loss", based on Chapter 100 and usage in this document, is actually a euphemism for "No Net Gain." The definition of "compensatory mitigation" allows for mitigation in unrelated areas. For example, a development on an acre of tideland is mitigated by a restoration project in another part of the County. There is no gain in ecological function

Additionally, if one of the main compensatory mitigation strategies is restoration in an area of Puget Sound in Thurston County, this would mean that taxpayers would be paying for "No net loss." While the shoreline development that causes impact is for an individual/entity's financial or personal benefit, taxpayers would be subsidizing that financial or personal benefit. "No Net Loss" is a technical term for the long understood expression: "Robbing Peter to pay Paul." This aspect of "No Net Loss" should be specifically detailed. The public and environmental organizations have a right to complete clarity on the concept of "No Net Loss," especially when they are funding restoration projects with the idea of "improving and restoring" Puget Sound. The County must be "up-front" about the facts of "No Net Loss" (robbing Peter to pay Paul), so that individuals and groups who willingly give funds for restoration projects for Puget Sound are not misled and are made aware of the fact that they are not donating to improve Puget Sound but to maintain the status quo for someone else's financial or personal benefit.

We would advocate for an overarching "Net Gain" policy rather than a "No Net Loss" policy.

2. Multi-family and multi-lot residential and recreational developments should provide public access and joint use for community recreational facilities. If public access is not feasible on site, off-site options such as an in-lieu fee may be recommended.
3. Access, utilities, and public services should be available and adequate to serve existing needs and/or planned future development.
4. Commercial development should be limited to water-oriented uses. Water-oriented includes water-dependent, water-related and water-enjoyment uses.

We suggest this policy be re-worded to be in compliance with the Shoreline Management Act. This policy is an over-simplification that appears to distort the meaning of the Act.

RCW 90.58.020 The Shoreline Management Act
The legislature declares that the interest of all of the people shall be paramount in the management of shorelines of statewide significance. The department, in adopting guidelines for shorelines of statewide significance, and local government, in developing master programs for shorelines of statewide significance, shall give preference to uses in the following order of preference which:

(1) Recognize and protect the statewide interest over local interest;
(2) Preserve the natural character of the shoreline;
(3) Result in long term over short term benefit;
(4) Protect the resources and ecology of the shoreline;
(5) Increase public access to publicly owned areas of the shorelines;
(6) Increase recreational opportunities for the public in the shoreline;
(7) Provide for any other element as defined in

RCW 90.58.100 deemed appropriate or necessary.

In the implementation of this policy the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally. To this end uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment, or are unique to or dependent upon use of the state's shoreline. Alterations of the natural condition of the shorelines of the state, in those limited instances when authorized, shall be given priority for single-family residences and their appurtenant structures, ports, shoreline recreational uses including but not limited to parks, marinas, piers, and other improvements facilitating public access to shorelines of the state, industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state. Alterations of the natural condition of the shorelines and shorelands of the state shall be recognized by the department. Shorelines and shorelands of the state shall be appropriately classified and these classifications shall be revised when circumstances warrant regardless of whether the change in circumstances occurs through man-made causes or natural causes. Any areas resulting from alterations of the natural condition of the shorelines and shorelands of the state no longer meeting the definition of "shorelines of the state" shall not be subject to the provisions of chapter 90.58 RCW.

Thus the SMA (Shoreline Management Act) includes a list of activities that involve "alterations of the natural condition of the shorelines of the state," from "single-family residences and their appurtenant structures" to "industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state". Both are, according to the SMP, activities that cause "alterations of the natural condition of the shorelines of the state."

So without question, based on the SMA itself, commercial/industrial shellfish aquaculture "alters the natural condition of the shorelines of the state." Although this is obvious to anyone who observes commercial/industrial shellfish aquaculture on the tidelands, there appears to be resistance on the part of the County to acknowledge this.

Rule #4 appears to be an open door for commercial/industrial development in shoreline residential areas.

19.200.120 Urban Conservancy

A. Purpose. To protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.

B. Designation Criteria. Shoreline areas within UGAs or LAMIRDs that are appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area and generally are not suitable for water-dependent uses. Such areas must also have any of the following characteristics:

"LAMIRD" (Limited Areas of More Intensive Rural Development) is an acronym defined in Chapter 100. Each acronym should be restated using the full terminology with the first instance in each subsequent Chapter.

"UGA" (Urban Growth Area) is acronym defined in Chapter 100. It should be restated using the full terminology with the first instance in each subsequent Chapter.

Every acronym and abbreviation in this document should follow the same re-statement in all chapters. See the following link for rationale for doing this.

https://books.google.com/books?id=MOVxIFO_jqIC&pg=PA41&lpg=PA41&dq=acronyms+repeat+definition&source=bl&ots=pCg3kPI0CY&sig=h0sULKePzMeTv4OmEanH-R4fx3g&hl=en&sa=X&ved=0ahUKEwi36ev28dzXAhWow1QKHQFsAwcQ6AEIZTAJ#v=onepage&q=acronyms%20repeat%20definition&f=false

Area suitable for low-intensity water-related or water-enjoyment uses without significant adverse impacts to shoreline functions or processes;

1. Open space, flood plain or other sensitive areas that should not be more intensively developed or supporting resource-based uses;
3. Potential for ecological restoration;
4. Retained important ecological functions, even though partially developed; or
5. Potential for development that is compatible with ecological restoration or Low Impact Development techniques.
6. Does not meet the designation criteria for the Natural Environment.
7. Land having any of the above characteristics and currently supporting residential development may be Urban Conservancy, as may those areas into which a UGA boundary is expanded and thus has any of the above characteristics.

C. Management Policies.

1. Uses that preserve the natural character of the area or promote preservation of open space, floodplain or other sensitive lands either directly or over the long term should be the primary allowed uses. Uses that result in restoration or preservation of ecological functions should be allowed if the use is otherwise compatible with the purpose of the environment and the setting.
2. Standards for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications shall ensure that new development does not result in a net loss of shoreline ecological functions, or further degrade other shoreline values.
3. Public access and public recreation objectives should be implemented whenever feasible and ecological impacts can be mitigated.
4. Water-oriented uses should be given priority over non-water oriented uses. For shoreline

areas adjacent to commercially navigable waters, water-dependent uses should be given highest priority.

5. Any development in the Urban Conservancy designation should implement Low Impact Development techniques, as much as is feasible, in order to maintain ecological functions.

19.200.125 Rural Conservancy

A. Purpose. Provide for sustained resource use, public access, and recreational opportunities while protecting ecological functions, and conserving existing ecological, historical, and cultural resources.

B. Designation Criteria. Shorelines outside the UGA or LAMIRD that have any of the following characteristics:

1. Currently support lesser-intensity resource-based uses, such as agriculture, aquaculture, forestry, or recreational uses, or are designated agriculture or forest lands;

We disagree that commercial/industrial aquaculture is a "lesser-intensity" use. Commercial/industrial aquaculture is also antithetical to recreational uses.

The term "lesser-intensity" is not adequately defined.

2. Currently accommodate residential uses but are subject to environmental limitations, such as properties that include or are adjacent to steep banks, feeder bluffs, or flood plains or other flood-prone areas;
3. Can support low-intensity water-dependent uses without significant adverse impacts to shoreline functions or processes;

The term "low-intensity" is not adequately defined.
The term "significant adverse impacts" to the shoreline is not adequately defined.

4. Private and/or publically owned lands (upland areas landward of OHWM) of high recreational value or with valuable historic or cultural resources or potential for public access;
5. Does not meet the designation criteria for the Natural environment;
6. Land designated Urban Conservancy and from which a UGA boundary is retracted may be designated as Rural Conservancy, if any of the above characteristics are present.

C. Management Policies.

1. Uses should be limited to those which sustain the shoreline area's physical and biological resources, and those of a non-permanent nature that do not substantially degrade ecological functions or the rural or natural character of the shoreline area. Developments or uses that would substantially degrade or permanently deplete the physical and biological resources of the area should not be allowed.

Change the phrase: "should not be allowed"
To: "must not be allowed"

Please define "uses of a non-permanent nature." We can infer that this refers to commercial/industrial geoduck aquaculture, which utilizes 43,560 PVC tubes

(approximately 7 miles/16 tons) per acre, in the first 2-3 years of a planting cycle that lasts 5-7 years. However it would be dishonest and unethical to categorize this as a use "of a non-permanent nature" because the cycle is repeated indefinitely. Once the native geoducks, some alive since statehood, are harvested, that alone represents a permanent alteration to the tideland, just as clear-cutting a forest is a permanent alteration of the ecosystem (give or take several centuries.) See http://www.oregonwild.org/oregon_forests/old_growth_protection/what-is-an-old-growth-forest. Since the County is issuing permits with no term of lease, when the harvest occurs, the tideland will go through the same cycle for an indefinite period of time, making commercial/industrial geoduck aquaculture a "permanent" event.

The term "physical and biological resources" is inadequate because "resources" in this context implies a commodity to be used for personal or corporate financial gain. The SMA specifically states that we must protect the resources and ecology of the shoreline.

RCW 90.58.020 states:
(4) Protect the resources and ecology of the shoreline;

Change the sentence "Uses should be limited to those which sustain the shoreline area's physical and biological resources" to "Uses should be limited to those which preserve the natural character and ecology of the shoreline."

The term "substantially degrade" is vague, nebulous and unclear.

2. New development should be designed and located to preclude the need for shoreline stabilization. New shoreline stabilization or flood control measures should only be allowed where there is a documented need to protect an existing structure or ecological functions and mitigation is applied.

How is "mitigation" defined and who decides if "mitigation" is appropriate or adequate?

3. Residential development standards shall ensure no net loss of shoreline ecological functions and should preserve the existing character of the shoreline consistent with the purpose of the "Rural Conservancy" environment.

4. Low-intensity, water-oriented commercial uses may be permitted in the limited instances where those uses have been located in the past or at unique sites in rural communities that possess shoreline conditions and services to support the development.

What are "low-intensive, water-oriented commercial uses"? For example, industrial/commercial aquaculture is not a "low-intensive" use.

The commercial/industrial shellfish industry has falsely claimed "past use" in areas where there has been no "past use." An example of this was in the Zangle Cove permit appeal. The historian of Boston Harbor stated under oath during that appeal that there has been no historic commercial aquaculture in Zangle Cove.

5. Water-dependent and water-enjoyment recreation facilities that do not deplete the resource over time, such as boating facilities, angling, hunting, wildlife viewing trails and swimming beaches, are preferred uses, provided significant adverse impacts to the shoreline area are mitigated.

What is the meaning of "deplete the resource?" The term "resource" implies a commodity to be used for personal or corporate financial gain. See the above comment under the Shoreline Jurisdiction heading.

6. Agriculture, commercial forestry and aquaculture, when consistent with the Program, may be allowed.

"Aquaculture" is not defined. If what is meant is "commercial/industrial scale aquaculture," we do not agree that this is consistent with the Program.

19.200.130 Natural

Areas designated as "Natural" should not allow the commercial/industrial shellfish industry. These areas have significant limitations as to upland shoreline property usage – specifically to protect the shoreline areas from human influence. The implementation of commercial/industrial shellfish aquaculture greatly impacts the natural state of these areas. The industry should be restricted from Natural areas.

A. Purpose. To protect those shoreline areas that are relatively free of human influence, and/or that include intact or minimally degraded shoreline functions intolerant of human use. Only very low intensity uses are allowed in order to maintain the ecological functions and ecosystem-wide processes. Restoration of degraded shorelines should be planned within this environment.

B. Designation Criteria. Shorelines having a unique asset or feature considered valuable for its natural or original condition that is relatively intolerant of intensive human use. This includes shorelines both in and out of the UGA or LAMIRD when any of the following characteristics apply:

1. The shoreline is ecologically intact and currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity; or
2. The shoreline is considered to represent ecosystems and geologic types that are of scientific and educational interest;
3. The shoreline is unable to support new development or uses without adverse impacts to ecological functions or risk to human safety.
4. The shoreline includes largely undisturbed portions of shoreline areas such as wetlands, estuaries, unstable bluffs, coastal dunes, spits, and ecologically intact shoreline habitats.
5. Retain the majority of their natural shoreline functions, as evidenced by shoreline configuration and the presence of native vegetation.
6. Generally free of structural shoreline modifications, structures, and intensive human uses.

The presence of endangered or threatened species should also be a part of this designation criteria. For example, a shoreline with spawning or migrating endangered, threatened or protected (herring, sand lance, etc.) species should be included.

C. Management Policies.

1. Any use that would substantially degrade or result in a net loss of ecological functions or natural character of the shoreline area should not be allowed. The following new uses should not be allowed: commercial, industrial and non-water-oriented recreation.

Commercial/industrial geoduck operations and other intensive aquaculture methods using artificial bags and/or using 43,560 PVC tubes per acre along with canopy netting and dredging to 3 foot depth at harvest is a substantial degradation and net loss of ecological

functions. It also dramatically changes the character of the shoreline. It is a commercial/industrial use. It should thus not be allowed.

2. Any alteration should be designed with low impact development methods, or be capable of restoration to the natural condition, where feasible. New development or significant vegetation removal that would reduce the capability of vegetation to perform normal ecological functions should not be allowed.

The harvest of geoducks on a commercial/industrial geoduck operation (43,560 PVC pipes planted with over 130,000 geoduck seeds per acre constitutes alteration of the said tideland because it includes harvest of any natively growing geoducks, which can live up to 168 years, before Washington statehood. These areas cannot be restored to their natural condition just as a clear-cut forest cannot be restored to its natural condition.

3. Single-family residences, roads, parking areas and utility corridors may be allowed as a conditional use only if they cannot be located outside the Natural Designation or shoreline jurisdiction, provided that the density and intensity of such use is limited to protect ecological functions and is consistent with the purpose of the designation.

Almost all shoreline areas already have single-family residences which were built according to County land use rules in force at the time of building. This paragraph must be changed to acknowledge, allow and grandfather in existing single-family residences thus built.

4. Low-intensity, water-oriented recreational access, scientific, historical, cultural, educational research uses may be allowed provided that no significant ecological impact on the area will result.

The restrictions on low intensity uses in the above paragraph, that "may be allowed" rather than simply "allowed," are in complete contradiction to the unlimited use of the tidelands granted to the commercial shellfish aquaculture industry (dredging, plowing, rebar insertion, use of plastics, etc). Please understand what this looks like to the public, i.e., collusion, bias, preferential treatment, duplicity, etc. with and for the commercial shellfish industry. This is not in keeping with the meaning of the SMA, which was written before the advent of commercial/industrial geoduck operations and/or other shellfish operations that dramatically alter the tidelands and introduce literally tons of man-made plastics and monoculture into the environment. To borrow a phrase, "this isn't your grandfather's oyster farm." http://coalitiontoprotectpugetsoundhabitat.org/wp-content/uploads/2013/02/not-your-grandfathers-oyster-farm.pdf

19.200.135 Aquatic

A. Purpose. To protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark (OHWM).

The terms "protect" and "restore" are not defined.

See Clallam County Aquatic Designation (2.3) for a slightly more definitive "purpose." "Purpose: The purpose of the Aquatic designation is to protect and restore the quality and health of marine and fresh waters and the species that depend upon them, while allowing for limited modification for water-dependent uses and public access when located in appropriate areas and developed to avoid a net loss of shoreline functions."

The term "manage the unique characteristics" is illogical. "Preserve the unique characteristics"

should be used.

The term "manage resources" implies a financial interest in the aquatic areas—that the aquatic areas are for commercial purposes. This appears to be an oblique reference to commercial/industrial aquaculture based on promotion of commercial/industrial aquaculture in this document.

Specifically what "resources" need to be "managed? The tideland, in its natural state, does not need to be "managed" by state agencies except for monitoring of illegal use. In this context the term "protect" is more appropriate than "manage."

There is no mention of "limited modification" (as in the Clallam County SMP draft) of the aquatic area and/or under what circumstances "limited modification" would be allowed.

There is no mention of "buffers" in the Aquatic section as required by **19.200.100Shoreline Jurisdiction**

> Buffers necessary to protect critical areas that are located within shoreline jurisdiction as described in this program.*

*- *optional jurisdiction*

There is no mention of "buffers" on the tidelands related to commercial/industrial shellfish aquaculture and the consequent worker trampling, sediment transport, moorage of boats and barges on neighboring tidelands and on the tideland in question.

B. Designation Criteria. Lands waterward of the OHWM, which include tidelands, bedlands, and lands beneath freshwater shorelines of the state (may also include wetlands).

C. Management Policies.

This section should contain the same "management policy" found under Urban Conservancy. "Uses that preserve the natural character of the area or promote preservation of open space, floodplain or other sensitive lands either directly or over the long term should be the primary allowed uses." Commercial/Industrial aquaculture utilizing 43,560 PVC pipes (approximately 7 miles/16 tons of PVC) per acre along with canopy netting, barges, boats, workers, etc. does NOT "preserve the natural character of the area or promote preservation of open space.)

1. New over-water structures and development on navigable waters and their beds should be allowed only for water-dependent uses, public access or ecological restoration, and when:
   a. They do not preclude attainment of ecological restoration; and
   b. The size of the new over-water structure is limited to the minimum necessary to support the structure's intended use; and
   c. Multiple use of the over-water facility has been encouraged; and
   d. The structure or use is located and designed to minimize interference with surface navigation, to consider impacts to public views, to allow for the safe, unobstructed passage of fish and wildlife, particularly those species dependent on migration and to ensure that the project does not conflict with existing water dependent uses; and
   e. The use or modification is designed and managed to prevent degradation of water quality and alteration of natural hydrographic conditions.
2. When new over-water structures are proposed for residential development of two or more dwellings, joint use or community dock facilities should be utilized rather than single-use facilities.
3. Development should be compatible with the adjoining upland designation.
4. Existing over-water residences may continue through normal maintenance and repair, but

should not be enlarged or expanded. New over-water residences should be prohibited.

5. Applicants for any use or modification should schedule a staff consult to review the site conditions, and potential habitats and species. This consult should result in a general understanding of applicable development standards for the proposal.
6. Development over or in critical freshwater or saltwater habitats should be limited to those which mitigate impacts according to mitigation sequencing, and development standards for that development activity.

This section addresses over-water structures and development, but does not address under-water or periodic under-water structures and development. There should be clear constraints or prohibition on new under-water structures and development especially in areas where endangered or threatened species are present. This would include any commercial/industrial aquaculture that utilizes PVC tubes, plastic mesh tubes or any other plastic and canopy nets that are on a daily basis under water and it also include uses of barges, tractors, etc. on the tidelands.

19.200.140 Official Shoreline Map

A. As part of this Program, there is one official Thurston County Shoreline Environment Designations Map, which shall be in the custody of the Department of Resource Stewardship and available for public inspection during normal business hours and on the Thurston County website. Unofficial copies of the official map or portions thereof may be included or distributed with copies of this Program (see Appendix A).

B. The purpose of the official Shoreline Environment Designations Map is to depict graphically those areas of Thurston County falling under the jurisdiction of this Program, and the shoreline environment designations of those areas.

19.200.145 Map Boundaries and Errors

A. Mapping Boundaries. Where the exact location of a jurisdiction or environment designation boundary line is uncertain, the official Shoreline Environment Designations Map will be used to determine the location of such line. When resorting to the Shoreline Environment Designations Map does not resolve the conflict, the following rules will apply:

1. Boundaries indicated as approximately following the center lines of streets, highways, alleys or other roadways shall be construed to follow such center lines;
2. Boundaries indicated as approximately following lot, fractional section or other subdivision lines shall be construed as following such subdivision lines;
3. Boundaries indicated as approximately following any lines of corporate limits or other local government jurisdictional lines shall be construed as following such lines;
4. Boundaries indicated as following railroad lines shall be construed as following the center line of the railroad right-of-way;
5. Boundaries indicated as parallel to or extensions of features identified in subsections 1. through 4. above shall be so construed;
6. Boundaries between parallel environment designations shall be construed as the top of the bluff or vegetation line that distinguishes existing development from the critical area abutting the shoreline;
7. When not specifically indicated on the Shoreline Environment Designations Map, distances shall be determined by the scale of the map;
8. Where existing physical or cultural features are at variance with those shown on the

Shoreline Environment Designations Map and cannot be determined with certainty by applying subsections one through six above, the Director shall determine the location or existence of such feature utilizing the provisions of WAC 173-27-211, the policies of RCW 90.58.020, TCC 24.01.040, and the corresponding Master Program provisions herein; and

9. Where a parcel within the shoreline jurisdiction is separated from the water by an existing developed road or an additional parcel that serves to create a distinct break in connectivity to the shoreline, the parcel on the landward side may not be required to meet certain development regulations for that designation (such as public access, water-oriented use, or vegetation conservation standards), provided all other applicable provisions of this Program are met, including no net loss of shoreline ecological functions.

B. Mapping Errors. Some mapping errors may be adjusted prior to a Master Program amendment to assign the appropriate designation to that area by the following methods:

1. The common boundary descriptions and the criteria in RCW 90.58.030(2) and Chapter 173-22 WAC supersede the map when there are mapping error conflicts, other than those with a solution provided in this section.
2. In the event that a jurisdictional area is not mapped, it will automatically be assigned a "Rural Conservancy" or "Urban Conservancy" designation depending on its location outside or inside of a UGA or LAMIRD. Such designation will apply until a Master Program amendment is approved that assigns the appropriate designation to the subject area.
3. In the event that a parcel was inadvertently assigned more than one designation, the more restrictive designation shall apply.
4. In the event that a parcel on the boundary between two designations appears to be a mapping error based on the criteria in this section, the County shall apply the most appropriate of the two designations, until such time as the map can be formally corrected consistent with WAC 173-26-100 and Section 19.500.105(I) (Shoreline Master Program Amendment).
5. In the event of an environment designation mapping error where the Master Program update or amendment record, including the public hearing process, is unclear in term of the correct environment designation to apply to a property, the County shall apply the environment designation approved through the Master Program Update or Amendment process and correct the map.
6. If the environment designation criteria were misapplied, but the update or amendment record, including the public hearing process, does not clearly show that a different designation was intended to be shown on the map, a Master Program amendment may be obtained consistent with WAC 173-26-100 and Section 19.500.105(I) (Shoreline Master Program Amendment). This process is intended to allow for reasonable corrections to the Shoreline Environment Designation process. Such process shall include early consultation with the Department of Ecology and other agencies with jurisdiction, affected tribes, and appropriate public notification prior to local approval. Current designations are reflected in the Shoreline Environment Designations Map (Appendix A).

THURSTON COUNTY
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RESOURCE STEWARDSHIP

This paper has been composed for the following reasons:

- The recent Marine Riparian Habitat Area setbacks along the Thurston County marine shoreline are excessive, unwarranted, not required by any law, and appear to be subject, arbitrary, and inconsistent in their application.
- An excessive setback of 265' has been imposed on our properties. This resulted in ruining over 10-years of retirement planning and investment. We know are forced into selling one of properties because the available building remaining building envelope is too small for our purposes.
- A parcel down the road from us apparently was not subjected to the same excessive setback that our property was subjected to. It appears their permits will allow them to build up to the original 100' Conservancy Zone buffer. Their bluff is about a 30" high medium-bank versus our 3' to 7' low-bank.
- We would like the Thurston County to honor the original 100' Conservancy Zone setback that was in place when we purchase our properties and obtained the first Conditional Site Approvals (CSAs). We would like our 165' back that was ***taken*** from us via recent regulations imposed without any warning or consideration to property owners like us.

Our properties that have been negatively impacted by these regulations: 13912110100 and 13912110500.

During the past several years, local governing bodies and state agencies in Washington State have imposed many rules and regulations that have denied private property owners the ability to use and develop their properties in usual and customary manners. Obviously some reasonable regulations, based on sound and unbiased science, are needed and expected to ensure safe and environmentally sound practices to guide human expansion and the use of our natural resources. However, onerous and unwarranted regulations that appear to be driven by the agendas and ideologies of a few people in positions of power has resulted in what amounts to a devastating tidal wave of the regulatory takings of private property rights. This has become very obvious in Thurston County during the past several years with the passage of the Thurston County Critical Areas Ordinance (CAO) [1] and the resulting restrictions placed on the use of private property. Guided by the CAO they created, county staff involved with land use and permitting activities could freely impose the restrictions written into the CAO.

The CAO was supposedly based upon of "Best Available Science" "… that was reviewed and utilized by the Thurston Board of County Commissioners, the Thurston County Planning Commission, and the Thurston County Planning Department in their development of the proposed critical areas ordinance update, from 2003 to present [July 24, 2012]." This is a list of over 560 documents that is stated to "…represent a partial list of data and best available science." [2]. This is a very impressive list and would tend to intimidate most individuals that might have fallen victim to what appear to be onerous, unwarranted, and financially damaging regulations which infringed upon their private property rights.

All people that are involved in writing, approving, and imposing rules and regulations that will affect the ability of private property owners to use and develop their properties must first and foremost ensure that all rights and freedoms guaranteed by the U.S. Constitution [3] and the

Washington State Constitution [4] are protected and not infringed upon in any manner. Both Constitutions contain clear protections of private property rights.

Amendment 5 in the Bill of Rights in the U.S. Constitution contains the following:
"No person shall … be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation." [5].

Amendment 14, Section 1 in the U.S. Constitution contains the following:
"No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws." [6].

Amendment 9 in the Washington State Constitution contains the following:
"… No private property shall be taken or damaged for public or private use without just compensation having been first made, or paid into court for the owner …" [4].

Recent land use regulations imposed by local and state government entities have resulted in extreme losses of usual and customary private property use, particularly along shorelines and in rural areas. Local and state government entities have created and imposed many of these land use regulations based on claims of preserving our natural resources for future generations (i.e. public use) with little, or no regard for the private property rights of the current property owners. Many affected properties have been rendered virtually useless and worthless to the property owners.

In order to avoid unconstitutional takings of private property, "The Office of the Attorney General is directed under RCW 36.70A.370 to advise state agencies and local governments on an orderly, consistent process that better enables government to evaluate proposed regulatory or administrative actions to assure that these actions do not result in unconstitutional takings of private property." [7].

RCW 36.70A.370 - Protection of private property states the following:
"The state attorney general shall establish by October 1, 1991, an orderly, consistent process, including a checklist if appropriate, that better enables state agencies and local governments to evaluate proposed regulatory or administrative actions to assure that such actions do not result in an unconstitutional taking of private property. It is not the purpose of this section to expand or reduce the scope of private property protections provided in the state and federal Constitutions. The attorney general shall review and update the process at least on an annual basis to maintain consistency with changes in case law." [8]. Based on what is available on the Attorney General's website regarding this topic [7], the attorney general has not reviewed or updated the process since December of 2015 per the date shown on the "Advisory Memorandum and Recommended Process for Evaluating Proposed Regulatory or Administrative Actions to Avoid Unconstitutional Takings of Private Property" [9] document linked on his website; this lapse in reviewing and/or updating the process appears to be in violation of the requirements set forth in RCW 36.70A.370 [8].

Page 1 of the "Advisory Memorandum and Recommended Process for Evaluating Proposed Regulatory or Administrative Actions to Avoid Unconstitutional Takings of Private Property" states the following:
"This Advisory Memorandum was developed to provide state agencies and local governments with a tool to assist them in the process of evaluating whether proposed regulatory or administrative actions may result in an unconstitutional taking of private property or raise substantive due process concerns. Where state agencies or local governments exercise regulatory authority affecting the use of private property, they must be sensitive to the constitutional limits on their authority to regulate private property rights. The failure to fully consider these constitutional limits may result in regulatory activity that has the effect of appropriating private property even though that outcome may not have been intended." [9].

The Advisory Memorandum [9] does contain a "Recommended Process for Evaluating Proposed Regulatory or Administrative Actions to Avoid Unconstitutional Takings of Private Property" (memorandum pages 2-4). The primary private property rights issue revolves around Regulatory Takings (memorandum pages 4-9). The following are some key statements from the Regulatory Takings section of the Advisory Memorandum.

- "…courts have recognized that **if government regulations go "too far," they may constitute a taking of property.** This does not necessarily mean that the regulatory activity is unlawful, but rather that the payment of just compensation may be required under the state or federal constitution." (Page 4). [Bold emphasis added].
- Inverse Condemnation. "There may be times where the government does not intend to acquire property through condemnation, but the **government action nonetheless has a significant impact on the value of property.**" "Inverse condemnation cases generally fall into two categories: those involving physical occupation or damage to property, and those involving the **impacts of regulation on property**." (Page 7). [Bold emphasis added].
- "This relationship between takings law and regulation is sometimes explained as looking at whether a regulation has **the effect of forcing certain landowners to provide an affirmative benefit for the public, when the burden of providing that benefit is one that actually should be carried by society as a whole.**". (Page 7). [Bold emphasis added].
- "… a local government may condition a development permit by requiring measures that mitigate identifiable adverse impacts of the development. However, **a permit condition that imposes substantial costs or limitations on the use of property, unrelated or out of scale to an identifiable impact, could amount to a taking.**" (Page 9). [Bold emphasis added].
- "Courts also consider whether the government could have achieved the stated public purpose by less intrusive means. **One factor used to assess the economic impact of a permit condition is the extent to which the condition interferes with a landowner's reasonable investment-backed development expectations.**" (Page 9). [Emphasis added].
- "… **government action that tends to secure some affirmative public benefit rather than preventing some harm, or that is extremely burdensome to an individual's legitimate expectations regarding the use of property, or that employs a highly burdensome strategy when other less burdensome options might achieve the same**

public objective, raises the possibility that the action may be a taking of private property." (Page 9). [Bold emphasis added].

- "**When government regulation has the effect of appropriating private property for a public benefit rather than to prevent some harm, it may be the functional equivalent of the exercise of eminent domain. In those cases the payment of just compensation will probably be required.**" (Page 9). [Bold emphasis added].

Another important topic in the Advisory Memorandum [9] is **Substantive Due Process.**

- "Under Washington law, even if a government action does not effect a taking, it may be unconstitutional if it violates principles of substantive due process. **Substantive due process invokes the due process provisions of the Fifth and Fourteenth Amendments to the U.S. Constitution to invalidate flagrant abuses of government power—actions that authorize some manifest injustice or that take away the security for personal liberty or private property that our government was formed to protect.**". (Pages 10-11). [Bold emphasis added].
- "In assessing whether a regulation has exceeded substantive due process limitations and should be invalidated, the court considers three questions. First, is the regulation aimed at achieving a legitimate public purpose? There must be a public problem or "evil" that needs to be remedied for there to be a legitimate public purpose. Second, is the method used in the regulation reasonably necessary to achieve the public purpose? The regulation must tend to solve the public problem. Third, **is the regulation unduly oppressive on the landowner?** Failing to consider and address each of these questions may lead to a substantive due process violation." (Page 11). [Bold emphasis added].
- "Factors to be considered in analyzing whether a regulation is unduly oppressive include (a) the nature of the harm sought to be avoided; (b) the availability and effectiveness of less drastic protective measures; and (c) the economic loss suffered by the property owner." (Page 11).
- "On the owner's side—the amount and percentage of value loss, the extent of remaining uses, the temporary or permanent nature of the regulation, **the extent to which the owner should have anticipated such regulation**, and how feasible it is for the owner to alter present or currently planned uses." (Page 11) [Bold emphasis added].

Warning signals are listed in the Advisory Memorandum [9]. There are a few that stand out:

- "Does the Regulation or Action Deprive the Owner of All Economically Viable Uses of the Property? If a regulation or action permanently eliminates all economically viable or beneficial uses of the property, it will likely constitute a taking." "...**the fact that some value remains does not preclude the possibility that the regulatory action might still be a taking of property under other takings tests that balance economic impact against other factors.**" (Page 14) [Bold emphasis added].
- "**Does the Regulation or Action Deny or Substantially Diminish a Fundamental Attribute of Property Ownership?** Regulations or actions that deny or impair a landowner's ability to exercise a fundamental attribute of property ownership are potential takings which should be analyzed further. The fundamental attributes of property ownership are generally identified as the right to own or possess the property, **the right to exclude others from the property**, and the right to transfer the property to someone else." (Page 15). [Bold emphasis added].

- Note: The **Thurston County Single Family Residential Agreement** that some property owners are forced to sign gives Thurston County unrestricted access to the private property without cause or a search warrant. This agreement also imposes extreme and unwarranted record keeping and reporting requirements that might be typically applied to a commercial site that may produce significant amounts of pollution. **Would every elected county official, county employee, and private property owner in Thurston County be 100% willing to agree to and sign the same agreement to be applied to their personal residences? If not, this "agreement" should never have been imposed on the owners of any single family residence.**

- **"Does the Regulatory Action Have a Severe Impact on the Landowner's Economic Interest?** Courts have acknowledged that regulations are a necessary part of an ordered society and that they may limit the use of property, thereby impacting its value." "**...if a regulation or regulatory action is likely to result in a substantial reduction in property value, the agency should consider the possibility that a taking or a violation of substantive due process may occur.**" (Page 16). [Bold emphasis added].
  - Note: I personally know of people that have nearly gone into bankruptcy due to these regulations, or what appears to be subjective interpretation and application of the CAO regulations. They know of people that have gone bankrupt due to the regulations. I also know of other shoreline owners that have had their properties rendered virtually useless and worthless due to the unwarranted setbacks and restrictive regulations.
  - "Factors to Consider in a Regulatory Takings Analysis. **Regulatory action that deprives property of all value constitutes a taking of that property.** Where there is less than a complete deprivation of all value, a court will evaluate whether a taking has occurred by considering the economic impact in relation to at least two other factors: (1) the extent to which the government's action impacts legitimate and long-standing expectations about the use of the property; and (2) the character of the government's actions—is there an important interest at stake and has the government tended to use the least intrusive means to achieve that objective?" (Page 16). [Bold emphasis added].
  - "Factors to Consider in a Substantive Due Process Analysis. **Substantive due process principles require the government to ensure that its actions are reasonably designed to advance a legitimate state interest. To determine whether the government action is reasonable, a court will consider the relation between the government's purpose and the burden on the landowner. To what extent does the landowner's land contribute to the problem the government is attempting to solve? How far will the proposed regulation or action go toward solving the problem? A court will also want to know if less oppressive solutions are feasible.**" (Pages 16-17). [Bold emphasis added].
  - "**Another factor to consider is how the owner's plans for the property are affected by the proposed government action. What uses remain after the proposed action?** Is the regulation temporary or permanent? Should the owner have been able to anticipate the regulation? How feasible is it for the owner to alter present or planned uses?" (Page 17). [Bold emphasis added].

Personal impact:

In our case, we purchased two low-bank, gently-sloped, waterfront properties on Totten Inlet in 2005 and 2006. At the time of our purchases, there was a 100' Conservancy Zone in place. We purchased with that knowledge and obtained Conditional Site Approvals (CSA) for both. Although the building envelopes started at 100', we planned on building further back anyway. Both properties were partially developed prior to the expiration of the first CSAs (Well's, Glendon septic pods and septic drain fields, and a construction road on one.

We were good until our original CSAs expired and Thurston County imposed the 250' Marine Riparian Habitat Area upon which staff could arbitrarily add up to another 50' for a total of 300'. There was no warning, or indication that would have caused us to anticipate a loss of use of an additional 165' of our property due to arbitrary regulations imposed without consideration of the specific characteristics of our properties. Although we were still able to obtain CSAs under the new onerous regulations, we had the use of nearly 40% of our property (265') ***taken*** from us via the new land use regulations and restrictions contained in the Thurston County Critical Areas Ordinance and what appeared to be arbitrary and subjective decisions by staff. We did not find out how severely we had been impacted until about 3-years after the new regulations had been imposed and we went. We believe there are many property owners that have little or no knowledge of how severely they have been impacted and harmed by the relatively recent passing of extremely restrictive land use regulations.

After having the ability to use 265' of our land (measured from the marine bluff landward) ***taken*** from us via regulatory overreach, I started looking into what possible justifications would drive such extreme and unwarranted regulations.

My conclusion first, then why that conclusion was reached.

The when the CAO was drafted, implemented, and updated by the prior three county Commissioners and the staff of that time, it became obvious that extremes in buffers, setbacks, and critical area designations were defined based on subjective and likely ideological interpretations of **suggestions** made by other state agencies and "research" papers which may, or may not be totally valid particularly when dealing with correlative research versus much more involved and detailed causation research.

The CAO, which is a primary guiding document used by the planning staff and permitting office, exhibits an immediate issue in which those people that wrote the CAO turned a suggested setback into a mandatory setback by using the word "shall".

Section 24.25.050 of the CAO addresses Fish and wildlife habitat conservation areas – Marine riparian habitat [1] (Page 221) states the following:
"Standard marine riparian habitat area width. Marine riparian habitat areas of 250 feet in width **shall** be established along all marine shorelines subject to this chapter, except for "Rural" shorelines (as designated by the Shoreline Master Program for the Thurston Region (1990). These "Rural" shorelines shall be regulated by the Master Program. The riparian habitat areas

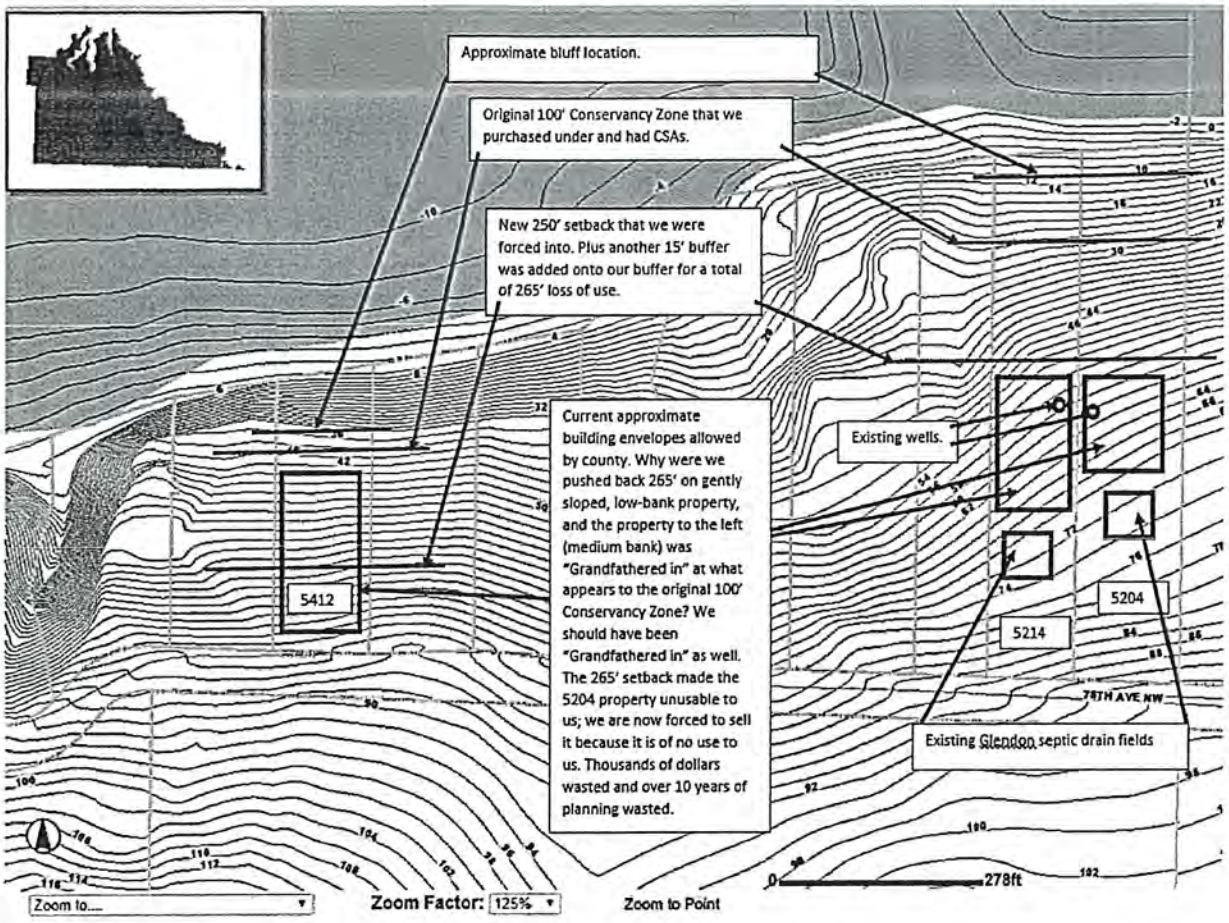
shall be measured, on a horizontal plane, landward from the OHWM or, if the OHWM cannot be identified, the top of the bank. The marine riparian habitat areas shall be retained in their existing condition, except as explicitly authorized by this chapter." [Bold emphasis added].

There is no law that required the Thurston County staff of Commissioners of the time to change suggested setbacks to mandatory setbacks with the use of the word "**shall**". The use of the word "**shall**" appears to have been deliberate and driven more by ideologies versus sound and unbiased science.

The Thurston County Geodata website has page titled, "Marine Riparian Review Area - 300 foot". It contains the following statement:
"This is the maximum possible riparian review area. **It could be less.** Please contact the Permit Assistance Center to determine the appropriate management zone." [10] [Bold emphasis added].

This is a good point to bring up the issue of the extent of the setback imposed on our gently sloped, low-bank (approximately 3' to 7') properties that are over 700' deep versus a property a few parcels down the road from us that is not as deep, has a much steeper slope, and a medium bank of about 30 feet high. The property down the road had their on-site sewage system permit finaled in 2007. Nothing more happened until March of 2016 when an administrative permit action happened. The parcel sold in July of 2017 with what appears to be the same 100' conservancy setback that we had when we purchased our properties. Why does this property get "grandfathered" in with the old conservancy setback, and our properties have a 265' setback imposed?

Official request: We would like the county to honor the original 100' Conservancy zone that existed when we first purchased our properties and give us back the use of the extra 165' recently ***taken***. Please note that we are not objecting to the property owners down the road being able to build on their new property, we are objecting to the obvious subjective and unequal treatment of our properties. Our properties are 5204 and 5214; the property that was apparently "grandfathered" with the 100' setback is 5412. The Geotechnical Evaluation we had done when we purchased our property indicated that the 100' setback would be sufficient for building site stability for at least the next 50 years. Please see the illustration below:



To further add support to my point regarding Thurston County imposing extreme setbacks when they are not required by any law to do so; that is, the setbacks appear to be subjective and arbitrary.

Reference PROTECTION OF MARINE RIPARIAN FUNCTIONS IN PUGET SOUND, WASHINGTON Prepared for: Washington Department of Fish and Wildlife (WDFW Agreement 08-1185) Prepared by: Washington Sea Grant (June 15, 2009) [11] (Page 27, Table 6). Through the Geotechnical Evaluation, our properties have demonstrated site stability oof at least 50 years and our bluff height is about 3' to 7'. Suggested setbacks under the worst slope conditions are not greater than 60'.

Table 6. Setback distances (in ft) from Griggs et al 1992 as cited in Macdonald and Witek (1994) for different bluff heights at various levels of stability where geologic stability for 50-years cannot be demonstrated.

Bluff Height (ft)	Stable (1:1)(45°)	Moderately Stable (2:1)(30°)	Unstable (1:1)(45°)+ (2:1)(30°)
20	20	40	60
40	40	80	120
60	60	120	180
80	80	160	240
100	100	200	300
120	120	240	360
140	140	280	420
160	160	320	480
180	180	360	540
200	200	400	600

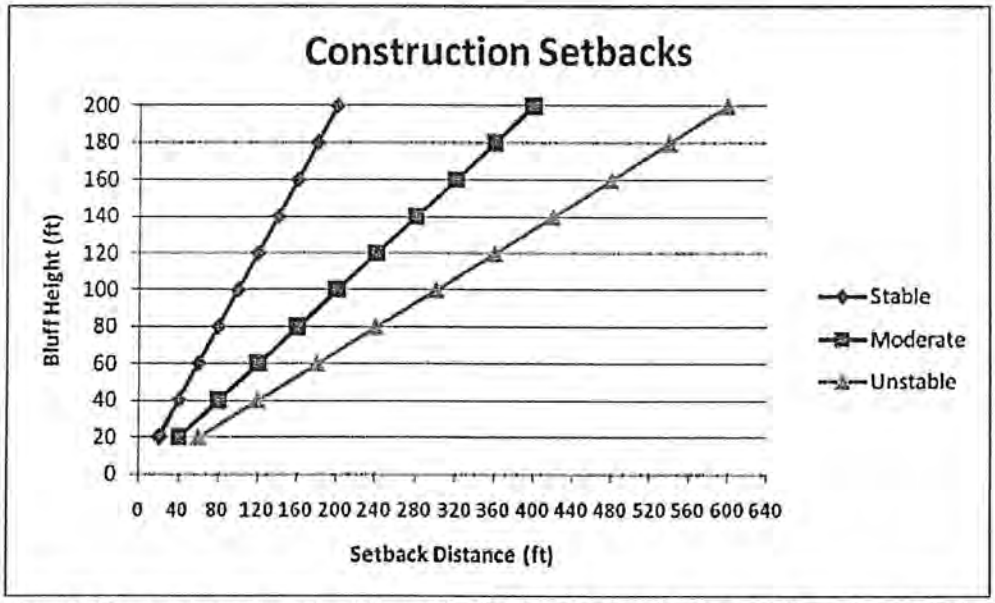


Figure 6. Construction setbacks for different bluff heights at various levels of stability, where geologic stability for 50-years cannot be demonstrated (after Griggs et al 1992 as cited in Macdonald and Witek 1994).

When looking at the water quality versus riparian influence versus setback, the county chose extremes versus reasonable. It is important to note that our septic drain field is about 500' from the Puget Sound. The original 100' Conservancy Zone would have been more than enough to protect the Puget Sound from runoff from our building site. Imposing the 265' setback is extreme and unnecessary. Beyond the 100' setback the gain in perceived water quality improvement is insignificant compared to the loss of property use imposed on us with a new setback of 265'. Table 1 and Figure 1 are from pages 9-10 in PROTECTION OF MARINE RIPARIAN FUNCTIONS IN PUGET SOUND, WASHINGTON [11]

Table 1. Summary data adapted from Desbonnet et al. (1994, 1995) used to generate generalized curve for removal effectiveness of various pollutants at different buffer widths. This data is identical to Desbonnet et al (1995) with the exception of the zero point which we added for illustrative purposes.

% Removal	Buffer Width in Meters (ft)			
	Sediment	TSS	Nitrogen	Phosphorus
0	0	0	0	0
50	0.5 (1.6)	2 (6.6)	3.5 (11)	5 (16)
60	2 (6.6)	6 (20)	9 (30)	12 (39)
70	7 (23)	20 (66)	23 (75)	35 (115)
80	25 (82)	60 (197)	60 (197)	85 (279)
90	90 (296)	200 (656)	150 (492)	250 (820)
99	300 (984)	700 (2297)	350 (1148)	550 (1804

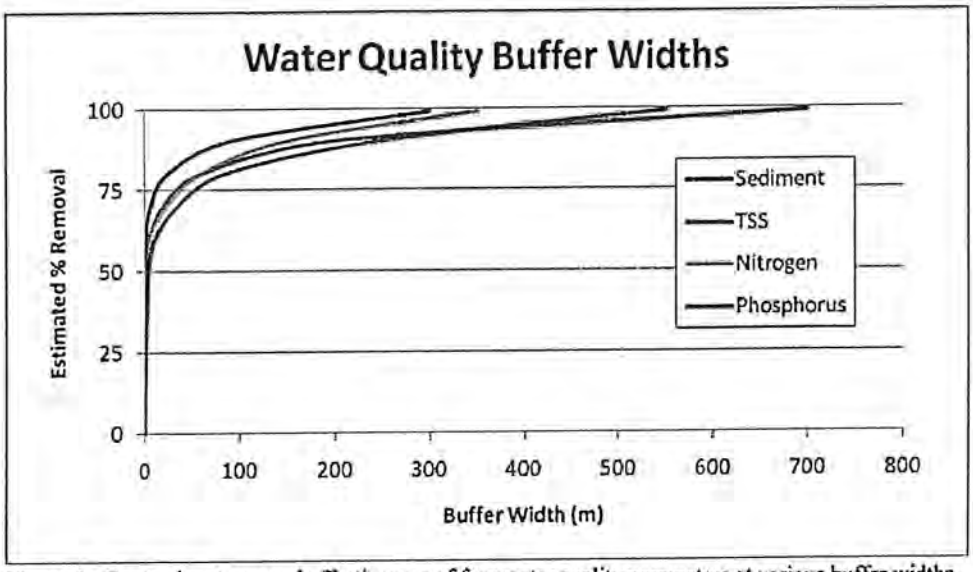


Figure 1. Contaminant removal effectiveness of four water quality parameters at various buffer widths (adapted from Desbonnet et al. 1995).

It appears that the county may have also used the **recommendation** from the Washington Department of Fish and Wildlife (WDFW) to establish their mandatory setback. The county was not obligated to go to the extreme setback, but it appears they chose to do so. The WDFW document regarding Riparian habitats dated December 1997 is still referenced and linked on the WDFW website (Management Recommendations for Washington's Priority Habitats: Riparian).

The linked document with the same title as the WDFW website Management Recommendations for Washington's Priority Habitats: Riparian [12] states the following:
From page xii

Standard recommended Riparian Habitat Area (RHA) widths for areas with typed and non-typed streams. If the 100-year floodplain exceeds these widths, the RHA width should extend to the outer edge of the 100-year floodplain.

Stream Type	Recommended RHA widths in meters (feet)
Type 1 and 2 streams; or Shorelines of the State, Shorelines of Statewide Significance	76 (250)
Type 3 streams; or other perennial or fish bearing streams 1.5-6.1 m (5-20 ft) wide	61 (200)
Type 3 streams; or other perennial or fish bearing streams <1.5 m (5 ft) wide	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with low mass wasting* potential	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with high mass wasting* potential	69 (225)

*Mass wasting is a general term for a variety of processes by which large masses of rock or earth material are moved downslope by gravity, either slowly or quickly.

From page 2:

In summary, management recommendations for Washington's priority habitats and species...

Are:	Are not:
Guidelines	Regulations
Generalized	Site specific
Updated with new information	Static
Based on fish and wildlife needs	Based on other land use objectives
To be used for all occurrences	To be used only for mapped occurrences

The key takeaway here is that the 250' setback is a **recommendation, NOT a regulation**. It was the county staff that wrote the CAO and the County Commissioners of the time that turned a recommendation into a regulation by using the word "shall" when imposing the setback requirement for marine shorelines.

Having to deal with what continually appears to be subjective and arbitrary imposition of regulatory setbacks on our properties, I submitted a Public Disclosure Request (PDR) to Brent Butler (Thurston County Resource Stewardship Director at that time) on May 1, 2017 asking for specific and precise information and/or law(s) that would require the county to impose a 250'+ setback on our properties and others along the shoreline. I did receive a response back from Brad Murphy which referred me back to the "Best Available Science" plus a specific federal document regarding floodplains.

Brad Murphy's response to my PDR:

From: Brad Murphy [mailto:murphyb@co.thurston.wa.us]
Sent: Thursday, June 01, 2017 10:32 AM
To: jimsvision@gmail.com
Cc: Vickie Larkin <LarkinV@co.thurston.wa.us>; Kelli Kennedy <kennedk@co.thurston.wa.us>; Erin Birklid <birklie@co.thurston.wa.us>; Ramiro Chavez <chavezr@co.thurston.wa.us>; Brent Butler <butlerb@co.thurston.wa.us>; Cynthia Wilson <wilsonc@co.thurston.wa.us>; Mike Kain <KainM@co.thurston.wa.us>
Subject: Thurston County Marine Shoreline Setback Issues-Goldsmith

Dear Mr. Goldsmith,

Thank you for your inquiry concerning the marine riparian habitat area as described in Thurston County Code (TCC 24.25.050). The marine riparian habitat width was put in place during Thurston County's 2012 Critical Areas Ordinance (CAO) update. Its purpose is to protect critical areas associated with marine shorelines and associated threatened and endangered species, per state growth management law (RCW 36.70A). Best available science (RCW 36.70A.172) was used in determining the marine riparian habitat area width. The BAS study included a National Marine Fisheries Service (NMFS) biological opinion on FEMA's National Flood Insurance Program (NFIP) which necessitated increased protections for anadromous fish in Puget Sound. Thurston County participates in the NFIP and was following federal guidance as part of the best available science review for the CAO update. The following website has information on best available science and a link to the list of best available science documents Thurston County used in developing the CAO update. http://www.co.thurston.wa.us/planning/critical_areas/criticalareas_science.htm

As you point out, marine riparian areas can also contain water quality, steep slopes or other geologic characteristics/functions, in addition to critical areas and important species and habitats, which also require protection. The marine riparian habitat area is intended to protect critical areas from degradation due to impacts from development. However, even if your parcel looks to be encumbered by the marine riparian habitat area, there are still options to develop your property using a reasonable use exception, per the critical area ordinance (TCC 24.45). These areas will also be evaluated with Thurston County's update to our Shoreline Master Program, which is currently underway. Once the new shoreline master program is adopted a shoreline permit would be the permitting option to review any planned development if it's proposed to be placed in any critical area or critical area buffer in shoreline jurisdiction.

I hope this information is helpful. Please contact me if you have any further questions or would like to set up a meeting to discuss any additional comments.

Sincerely,

Brad Murphy

Senior Planner
Long Range Planning
Thurston County Resource Stewardship
2000 Lakeridge Dr. SW
Olympia, WA 98502
360-754-3355 ext. 4465

murphyb@co.thurston.wa.us

While I do appreciate the response, I did take the time and effort to look up the best available science Brad referred to. The best available science (BAS) that Brad refers to is listed in the Thurston County Best Available Science Document (BAS) – Attachment A [2] – Frequently Flooded Areas – Item 22.

Frequently Flooded Areas

22. National Marine Fisheries Service, Northwest Region. 2008. Endangered Species Act – Section 7 Consultation Final Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. Implementation of the National Flood Insurance Program in the State of Washington Phase One Document – Puget Sound Region. [13]

On page 222 of that document is the following:

In all 100-year floodplain areas (SFHAs) the following criteria apply:

1. Restrict Development in the Riparian Buffer Zone for all watercourses including off channel areas (areas outside this zone but within the Special Flood Hazard Area) to provide necessary protection to the RBZ. The RBZ is the greater of the following:

- 150 feet measured perpendicularly from ordinary high water for Type S (Shorelines of the State) and F (fish-bearing)streams; 100 feet for N (nonsalmonid-bearing) streams, lakes and marine shorelines, and 50 feet for U (untyped) streams,
- the Channel Migration Zone[22] plus 50 feet; and
- the mapped Floodway.

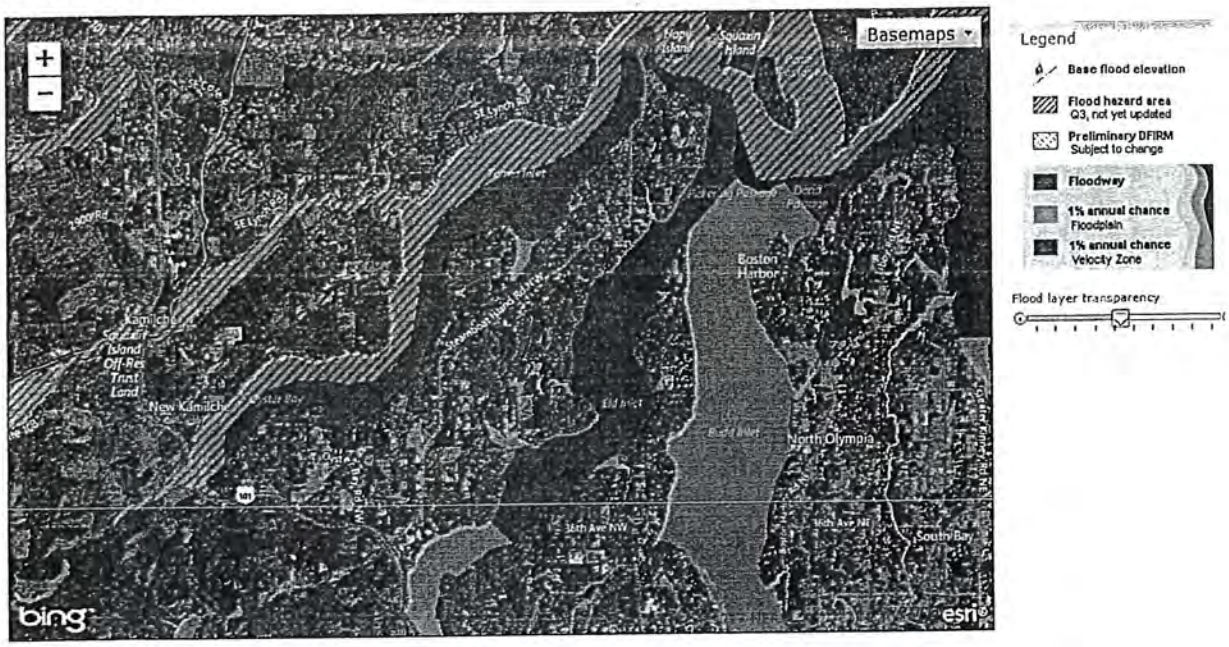
Note that the recommended setback is 100' to 150' depending on the type of shoreline.

Our properties are not in a flood plain. According to the Washington Department of Ecology Flood Hazard Area map, our property shorelines are adjacent to what is called a 1% annual chance Velocity Zone. See the Flood Hazard Areas illustration below.

My question is **how does the** Endangered Species Act – Section 7 Consultation Final Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation **document justify the 265' setback that was imposed on our properties even if it is considered in a "Special Flood Hazard Area"?**

Note that the "High Velocity Zone" is in the Puget Sound waterway, not on land.

Flood Hazard Areas



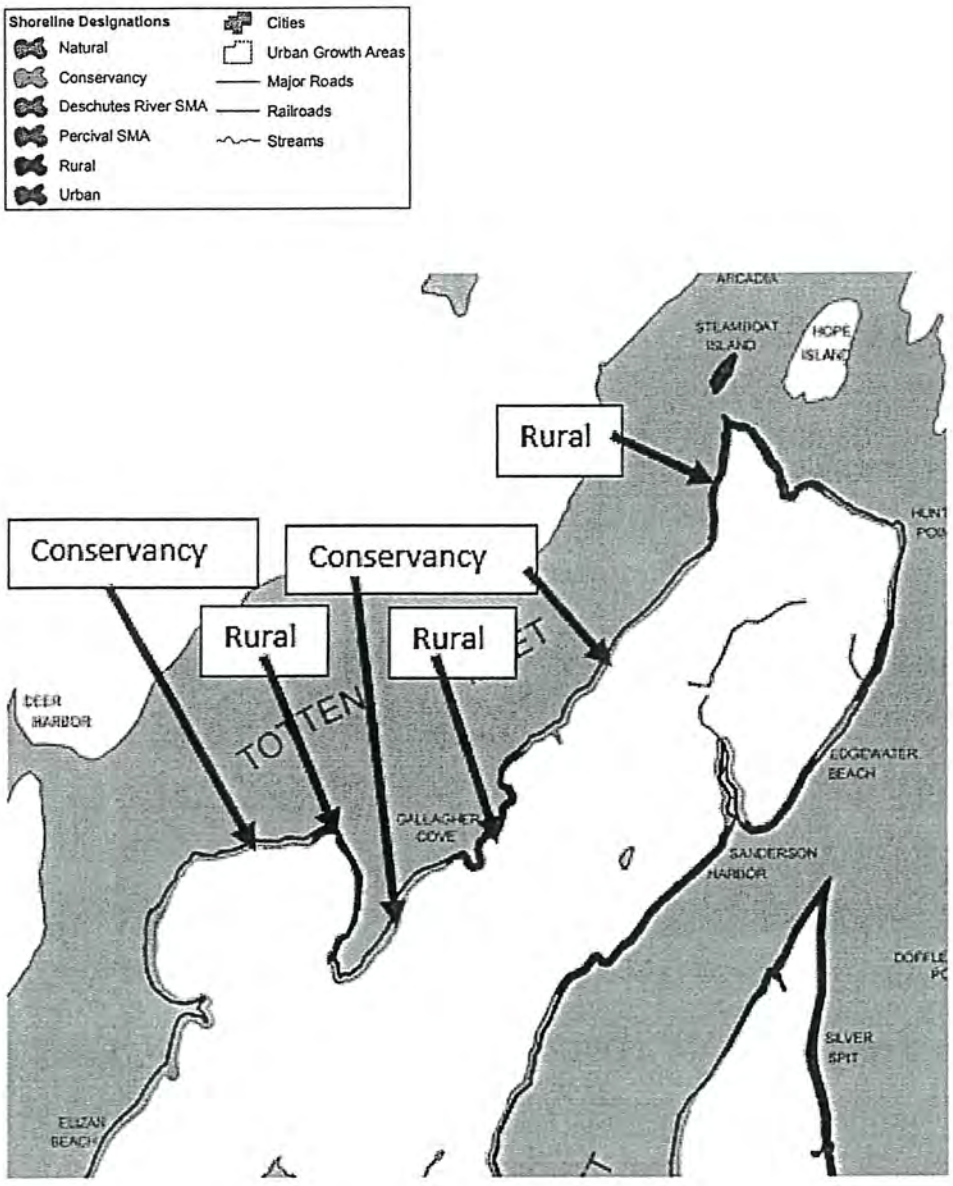
Another issue is the dotted line approach to imposing the 250'+ setback. Rural designated areas only have about a 50' setback (we were told) compared to the conservancy zones that had 250'+ setbacks imposed on them. Our properties happen to fall into one of the **unlucky** Conservancy Zones. The reality is if you own property in a dotted line section designated as rural, you are lucky and safe from the excessive setback. If you own property in a dotted line section designated as Conservancy, you are unlucky and lose the ability to use 250 or more feet of your property. It doesn't get more arbitrary or unequal treatment under the "law" than this. Also recall the property down the road from us somehow avoided the 250'+ setback requirement imposed on our properties; that property also is located in an unlucky conservancy dotted line area.

The following map (Map 1. Existing Shoreline Environment Designations [14])was taken from the Thurston County Shoreline Master Program Update web page - DRAFT Shoreline Environment Designation Report [15].

THURSTON COUNTY

Shoreline Master Program
2013 Update

Map 1
Existing Shoreline
Environment Designations



I can continue to more research and add more supporting information, but I believe I have made a case of how subjective, arbitrary, and excessive the restrictions and regulations truly are along the Thurston County shoreline. We find this regulatory situation abusive, and resulting in financial and emotional harm. We also believe that county has violated several aspects of the 5th and 14th Amendments of the U.S. Constitution, and the 9th Amendment of the Washington State Constitution. Based on just the information I have presented, it appears that the Advisory Memorandum issued by the attorney general regarding private property rights was virtually ignored by the county staff and Commissioners in place at the time the regulations were imposed.

Thank you.

Jim & Cindy Goldsmith
5311 Skillman Ln NW
Olympia, WA 98502

Phone: 360-866-0612
Email: jimsvision@gmail.com

1. *Thurston County Critical Areas Ordinance Update (July 24, 2012)*. 2012 [cited 2017 11/29]; Available from: http://www.co.thurston.wa.us/planning/critical_areas/adopted-ordinance/full-ordinance-unsigned-20120724.pdf.
2. *Best Available Science and Information List - Thurston County Critical Areas Ordinance Update*. 2012 [cited 2017 11/29]; Available from: http://www.co.thurston.wa.us/planning/critical_areas/adopted-ordinance/cao-attachment-a-best-available-science-and-information-list.pdf.
3. *The Constitution of the United States: A Transcription*. [cited 2017 11/29]; Available from: https://www.archives.gov/founding-docs/constitution-transcript.
4. *CONSTITUTION OF THE STATE OF WASHINGTON*. [cited 2017 11/29]; Available from: http://leg.wa.gov/lawsandagencyrules/documents/12-2010-wastateconstitution.pdf.
5. *The Bill of Rights: A Transcription*. [cited 2017 11/29]; Available from: https://www.archives.gov/founding-docs/bill-of-rights-transcript#toc-the-preamble-to-the-bill-of-rights.
6. *The Constitution: Amendments 11-27*. [cited 2017 11/29]; Available from: https://www.archives.gov/founding-docs/amendments-11-27.
7. *AVOIDING UNCONSTITUTIONAL TAKINGS OF PRIVATE PROPERTY*. [cited 2017 11/29]; Available from: http://www.atg.wa.gov/avoiding-unconstitutional-takings-private-property.
8. Legislature, W.S. *RCW 36.70A.370 - Protection of private property*. [cited 2017 11/29]; Available from: http://apps.leg.wa.gov/RCW/default.aspx?cite=36.70A.370.
9. *Advisory Memorandum and Recommended Process for Evaluating Proposed Regulatory or Administrative Actions to Avoid Unconstitutional Takings of Private Property*. 2015 [cited 2017 11/29]; Available from: http://agportal-s3bucket.s3.amazonaws.com/uploadedfiles/Home/About_the_Office/Takings/2015%20AGO%20Takings%20Guidance%20Update%2012-01-15.pdf.

10. *Marine Riparian Review Area - 300 foot*. [cited 2017 11/30]; Available from: http://www.geodata.org/marineriparianreview.htm.
11. WDFW, W.S.G.f. *PROTECTION OF MARINE RIPARIAN FUNCTIONS IN PUGET SOUND, WASHINGTON*. 2009 [cited 2017 11/30]; Available from: http://wdfw.wa.gov/publications/00693/wdfw00693.pdf.
12. Publication, W. *Management Recommendations for Washington's Priority Habitats: Riparian*. 1997 [cited 2017 11/30]; Available from: http://wdfw.wa.gov/publications/00029/wdfw00029.pdf.
13. *ESA Sect 7 Final Biological Opinion*. 2008 [cited 2017 11/30]; Available from: http://www.mercergov.org/files/19%20-%20ESA%20Sect%207%20Biological%20Opinion.pdf.
14. *Map 1 Existing Shoreline Environment Designations*. [cited 2017 11/30]; Available from: http://www.co.thurston.wa.us/planning/shoreline/documents/designations/map-1-existing-shoreline-designations.pdf.
15. *Thurston County Shoreline Master Program Update webpage*. [cited 2017 11/30]; Available from: http://www.co.thurston.wa.us/planning/shoreline/shoreline-designation.html.

THURSTON COUNTY, WASHINGTON

SINGLE FAMILY RESIDENTIAL MAINTENANCE AGREEMENT

Grantor(s) (Last, First and Middle Initial)

[redacted]

Grantee(s) (Last, First and Middle Initial)

Thurston County

Legal Description (abbreviated form: i.e. lot, block, plat or section, township, range, quarter/quarter)

[redacted]

Assessor's Property Tax Parcel/Account Number

[redacted]

The Auditor/Recorder will rely on the information provided on this form. The staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

	Attached?
Stormwater Facility Maintenance Program – Attachment "A"	☒ Yes
Pollution Prevention Source Control Manual – Attachment "B"	☒ Yes

SINGLE FAMILY RESIDENTIAL MAINTENANCE AGREEMENT

After recording return to:

Thurston County
2000 Lakeridge Drive SW
Olympia, WA 98502

Thurston County Project No. _____

RESIDENTIAL
AGREEMENT TO MAINTAIN
STORMWATER FACILITIES AND TO IMPLEMENT A
POLLUTION SOURCE CONTROL PLAN

For purposes of this agreement and for indexing by the Auditor as required by R.C.W. Ch. 65.04, the parties of this agreement are [redacted] **Grantor**, and Thurston County and succeeding jurisdictions through annexation, **Grantee**.

LEGAL DESCRIPTION OF PROPERTY: (Abbreviated legal description if complete legal will not fit here and reference to where complete legal can be found.)

[redacted]

Assessor Parcel No.(s)

[redacted]

(RESIDENTIAL VERSION)

Why do we need a pollution source control plan? This is a single familly residence.

AGREEMENT TO MAINTAIN STORMWATER FACILITIES AND TO IMPLEMENT A POLLUTION SOURCE CONTROL PLAN BY AND BETWEEN THURSTON COUNTY AND SUCCEEDING JURISDICTIONS THROUGH ANNEXATION, AND [redacted] AND ITS HEIRS, SUCCESSORS, OR ASSIGNS (HEREINAFTER "OWNER")

The upkeep and maintenance of stormwater facilities and the implementation of pollution source control best management practices (BMPs) are essential to the protection of water resources in Thurston County. All property owners are expected to conduct business in a manner that promotes environmental protection. This Agreement contains specific provisions with respect to maintenance of stormwater facilities and use of pollution source control BMPs. The authority to require maintenance and pollution source control is provided by Thurston County Code.

This is not a business.

LEGAL DESCRIPTION:

[redacted]

RECITALS

WHEREAS, OWNER is the owner of certain real property in Thurston County, Washington, described as set forth in the legal description contained herein and referred to in this agreement as the "Property".

and

WHEREAS, In connection with the OWNER'S proposed development of the Property, Thurston County has required and OWNER has agreed to construct stormwater facilities and to implement a pollution source control plan. The stormwater facilities and pollution source control plan were prepared by [redacted] for the OWNER'S property and is on file with Thurston County.

We paid for an engineered stormwater design already which will be submitted with the permit application.

and

WHEREAS, OWNER has constructed improvements, including but not limited to, buildings, pavement, and stormwater facilities on the Property, in order to further the goals of Thurston County to ensure the protection and enhancement of Thurston County's water resources, THURSTON COUNTY and OWNER hereby enter into this Agreement. The responsibilities of each party to this Agreement are identified below.

We have an engineered stromwater drainage design that meets county code. Isn't that enough?

OWNER SHALL:

(1) Implement the stormwater facility maintenance program included herein as Attachment "A".

(2) Implement the pollution source control program included herein as Attachment "B".

(3) Maintain a record (in the form of a log book) of steps taken to implement the programs referenced in (1) and (2) above. The log book shall be available for inspection by THURSTON COUNTY at _____ during normal business hours. The log book shall catalog the action taken, who took it, when it was done, how it was done, and any problems encountered or follow-on actions recommended. Maintenance items ("problems") listed in Attachment "A" shall be inspected as specified in the attached instructions or more frequently if necessary. OWNER is encouraged to photocopy the individual checklists in Attachment "A" and use them to complete its monthly inspections. These completed checklists would then, in combination, comprise the log book.

Why does a single family residence have to maintain a log book, do monthly inspections, and be subject to inspections by Thurston County during normal business hours? This is way over the top and not necessary.

(4) Submit an annual report to THURSTON COUNTY regarding implementation of the programs referenced in (1) and (2) above. The report must be submitted on or before August 31 of each calendar year and shall contain, at a minimum, the following:

(a) Name, address, and telephone number of the business, the person, or the firm responsible for plan implementation, and the person completing the report.

(b) Time period covered by the report.

(c) A chronological summary of activities conducted to implement the programs referenced in (1) and (2) above. A photocopy of the applicable sections of the log book, with any additional explanation needed, shall normally suffice. For any activities conducted by paid parties not affiliated with OWNER, include a copy of the invoice for services.

(d) An outline of planned activities for the next year.

Why does a single family residence have to submit an annual report with all the information listed?

(5) Prevent any unauthorized modifications to the drainage system and prevent it from being dismantled, revised, altered or removed except as necessary for maintenance, repair or replacement. Any such actions will be covered under item 4 above and shall be approved of by THURSTON COUNTY. Modifications to the stormwater quantity control and stormwater quality system must be approved in advance by THURSTON COUNTY and may require the submittal of revised design drawings, supporting calculations, modifications to maintenance requirements, and applications for permits.

THURSTON COUNTY WILL, AS RESOURCES ALLOW:

(1) Provide technical assistance to OWNER in support of its operation and maintenance activities conducted pursuant to its maintenance and source control programs. Said assistance shall be provided upon request, as County time and resources permit and at no charge to OWNER.

(2) Review the annual report and conduct occasional site visits to discuss performance and problems with OWNER.

(3) Review this agreement with OWNER and modify it as necessary.

If this "agreement" is required, then we would like it modified immediately to simply state that we will construct the stormwater drainage system as designed by a professional engineer that meets current county codes - PERIOD. The rest of it is over the top and ridiculous and should be deleated. That said, the entire "agreement" should not be required as long as we are building per county code and it is accepted. It is ridiculous to expect a single family residence homeowner to maintain an annual log book, conduct monthly inspections, and be subject to Thurston County inspections during normal business hours. Our home is not a business and the stormwater is rain water.

If our gutter downspouts or drainage pipe are broken or damaged we would fix them. We don't need the threat of this onerous agreement to do so.

REMEDIES:

(1) If THURSTON COUNTY determines that maintenance or repair work is required to be done to the stormwater facility existing on the OWNER'S property, THURSTON COUNTY shall give OWNER, and the person or agent in control of said property if different, written notice in accordance with the Notice Section of this Agreement, of the specific maintenance and/or repair required. THURSTON COUNTY shall set a reasonable time in which such work is to be completed by the persons who were given notice. If the above required maintenance and/or repair is not completed within the time set by THURSTON COUNTY, written notice will be sent to the persons who were given notice stating THURSTON COUNTY'S intention to perform such maintenance and bill the owner for all incurred expenses. THURSTON COUNTY may also adjust stormwater utility charges if required maintenance is not performed.

It's rainwater.

(2) If at any time THURSTON COUNTY determines that the existing system creates any imminent threat to public health, welfare or water quality THURSTON COUNTY may take immediate measures to remedy said threat. No notice to the persons listed in Remedies (1), above, shall be required under such circumstances, however, THURSTON COUNTY shall take reasonable steps to immediately notify OWNER of such imminent threat to the public health and welfare. All other responsibilities shall remain in effect.

This is invasive and unnecessary. Would county staff and county leadership agree to unrestricted access and inspections by county personnel on their home property?

(3) OWNER grants unrestricted authority to THURSTON COUNTY for access to any and all stormwater system features for the purpose of routine inspections and/or performing maintenance, repair and/or retrofit as may become necessary under Remedies (1) and/or (2).

(4) OWNER shall assume all responsibility for the cost of any maintenance and for repairs to the stormwater facility. Such responsibility shall include reimbursement to THURSTON COUNTY within 30 days of the receipt of the invoice for any such work performed. Overdue payments will require payment of interest at the current legal rate for liquidated judgments. If legal action ensues, any costs or fees incurred by THURSTON COUNTY will be borne by the parties responsible for said reimbursements.

(5) OWNER hereby grants to the THURSTON COUNTY a lien against the above-described property in an amount equal to the cost incurred by THURSTON COUNTY to perform the maintenance or repair work described herein.

Again, this is over the top and unnecessary. What will the county fix. This can be easily abused. Again, this is a single family residence, not a pollution producing business or subdivision.

NOTICE:

Whenever a party is required or permitted under this Agreement to provide the other party with any notice, request, demand, consent, or approval ("Notice"), such Notice will be given in writing and will be delivered to the other party at the address or facsimile number set forth below: (a) personally; (b) by a reputable overnight courier service; (c) by certified mail, postage prepaid, return receipt requested; or (d) by e-mail or facsimile transmission. A party may change its address for Notice by written notice to the other party delivered in the manner set forth above. Notice will be deemed to have been duly given: (i) on the date personally delivered; (ii) one (1) business day after delivery to an overnight courier service with next-day service requested; (iii) on the third (3rd) business day after mailing, if mailed using certified mail; or (iv) on the date sent when delivered by facsimile or e-mail (so long as the sender sends such facsimile or email on a business day and receives electronic confirmation of receipt and a copy of the Notice is sent by one of the other means permitted hereunder on or before the next business day). The initial addresses for Notice are as follows:

IF TO OWNER:

[redacted]

Telephone: [redacted]
Fax: _____
E-mail: _____

IF TO THURSTON COUNTY:

Thurston County
Storm and Surface Water Utility
2000 Lakeridge Dr SW
Bldg. 4, Room 100
Olympia, WA 98502
Telephone: (360) 754-4681
Web:
http://www.co.thurston.wa.us/stormwater/

This Agreement is intended to protect the value and desirability of the real property described above and to benefit all the citizens of the County. It shall run with the land and be binding on all parties having or

acquiring from OWNER or their successors any right, title, or interest in the property or any part thereof, as well as their title, or interest in the property or any part thereof, as well as their heirs, successors, and assigns. They shall inure to the benefit of each present or future successor in interest of said property or any part thereof, or interest therein, and to the benefit of all citizens of THURSTON COUNTY.

Dated at _____, Washington, this _____ day of _____, _____.

OWNER

By: _____ By: _____

Address: _____ Address: _____

_____ _____

STATE OF WASHINGTON)
) ss
COUNTY OF THURSTON)

On this day and year above personally appeared before me, _____
_____ known to be the individual(s) described, and who executed the foregoing instrument and acknowledge that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

Given under my hand and official seal this _____ day of _____, _____.

_____
Notary Public in and for the State of

Washington, residing in _____

My commission expires _____

Dated at _____, Washington, this _____ day of _____, _____

APPROVED as to form only May 11, 2011:

ACCEPTED BY:

_____
for THURSTON COUNTY

_____
Date

If we are to be required to sign this "agreement" in order to get our permits or certificate of occupancy, we will clearly state on the agreement that we signed under duress and believed if we did not sign it, we would not be able build our home or move into it (i.e. blackmail). We do not agree with the onerous and unwarranted requirements of this "agreement" since we are building per county code requirements. This is not a pollution producing business, it is a single family residence. This "agreement" is not common, appears to be discriminatory, does not serve any reasonable purpose other than to make building a new home very difficult, and does not apply to other single family residences that may have been built at an earlier date.

Would any county staff or county leadership truly believe that their homes should be subject to an agreement such as this?

Thurston County Shoreline Stakeholders Coalition

Long Lake Management District 21 Steering Committee
Boston Harbor Association
Black Lake Special Use District

4108 Kyro Rd SE. Lacey, WA 98503

December 5, 2017

TO: Thurston County Planning Commissioners

Thru: Brad Murphy
Senior Planner, Long Range Planning
Thurston County Resource Stewardship

From: John Woodford, Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Shoreline Master Program Update – Chapter 19.200

Our comments on the chapter for the Shoreline Environmental Designations (SEDs) are for greater clarity, particularly in the management policies for each SED. These are of course the basis for the subsequent regulations and are covering aspects that are new to all of us. Therefore, we may need to submit additional comments on this chapter, which we understand from staff is expected and welcome. We find we must consider this chapter in conjunction with future chapters, such as 19.600, to understand the full intent.

Thank you for your consideration.

John Woodford, Chairman
Thurston County Shoreline Stakeholder Coalition
4108 Kyro Rd SE, Lacey WA 98503

Cc: Thurston County Planning Commissioners

THURSTON COUNTY SHORELINE MASTER PROGRAM

PREPARED FOR:

Thurston County Board of County Commissioners

PREPARED BY:

Thurston County Resource Stewardship

THURSTON COUNTY
WASHINGTON
SINCE 1852

_____, 2017

Track Changes by the Thurston County Shoreline Stakeholders Coalition
Nov. 29, 2017

Chapters:

19.100	Introduction
19.150	Definitions
19.200	Shoreline Jurisdiction and Environment Designation
19.300	General Goals and Policies
19.400	General Regulations
19.500	Permit Provisions, Review and Enforcement
19.600	Shoreline Use and Modification Development Standards
19.700	Special Reports
Appendix A	Shoreline Environment Designations Map
Appendix B	Mitigation Options to Achieve No Net Loss for New or Re-Development Activities
Appendix C	Shoreline Restoration Plan
Appendix D	Channel Migration Zone Maps
Appendix E	Critical Area Regulations Incorporated By Reference

Acknowledgements:

Chapter 19.100 Introduction

19.100.105 Title

The goals, policies and regulations herein shall be known as the Thurston County Shoreline Master Program, and may be referred to as the "Master Program", "Program", or the "SMP".

19.100.110 Purpose, Goals, and Intent

The Thurston County Comprehensive Plan explains that Thurston County's shorelines provide valuable habitat for fish and wildlife, economic diversity, and recreational opportunities used by residents of all ages. Shorelines play an important role in enhancing the quality of life for our County's citizens.

Therefore, the purpose of the Master Program is to guide the future development of the shorelines in Thurston County in a manner consistent with the Shoreline Management Act of 1971, hereinafter the "Act." The Act and this Program comprise the basic state and county law regulating use of shorelines in the county and is the regulating document for critical areas within shoreline jurisdiction.

The purpose of the Shoreline Master Program is to promote the health, safety, and general welfare of the community by providing reasonable regulations for use and development of Thurston County shorelines consistent with the Washington State Shoreline Management Act of 1971 (Revised Code of Washington [RCW] 90.58) as amended. This Program will be implemented and administered to achieve the following goals:

1. To preserve, to the fullest extent possible, the scenic, historic, and ecological quantities of the shorelines of Thurston County, in harmony with those uses which are essential to the life of its citizens.
2. To provide property owners with clear guidelines and requirements for future shoreline development and provide fair and reasonable allowances for the continued use and enjoyment of private property.
3. To ensure, at minimum, no net loss of shoreline ecological functions and processes, and to promote where feasible, voluntary and collaborative efforts by government agencies, Tribes, businesses, property owners, and other citizens to restore shorelines that have been impaired or degraded in the past by non-natural events.
4. To respect the rights of private property owners and the rights of citizens at large to use and enjoy shorelines of the county.
5. To accommodate and give priority to water dependent uses such as aquaculture and preferred uses such as single-family residential uses when they are consistent with the goal of preserving shoreline ecological functions and processes, in accordance with the policy enunciated in RCW 90.58.020.

Thurston County utilizes a variety of other regulations, policies, plans, and programs to supplement the goals and regulations contained within the Shoreline Master Program, and to manage shoreline resources and regulate development near the shoreline. All development projects are reviewed for compliance with the Thurston County Code (TCC) including but not limited to: Thurston County Comprehensive Plan, Zoning Ordinance (TCC 20, 21, 22, and 23); Critical Areas Ordinance (TCC 24); Thurston County Stormwater Standards (TCC 15.05); Platting and Subdivisions (TCC 18); and the State Environmental Policy Act (SEPA) Ordinance (TCC 17.09). The County works with other entities such as the Thurston Conservation District, Stream Team, South Sound Salmon Recovery Group and watershed lead entities to promote awareness of shoreline issues. In addition, the County has developed Shellfish Protection Districts, Basin Plans, and Capital Facilities Plans to further the goals and the policies of the Shoreline Master Program and promote wise shoreline usage.

Although critical areas in shoreline jurisdiction are identified and designated under the Growth Management Act (GMA), they must also be protected under the Shoreline Management Act (SMA). The Washington State Legislature has determined that local governments must adopt Programs that protect

Comment [D1]: "Future development of the shorelines..." It should be noted that in the 27 yea since the last SMP update that Thurston County's shorelines have shifted from undeveloped to developed and that the thousands of homeowners with existing homes require recognition by their local government of their existing status and be assured of stability and reasonableness of oversigh

Comment [D2]: It is recommended that a new section/paragraph be inserted as "SMP Goals" (as allowed under State SMP Guidelines). Goals shoul be solicited through the public review process. These goals are overarching statements of how the County will recognize and balance the diverse elements of the Act, chapter 90.58 RCW. They reflect the values and the stakeholders inherent in fulfilling the Act. Including homeowners is supported by RCW 90.58.020 "...recognizing and protecting private property rights consistent with the public interests" and RCW 90.58.130 Involvement of all persons and entities having interest, means.

Comment [D3]: It should be noted that none o the plethora of special interest groups with very specific agendas listed here are the property owne who live on the shoreline and pay taxes which represent the higher value of that property. Why not include some property owner groups or types?

critical areas within shorelines at a level that assures no net loss of shoreline ecological functions (ESHB 1653 Sec. 2(4)). Although Washington's shorelines may contain critical areas, the shorelines themselves are not critical areas by default as defined by GMA.

Comment [D4]: Should the reference to ESHB 1 updated to the current WAC: WAC 173.26.221 (2)(a)

The provisions of this title for regulating critical areas shall apply to all land, all water areas and all structures, and all uses irrespective of lot lines in the unincorporated territory of Thurston County, Washington, except for existing and on-going agricultural activities. Agricultural activities meeting the requirements of TCC Section 17.15.110 shall be regulated by Chapter 17.15 TCC (as updated) or by the Voluntary Stewardship Program (VSP) once a VSP Workplan is adopted.

19.100.115 Adoption Authority

This Master Program is adopted pursuant to the authority granted under the Shoreline Management Act of 1971, Chapter 90.58 Revised Code of Washington (RCW) and Chapter 173-26 of the Washington Administrative Code (WAC).

19.100.120 Applicability

Comment [D5]: Please reference the exception listed in 19.500.100.3.c and any other sections that have exceptions to "Applicability".

A. Unless specifically exempted by statute, all proposed uses and development occurring within shoreline jurisdiction must conform to Chapter 90.58 RCW, the Act, this Master Program and Thurston County Code (TCC), whether or not a permit is required. This Master Program applies to every person, firm, corporation, government agency, or department who or which:

   1. Proposes any new use, activity, development or structure within the unincorporated area of Thurston County subject to the Act, as now or hereafter amended; or
   2. Proposes a change, modification, addition or alteration to a legally existing use, activity, development or structure within the unincorporated area of Thurston County subject to the Act, as now or hereafter amended.

B. Direct federal agency activities affecting the uses or resources subject to the Act must be consistent to the maximum extent practicable with the enforceable provisions of the Act and with this Master Program as required by WAC 173-27-060.

C. The Act and this Program, including the permit system, shall apply to all non-federal developments and uses undertaken on federal lands and on lands subject to non-federal ownership, lease or agreement, even though such lands may fall within the external boundaries of a federal ownership.

D. This Master Program shall apply to all unincorporated rural and urban lands until such time as a city incorporates land into their city boundaries through annexation.

19.100.125 Relationship to Other Plans and Regulations

A. Uses, developments, and activities regulated by the Master Program may be independently subject to the Thurston County Comprehensive Plan, the Washington State Environmental Policy Act, the Thurston County Code (TCC) Zoning (Title 20, 21, 22, and 23), Platting and Subdivisions (Title 18), Environment (Title 17), the Critical Areas Ordinance (Title 24), and various other provisions of federal, state, and county laws. The applicant must comply with all applicable laws prior to commencing any use, development, or activity.

B. Should a conflict occur between the provisions of this Program or between this Program and the laws, regulations, codes or rules promulgated by any other authority having jurisdiction within Thurston County, the more restrictive requirements shall apply, except when constrained by federal or state law, or where specifically provided otherwise in this Program.

C. When achieved in accordance with Title 20, 21, 22, or 23 TCC (Zoning), building and lot dimension flexibility may be allowed on shorelines within Urban areas or Limited Areas of More Intensive Rural Development (LAMIRDs) when consistent with the Act and all other applicable requirements of this Program, including the requirement to achieve no net loss of shoreline ecological functions.

Further, in order to preclude fragmentation of review and the necessity for individual shoreline permits, an application ~~combined shoreline permit~~ is encouraged for combined review by federal, state and local agencies of proposed projects. ~~proposed activities within the shoreline jurisdiction where feasible.~~

Comment [D6]: Instead of the vague "combine shoreline permit" wording, the language should limit to applying for a combined review of a single project as the current JARPA (Joint Aquatic Resources Permit Application) does to coordinate the permit reviews by Federal, State and Local agencies. We object to vague wording with allows for unrestricted bundling of properties or broad area designation to serve as an "activity". Also, what is the significance of using the word "activities" rather than "projects"?

D. Consistent with RCW 36.70A.480, the goals and policies of this Master Program approved under Chapter 90.58 RCW shall be considered an element of the County's comprehensive plan, including Chapter 19.300 (General Goals and Policies). All regulatory elements of this Program, including, but not limited to Chapter 19.100 (Introduction), Chapter 19.150 (Definitions), Chapter 19.200 (Shoreline Jurisdiction and Environment Designations), Chapter 19.400 (General Regulations), Chapter 19.500 (Permit Provisions, Review and Enforcement), Chapter 19.600 (Shoreline Use and Modification Development Standards), Chapter 19.700 (Special Reports), Appendix A (Shoreline Environment Designations Map), Appendix B (Mitigation Options to Achieve No Net Loss for New or Re-Development Activities), and Appendix D (Channel Migration Zone Maps) shall be considered a part of the County's development regulations. Certain non-regulatory elements of this Master Program, including, but not limited to Appendix C (Shoreline Restoration Plan), may be updated and amended at any time without requiring a formal Master Program amendment.

E. Where this Program makes reference to RCW, WAC, or other state or federal law or regulation, the most recent amendment or version shall apply.

F. This Program will be applied consistent with all applicable federal, state and local laws affecting tribal rights.

G. Coastal Zone Management Act Consistency reviews for sites within federal jurisdiction shall apply the Environment Designation criteria in Chapter 19.200 that most closely correspond to the project site in order to determine applicable Program policies.

19.100.130 Governing Principles

Comment [D7]: "Governing Principles" carry th weight of legal determination yet the wording throughout this section is vague for legal purposes and the paraphrasing changes intent from the stat law **of WAC 173.26.186 Governing principles of th guidelines**. It is recommended to instead have a brief statement, provide reference to WAC 173.26.186 as providing the Governing Principles.

Comment [D8]: Below are comments on the existing wording of the draft SMP update if this section remains.

The following governing principals, along with the policy statement of RCW 90.58.020, the principles of WAC 173-26, and purpose statements in Title 24.01.010 & 24.01.015 TCC, establish the basic concepts of this Program.

A. Any inconsistencies between this Program and the Act must be resolved in accordance with the Act.

B. The policies of this Program may be achieved by diverse means, one of which is regulation. Other means authorized by the Act include, but are not limited to: acquisition of lands and/or easements by purchase or gift, incentive programs, and implementation of capital facility and/or non-structural programs.

C. Protecting the shoreline environment is an essential statewide policy goal. Permitted and/or exempt development, actions taken prior to the Act's adoption, and/or unregulated activities can impair shoreline ecological processes and functions. This Program protects shoreline ecology from such impairments in the following ways:

1. By using a process that identifies, inventories, and ensures meaningful understanding of current and potential ecological functions provided by shorelines.
2. By including policies and regulations that require mitigation of all adverse impacts in a manner that ensures no net loss of shoreline ecological functions. The required mitigation shall include avoidance, minimization, and compensation of impacts in accordance with the policies and regulations for mitigation sequencing. This Program and any future amendment hereto shall ensure no net loss of shoreline ecological functions and processes on a programmatic basis in accordance with the baseline functions present as of the date of adoption of this Program.
3. By including policies and regulations that ensure that the cumulative effect of exempt development will not cause a net loss of shoreline ecological functions, and by fairly allocating the burden of addressing such impacts among development opportunities.
4. By including regulations and regulatory incentives designed to protect shoreline ecological functions, and restore impaired ecological functions where such opportunities have been identified, consistent with the Shoreline Restoration Plan (Appendix C) developed by Thurston County.

D. Regulation of private property to implement Program goals, such as public access and protection of ecological functions and processes, must be consistent with all relevant constitutional and other legal limitations. These include, but are not limited to the protections afforded by the federal and state constitutions, and federal, state and local laws.

E. Regulatory or administrative actions contained herein must be implemented with consideration to the Public Trust Doctrine, regulatory takings, and other applicable legal principles as appropriate.

F. Regulatory provisions of this Program are limited to Shorelines of the State, whereas the planning functions of this Program may extend beyond the designated shoreline boundaries.

G. Consistent with the policy and use preferences of RCW 90.58.020, Thurston County should balance the various policy goals of this Program along with giving consideration to other relevant local, state, and federal regulatory and non-regulatory programs.

Comment [D9]: Section C wording results in paraphrases and revisions of WAC 173.26.186 whic substantially change the intent and coverage as legal principles for the County to apply. C1,2,3,4 should be replaced by the WAC's language. Our

Comment [D10]: Why do you have to use the word "Protecting"? We are way past protecting an into managing the shoreline. It should be our goal to manage not protect. When you protect, you ca negatively impact many different plants, animals and people. When you manage you take all into consideration and do what is right.

Comment [D11]: Provide a cited reference to the standards and definitions regarding "no net loss" and distinguish "no net loss of shoreline ecological functions" vs No net loss of shoreline ecological functions and processe on a programati basis". It is noted that in the second month of public review of this proposed SMP update, the Appendices are still not available that might define this process.

Comment [D12]: State law in WAC requires th County to counteract cumulative effects by ALL. The words "exempt development" directly target residential repair and maintenance and bulkheads and "Cumulative effect" should be addressed in those sections in detail. "Fairly allocating the burden...among development opportunities" is vague and should instead be addressed in subsequent sections in specific provisions.

Also: "Cumulative effect" should be addressed for each type of use, including Aquaculture.

Comment [D13]: This does provide a reference and it is noted that Appendix C is not available for public review.

19.100.135 Liberal Construction

As provided for in RCW 90.58.900, the Act is exempted from the rule of strict construction. Therefore, the Act and this Program shall be liberally construed to give full effect to the purposes, goals, objectives, and policies for which the Act and this Program were enacted and adopted, respectively.

19.100.140 Severability

Should any section or provision of this Program be declared invalid, such decision shall not affect the validity of this Program as a whole.

Chapter 19.150 Definitions

Where terms, phrases and words are not defined, they shall have their ordinary accepted meanings within the context with which they are used. The most current version of the English Webster's Dictionary shall be considered as providing ordinary accepted meanings. In addition, where available, the definitions provided in WAC 173-26-020, WAC 173-27-030, Chapter 90.58 RCW, TCC 20.03, or TCC Title 24.03 shall be applied in the interpretation and administration of this Program. The definition of various terms as presented in this section does not necessarily represent the same definitions as may be found for the same terms in other chapters of the Thurston County Code.

19.150.100 Abandonment: cessation or vacation of a permitted use or structure through non-action for a period of one year or longer.

19.150.105Accessory use or accessory structure - any use or structure customarily incidental and accessory to the principal use of a site or a building or other structure located upon the same lot.

19.150.110 Accessory Structure -View Blockage: as it relates to view blockage, buildings and other structures encompassing less than 200 square feet and less than twelve feet in height from grade level, and fences which are six feet, or less in height from grade level do not constitute view blockage.

19.150.115 Accretion: the growth of a beach by the addition of material transported by wind and/or water. Included are such shore forms as barrier beaches, points, spits, and hooks.

19.150.120 Adaptive Management: a process of evaluating data acquired through project monitoring relative to a developed plan with goals or benchmarks, and taking action based on the results in order to reduce uncertainty with regard to adverse ecological impacts and improve outcomes over time.

19.150.125 Adjacent Principle Building: a principle building on a lot abutting the applicant's lot.

19.150.130 Agriculture: uses and practices, primarily commercial in nature, which are in support of agricultural activities, agricultural products, agricultural equipment and facilities, and agricultural land, as defined in WAC 173-26-020(3). This excludes activities typically associated with single-family residences, such as gardening activities primarily for on-site consumption. Such uses may still be subject to other provisions of this Program, Title 24 TCC, or Title 17.15 TCC.

19.150.135 Amendment: a revision, update, addition, deletion, and/or reenactment to an existing shoreline master program.

19.150.140 Anchor: a device used to secure a vessel

19.150.145 Appurtenance: structures and development necessarily connected to the use of a single family residence, and located within contiguous ownership of the primary residential use: Common appurtenances include a garage, deck, driveway, fences, utilities, septic tanks and drain-fields, officially registered historic structures, and grading which does not exceed two hundred fifty cubic yards and which does not involve placement of fill in any wetland or waterward of the OHWM. Appurtenances do not include bulkheads and other shoreline modifications or over-water structures, including tower stairs with landings at or below the ordinary high water line.

Comment [D14]: This is not a required SMP definition according to RCW and WACs. It is added by the County. Why is it needed in this SMP? Why is it set at one year? Does it apply to uplands and tidelands?

Comment [M15]: What are the intended differences between "accessory structures" and "appurtenances"?

Comment [D16]: While this definition appears to address upland structures, an additional view Definition is needed for tideland structures which may be short in height but impact quality of views by properties paying taxes based upon their views.

Comment [M17]: Because the words "and development" were added, the examples should include other forms of development such as patios paths and walkways, gardens, sheds, landscaping walls, boats on trailers, etc.

19.150.150 Aquaculture: the culture or farming of fish, shellfish, or other aquatic plants and animals. Aquaculture does not include the harvest of wild geoduck associated with the state and tribal co-managed wild-stock geoduck fishery.

19.150.155 Aquatic Lands: the bed-lands (submerged at all times) and tidelands (submerged lands and beaches that are exposed and submerged with the ebb and flow of the tides) beneath the waters of lakes, rivers and marine waters and along their shores.

19.150.160 Associated Wetlands: those wetlands which are in proximity to and either influence or are influenced by tidal waters or a lake or stream subject to the Act.

19.150.165 Barrier Structure: any shoreline or in-water structure that has the primary purpose of diverting, capturing or altering the natural flow or transport of water or sediment. These include breakwaters, jetties, groins and weirs.

19.150.170 Best Management Practices: those practices determined to be the most efficient, practical and cost-effective measures identified to reduce or control impacts to water bodies from a particular activity, most commonly by reducing the loading of pollutants from such sources into stormwater and water bodies.

Comment [M18]: and shorelines

Comment [M19]: Is it intended to only deal wit stormwater?

19.150.175 Boat House: a structure built for and with a continued primary purpose to store aquatic vessels and usually associated with a single-family residence.

19.150.180 Boat Launch or Ramp: a solid ramp, usually made of concrete, used for the purpose of placing watercraft in and out of the water.

19.150.185 Boating Facilities: public and private mooring structures and related services serving five or more boats, including piers, docks, buoys, floats, marinas, and facilities for the use of boat launching, boat storage, or for the service and maintenance of pleasure or commercial craft.

19.150.190 Breakwater: a protective structure usually built off-shore to protect beaches, bluffs, or harbor areas from wave action.

19.150.195 Buffer: a non-clearing area established to protect the integrity, functions and values of the affected critical area or shoreline, so that no net loss of critical area or shoreline ecological functions occurs. Under optimal conditions, buffers are composed of intact native vegetation. Buffer widths are measured horizontally.

Comment [D20]: Per 19.100.110 paragraph 1 "the purpose of the Master Program is to guide the future development ..." Therefore, buffer as defined here would apply to that purpose and should be so stated. It would not apply to already developed property. So you need to insert undeveloped property in this case. If you need to give a buffer for developed property you need an additional definition and remove the words "non clearing area".

Comment [M21]: ...on undeveloped property

19.150.200 Building: any structure used or intended for supporting or sheltering any use or occupancy.

19.150.205 Building Line: the perimeter or that portion of a building closest to the ordinary high water mark (OHWM), including (but not limited to) decks, balconies, open steps, architectural features (such as cornices), utilities, and roof overhangs.

19.150.210 Bulkhead: a "normal protective" bulkhead includes those structural and nonstructural developments installed at or near, and parallel to, the OHWM for the sole purpose of protecting an existing single-family residence and appurtenant structures from loss or damage by erosion.

Comment [D22]: The definition needs to cover bulkheads for commercial and governmental properties as well as existing single and future single-family residences.. While there is a required WAC definition of Shoreline Modification, this definition of bulkhead is the County's. For residences, suggest "the OHWM for the sole purpose of protecting an existingsingle-family residence, and appurtenant structures and waterfront land from loss or damage by erosion."

19.150.215 Buoy: an anchoring device with a float used to secure a vessel. For the purposes of this program, the term "buoy field" refers to more than one buoy per parcel.

19.150.220 Census-defined Urban Areas: Territories that consist of areas of high population density and urban land use resulting in a representation of "urban footprint". The territories include residential, commercial and other non-residential urban land uses. Defined by U.S. Department of Commerce and the U.S. Census Bureau Tigerline Shapefile 2012: *http://www.census.gov/geo/www/ua/2010urbanruralclass.html*.

19.150.225 Certified Local Government: a local government that establishes a historic preservation program meeting federal and state standards, and is eligible to apply to the State Historic Preservation Officer (SHPO) and the National Park Service for certification.

19.150.230 Clearing: the destruction, removal, or disposal of vegetation by manual, mechanical, or chemical methods. Clearing includes logging, even when the understory of vegetation is not being removed.

19.150.235 Commercial, Commercial Development: a use that involves wholesale or retail trade, or the provision of services.

19.150.240 Compensatory Mitigation: compensatory mitigation is the stage of mitigation sequencing where unavoidable impacts to shoreline ecological functions are offset by restoring, creating, enhancing, or preserving critical habitat within a specific watershed or geographic area.

19.150.245 Conditional Use Permit (CUP): a permit for a use, development, or substantial development that is classified as a conditional use or is not a listed use in the Use and Modifications Matrix in Chapter 19.600.

ADD Conforming: Consistent with RCW 90.58.620 and WAC 173-27-080, single-family residences and accessory structures located landward of the ordinary high water mark that were legally established prior to the effective date of this Program, but do not conform to the regulations of this Program, are considered conforming structures and uses for the purposes of this Program. For the purposes of this definition, accessory structures do not include shoreline modifications or over-water structures.

Comment [M23]: Add a definition of "Conforming" for legally established single family residences and their appurtenances which were established prior to the effective date of the ACT, and this SMP update per RCW 90.58.620. Rule WA 173.26.241 (3)(j)

19.150.250 Critical Areas: As defined in Title 24 (Critical Areas) of the Thurston County Code which is adopted by reference as though set forth herein in full, (as amended) provided that the reasonable use provisions set forth in TCC 24.45, and 24.17, shall not be available within the shoreline jurisdiction. Instead, applicants may apply for a shoreline variance when seeking relief from critical areas regulations within shorelines.

19.150.255 Critical Habitat: Habitat areas within which endangered, threatened, sensitive or monitored plant, fish, or wildlife species have a primary association (e.g., feeding, breeding, rearing of young, migrating). Such areas are identified herein with reference to lists, categories, and definitions promulgated by the Washington Department of Fish and Wildlife as identified in WAC 232 12 011 or WAC 232 12 014; in the Priority Habitat and Species (PHS) program by the Department of Fish and Wildlife; or by rules and regulations adopted by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, or other agency with jurisdiction for such designations.

19.150.260 Critical Freshwater Habitats: includes those portions of streams, rivers, wetlands, lakes and their associated channel migration zones and flood plains that provide habitat for priority species at any stage in their life cycles, and provide critical ecosystem-wide processes, as established in WAC 173-26-221(2)(c)(iv). This is distinguished from the term "Critical Habitat" as utilized in relation to the Endangered Species Act.

19.150.265 Critical Saltwater Habitats: as defined in WAC 173-26-221(2)(c)(iii), include all kelp

beds; eelgrass beds; spawning and holding areas for forage fish, such as herring, smelt and sand lance; subsistence, commercial and recreational shellfish beds; mudflats; intertidal habitats with vascular plants; and areas with which priority species have a primary association. See this chapter for definitions of each type of critical saltwater habitat. This is distinguished from the term "Critical Habitat" as utilized in relation to the Endangered Species Act.

19.150.270 Cumulative impacts or cumulative effects: the impact on the environment or other shoreline functions or uses which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. ~~regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a long period of time.~~ See WAC 173 26 186(8)(d).

Comment [D24]: "Cumulative" is a significant new concept in this update with significant legal interpretations. We recommend using the wordin of the WAC.

19.150.275 Department: for the purposes of this program, means the Thurston County Resource Stewardship Department (or as amended).

19.150.280 Development: ~~means any human-made change to improved or unimproved real estate, including but not limited to buildings or other~~. A use consisting of the construction or exterior alteration of structures, mining, dredging, filling, grading, clearing, paving, excavation or drilling operations, storage of equipment or materials, bulkheading, driving of piling, placing of obstructions, or any project of a permanent or temporary nature which interferes with the normal public use of the surface waters overlying lands subject to the Act at any stage of water level.

Comment [D25]: Return to the State definition The consistency of the definition for "Developmen is critical for 19.150.145 - 19.150.180 - 19.150.285 19.150.770 and subsequent chapters of this SMP. "Development" is used in various ways throughout the SMP:

19.150.285 Development Regulation Standards: controls placed on development ~~or land uses~~, including, but not limited to, zoning ordinances, critical areas ordinances, all portions of a shoreline master program other than goals and policies approved or adopted under Chapter 90.58 RCW, planned unit development ordinances, subdivision ordinances, and binding site plan ordinances together with any amendments thereto.

Comment [M26]: "Development" is already defined as a use. See comment about 19.150.230

19.150.290 Dock: the collective term for a moorage structure that typically consists of a nearshore fixed-pile pier, a ramp (or gangway), and a float that is used as a landing place for marine transport or for recreational purposes. It does not include recreational decks, storage facilities or other accessory structures.

19.150.295 Dredge: the removal of earth, gravel, sand or other mineral substances from the bottom of a stream, river, lake, bay, or other waterbody, including wetlands.

19.150.300 Ecological Functions: the work performed or role played by the physical, chemical, and biological processes that contribute to the maintenance of the aquatic and terrestrial environments that constitute the shoreline's natural ecosystem.

Comment [D27]: This is an inadequate and confusing definition. In order to administer the Program there needs to be an appendix that lists the "Ecological function" and what each function does. This cannot be left up to the SMP plan checker. We understand that this is the definition provided by Ecology. However, it still needs furthe explanation.

19.150.305 Ecologically Intact: those shoreline areas that retain the majority of their natural shoreline functions, as evidenced by the shoreline configuration and the presence of native vegetation. Generally, but not necessarily, ecologically intact shorelines are free of structural shoreline modifications, structures, and intensive human uses. In forested areas, they generally include native vegetation with diverse plant communities, multiple canopy layers, and the presence of large woody debris available for recruitment to adjacent water bodies. Recognizing that there is a continuum of ecological conditions ranging from near natural conditions to totally degraded and contaminated sites, this term is intended to delineate those shoreline areas that provide valuable functions for the larger aquatic and terrestrial environments which could be lost or significantly reduced by human development. Whether or not a shoreline is ecologically intact is determined on a case-by-case basis.

Comment [D28]: This is not a required definition. If it is to be inserted, it would primarily apply to undeveloped property as opposed to developed property. In addition, without knowing what Ecological Function means how can you determine if a shoreline is Ecologically intact. Also, why is Ecologically intact better than historically intact. Again, you are implying that improving Ecological Function is needed to achieve "No Net Loss". This is not the case on a site by site basis.

19.150.310 Eelgrass: a flowering plant adapted to the marine environment that roots in sand or mud in shallow waters where waves and currents are not too severe. Eelgrass beds require high ambient light

levels. Where eelgrass beds are disputed as a critical saltwater habitat, appropriate state agencies and co-managing tribes shall be consulted in order to assist with the determination.

19.150.315 Emergency: an unanticipated and imminent threat to public health, safety, or the environment which requires immediate action within a time too short to allow full compliance with this program. All emergency construction is construed narrowly and shall be consistent with the SMA and this Program (RCW 90.58.030 (3eiii)). See also emergency exemption procedures in WAC 173-27-040(2)(d).

19.150.320 Endangered Species Act (ESA) - a federal law intended to protect any fish or wildlife species that are threatened with extinction throughout all or a significant portion of its range.

19.150.325 Enhancement: to improve the ecological functions at the site or landscape scale. This includes physical, biological and chemical processes which contribute to the maintenance of the aquatic and terrestrial environments.

19.150.330 Environmental Limitations: limiting factors to new modifications or development, such as floodplains or unstable slopes.

19.150.335 Excavation: the mechanical removal of earthen material.

19.150.340 Exemptions: uses and development, set forth in WAC 173-27-040 and RCW 90.58.030 (3)(e), 90.58.140(9), 90.58.147, 90.58.355, and 90.58.515, that are not required to obtain a Substantial Development Permit, but which must otherwise comply with applicable provisions of the Act and this Program. Certain exemption developments must obtain a letter of exemption (see Section 19.500.100(C)(4)).

19.150.345 Existing Lots: lots, tracts, parcels, sites or other fractional part of divided land that was legally established in accordance with local and state subdivision requirements prior to the effective date of this Program.

19.150.350 Existing Structures: structures that were legally constructed prior to the effective date of this Program in accordance with the requirements in effect at the time of construction.

19.150.355 Existing Uses: uses that were legally established prior to the effective date of this Program in accordance with the applicable regulations at the time established.
ADD Expansion/Enlargement of Single-family Residence or Accessory Structure: see comment for wording

19.150.360 Facilities: defined per 19.600.115(3)

19.150.365 Feasible: an action, such as a development project, mitigation, or preservation requirement, that meets all of the following conditions:

A. The action can be accomplished with technologies and methods that have been used in the past in similar circumstances, or studies or tests have demonstrated in similar circumstances that such approaches are currently available and likely to achieve the intended results;

B. The action provides a reasonable likelihood of achieving its intended purpose; and

C. The action does not physically preclude achieving the project's primary intended legal use.

The burden of proving infeasibility is on the applicant. In determining infeasibility, the reviewing agency may weigh the action's relative public costs and public benefits, considered in the short- and long-term

Comment [D29]: Insert a new definition: "Expansion/Enlargement of Single-family Residenc or Accessory Structure: The Administrator may grant a one-time Administrative Approval for an enlargement, expansion or addition to a legally Conforming or grandfathered single-family residence or accessory structure that would not otherwise be allowed under this Program if all of the following criteria are met:
a. The enlargement or addition does not expand the total footprint of the existing structure by mor than 500 square feet.]
b. The expansion or addition does not adversely impact critical areas or significantly impair the ability of a substantial number of people to view th shoreline.
c. The structure is located landward of the ordinar high water mark.
d. No waterward enlargement or expansion beyor the existing structure's footprint will occur.

time frames.

19.150.370 Fill: the addition or redistribution of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the OHWM, within a one-hundred year floodplain; or within an important habitat, lake, pond, stream, wetlands, or shorelands (and their associated buffers) in a manner that changes the elevation or creates dry land. Large woody debris or other native materials approved as a part of a habitat restoration project shall not be considered fill.

19.150.375 Float: an anchored (not directly to the shore) floating platform THAT IS FREE TO RISE AND FALL WITH WATER LEVELS AND IS USED for water-dependent recreational activities such as boat mooring, swimming or diving. Floats may stand alone with no over-water connection to shore or may be located at the end of a pier or ramp.

19.150.380 Forage Fish: small, schooling fishes that are key prey items for larger predatory fish and wildlife in a marine food web. Puget Sound species include, but are not limited to, Pacific herring, surf smelt, Pacific sand lance and northern anchovy. Each species has specific habitat requirements for spawning, such as sediment grain size, tidal heights, or vegetation types. Known spawning and holding areas have been mapped by the Department of Fish and Wildlife.

19.150.385 Forest Practices: any activity conducted on or directly pertaining to forestland and relating to growing, harvesting or processing timber, including, but not limited to:

A. Road and trail construction;

B. Harvesting, final and intermediate;

C. Pre-commercial thinning;

D. Reforestation;

E. Fertilization;

F. Prevention and suppression of diseases and insects;

G. Salvage of trees; and

H. Brush control.

Forest practices shall not include preparatory work such as tree marking, surveying and road flagging; or removal or harvest of incidental vegetation from forest lands such as berries, ferns, greenery, mistletoe, herbs, mushrooms and other products which cannot normally be expected to result in damage to forest soils, timber or public resources.

19.150.390 Groin: barrier-type structures extending waterward from the back shore across the beach to interrupt and trap sand movement.

19.150.395 Guidelines (WAC): those standards adopted by the Department of Ecology pursuant to RCW 90.58.200 to assist in the implementation of Chapter 90.58 RCW for the regulation of shorelines of the state. The standards may be referenced at WAC 173-26 and 173-27.

19.150.400 Hard Surface: An impervious surface, a permeable pavement, or a vegetated roof.

19.150.405 Impervious Surface: A non-vegetated surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A non-vegetated surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the

flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

19.150.410 Industrial, Industrial Development: facilities for processing, manufacturing, and storing finished or partially finished goods; heavy vehicle dispatch and maintenance facilities; and similar facilities.

19.150.415 In-lieu Fee (Fee In-Lieu): a fee paid to a sponsor (e.g., Thurston County,) to satisfy compensatory mitigation requirements when mitigation is precluded from being completed on-site due to site development or physical constraints, is part of a habitat conservation plan, or when the permitting agencies determine that ILF is more environmentally preferable over proposed permittee responsible mitigation.

19.150.420 Invasive exotics/non-native vegetation: see Chapters 17.10.010 RCW and WAC 16-750-003

19.150.425 In-stream Structure: structure placed by humans within a stream or river waterward of the ordinary high water mark that either causes or has the potential to cause water impoundment or the diversion, obstruction, or modification of water flow. In-stream structures may include those for hydroelectric generation, irrigation, water supply, flood control, transportation, utility service transmission, fish habitat enhancement, or other purpose.

19.150.430 Jetty: barrier-type structures designed to modify or control sand movement and usually placed at inlets to improve a navigable channel.

19.150.435 Kelp: a plant generally attaching to bedrock or cobbles in shallow waters, especially in areas with moderate to high waves or currents. Kelp beds generally require high ambient light levels. Kelp includes both floating and non-floating species. Where kelp beds are disputed as a critical saltwater habitat, appropriate state agencies and co-managing tribes shall be consulted in order to assist with the determination.

19.150.440 Landscaping/Landscape materials:

19.150.445 Land-disturbing Activity: Any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity. Vegetation maintenance practices, including landscape maintenance and gardening, are not considered land-disturbing activity. Stormwater facility maintenance is not considered land disturbing activity if conducted according to established standards and procedures.

19.150.505 Limited Area of More Intense Rural Development (LAMIRD): locally designated rural areas authorized to accept more intense, urban-like development under RCW 36.70A.070(5)(d) and Title 20 TCC.

19.150.510 Live Aboard: use of a vessel as a residence, meaning full time occupancy in a single location, for an uninterrupted period exceeding 60 days in any calendar year.

19.150.515 Lot: a fractional part of divided lands having fixed boundaries, being of sufficient area and dimension to meet minimum zoning requirements for width and area. The term shall include tracts, or parcels. Where the context so indicates, lots, tracts or parcels may refer to subdivided lands not conforming to, or in violation of, zoning or subdivision regulations.

19.150.520 Lot Coverage: the percent or square footage of a lot that will be covered by a modification to impervious or hardened surfaces.

19.150.525 Low Impact Development (LID): a stormwater management strategy that that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

19.150.530 Low-intensity: activities which do not adversely alter natural ecosystem functions.

19.150.535 Macroalgae: Marine algae visible to the naked eye, such as kelp or other seaweeds.

19.150.540 Marina: a public or private water dependent wet moorage and/or dry boat storage facility for 10 or more pleasure craft and/or 10 or more commercial craft, and generally including goods or services related to boating. Marinas also include wet moorage facilities where boat moorage slips may be leased or rented to individuals who are not a member owner of an associated residential development. Launching facilities may also be provided. Marinas may be open to the general public or restricted on the basis of property ownership or membership.

19.150.545 Marine rail system: a pair of sloping tracks which extends into the tidelands, used for the purpose of placing watercraft in and out of the water.

19.150.550 May: a permissive term that means the action is acceptable, provided it satisfies all other provisions of this Program.

19.150.555 Mining: the removal of sand, soil, minerals, and other naturally occurring materials from the earth for commercial or economic use.

19.150.560 Mitigation Sequencing: Mitigation actions associated with development proposals impacting critical areas shall adhere to the following mitigation sequence:

A. Avoiding the impact altogether by not taking a certain action or parts of an action;

B. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

C. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

D. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

E. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or

F. Monitoring the impact and taking appropriate corrective measures.

Comment [D30]: Insert a new definition: "Mitigation Bank: The actions the property owner has done to improve shoreline function on their property since the Act was approved. Mitigation Bank can be used to offset future required mitigations.

19.150.565 Modification: those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such as a dike, breakwater, pier, weir, dredged basin, fill, bulkhead, or other structure. They can include other actions, such as clearing, grading, or application of chemicals.

19.150.570 Mooring Structures: includes piers, docks, floats and buoys and their associated pilings, ramps, lifts and railways, as well as modifications that support boating facilities and marinas. Any mooring structure or grouping of structures that provide docking space for 10 or more boats is considered a marina.

19.150.575 Mudflats: a low-lying land of fine sediments and silt that is exposed at low tide and covered at high tide.

19.150.580 Must: a mandatory term that means an action is required.

19.150.585 Natural hydrographic conditions: the natural conditions for a particular time of year of water delivery and movement through a system.

19.150.590 No Net Loss: the maintenance of the aggregate total of the County's shoreline ecological functions. The no net loss standard requires that the impacts of shoreline development and/or use, whether permitted or exempt, be identified and prevented or mitigated such that there are no resulting adverse impacts on ecological functions or processes. Each project shall be evaluated based on its ability to meet the no net loss requirement. The no net loss standard applies at multiple scales, starting at the project site. Compensatory mitigation standards include sequencing guidelines to ensure the most appropriate mitigation type and site are selected, as close to the impacted location as possible.

Comment [D31]: The SMP needs to provide standards for determining "No Net Loss". What is t be considered as a loss, as a gain and from what baseline.

19.150.595 Normal Maintenance: those usual acts necessary to prevent a decline, lapse or cessation from a lawfully established condition.

19.150.600 Normal Repair: to restore a development to a state comparable to its original condition, including, but not limited to, its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, ~~except where repair causes substantial adverse effects to a shoreline resource or environment~~. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance, ~~and the replacement does not cause substantial adverse effects to shoreline resources or environment~~.

Comment [D32]: Normal Repair and Maintenance are critical definitions that can make the difference between having to go through a Substantial Development Permit with a hearing examiner, or not. Furthermore, these are required definitions set by RCW and Ecology. We ask that more review time be allowed to explore how these definitions fit the everyday needs of property owners.

Comment [D33]: Why use the word development. A prudent person would not put maintenance and a development together. Especially since the purpose of the SMP as stated ir 19.100.110 is to guide future development. Norma maintenance and repair are not future development.

19.150.605 Noxious Weeds: see Chapters 17.10.010 RCW and WAC 16-750-003.

19.150.610 Ordinary High Water Mark (OHWM): the mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition existed on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by the County or Ecology provided, that in any area where the OHWM cannot be found, the OHWM adjoining salt water shall be the line of mean higher high tide and the OHWM adjoining fresh water shall be the line of mean high water.

Comment [D34]: The determination of "causin substantial adverse effects" will now be addressed through the mitigation process and goal of no net loss. This "adverse effects" language is not needed in this definition and may even be contradictory to other processes and considerations.

19.150.615 Pervious Surface: Any surface material that allows stormwater to infiltrate into the ground. Examples include lawn, landscape, pasture, native vegetation areas, and permeable pavements.

19.150.620 Pier: a rigid structure built over the water and typically constructed on piles, attached to the shore and used as a landing place for marine transport or for recreational purposes.

19.150.625 Platted: land that has been divided following the applicable laws for divisions of land under Title 18 TCC, including land subject to a current application for such division.

~~**19.150.630 Predator Exclusion: an object or activity used to implement pest management in aquaculture practices with the intent of deterring or excluding predators such as moon snails, sea star, crabs, diving ducks, burrowing shrimp or sand dollars. Common methods include, but are not limited to, large canopy nets, mesh, PVC tubes with net caps, flexar plastic tunnels, oyster bags and suspended culture systems.~~

Comment [D35]: This is not a required definition. It should be deleted from the SMP. It is an industry-specific term used in operating practice without basis to be established by the SMP. Also, "activity" is not defined and could include pesticide application and digging and dredging of tidelands.

19.150.635 Principle Building: the primary structure on a lot closest to the ordinary high water mark excluding accessory structures.

19.150.640 Priority Species: species requiring protective measures and/or management guidelines to ensure their persistence at genetically viable population levels. Priority species are those that meet any of the criteria listed below.

A. State-listed or state proposed species. State-listed species are those native fish and wildlife species legally designated as endangered (WAC 232-12-014), threatened [WAC 232-12-011(1)], or sensitive (WAC 232-12-011). State proposed species are those fish and wildlife species that will be reviewed by the Washington Department of Fish and Wildlife (POL-M 6001) for possible listing as endangered, threatened, or sensitive according to the process and criteria defined in WAC 232-12-297.

B. Vulnerable aggregations. Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to congregate. Examples include heron colonies, seabird concentrations, and marine mammal congregations.

C. Species of recreational, commercial, and/or tribal importance. Native and nonnative fish, shellfish, and wildlife species of recreational or commercial importance and recognized species used for tribal ceremonial and subsistence purposes that are vulnerable to habitat loss or degradation.

D. Species listed by the National Marine Fisheries Service or the U.S. Fish and Wildlife Service under the federal Endangered Species Act as either proposed, threatened, or endangered.

19.150.645 Prohibited: not permitted to occur in a particular designation.

19.150.650 Public Access: the ability of the general public or, in some cases, a specific community, to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations.

19.150.655 Qualified Professional or Qualified Consultant: in accordance with WAC 365-195-905(4), a qualified professional must have obtained a B.S. or B.A. or equivalent degree in biology, soil science, engineering, environmental studies, fisheries, geology, geomorphology or related and relevant field to the subject in question, have related work experience and meet the following criteria:

Comment [D36]: Where does it define the credentials for the individual working for the Count that can stop or critique a proposal/project? Wher does it provide the ability for the Qualified Professional or Qualified Consultant to trump a perceived requirement without having to spend a ton of money through the appeal process?

A. A qualified professional for wetlands must have a degree in biology, ecology, soil science, botany, or a closely related field and a minimum of five years of professional experience in wetland identification and assessment associated with wetland ecology in the Pacific Northwest or comparable systems.

B. A qualified professional for habitat management plans or shoreline mitigation plans must have a degree in wildlife biology, ecology, fisheries, or closely related field and a minimum of five years professional experience related to the subject species/habitat type.

C. A qualified professional for geologically hazardous areas, geotechnical and hydrogeological reports must be a professional engineering geologist or geotechnical engineer, licensed in the state of Washington. In designing soft armoring techniques, a qualified professional may also have similar qualifications as that required for habitat management plans.

D. A qualified professional for critical aquifer recharge areas means a Washington State licensed hydrogeologist, geologist, or an engineer qualified in experience and training in aquifer recharge.

19.150.660 Ramp (or gangway): a structure between a pier and float which adjusts its angle based on the tidal elevation, allowing access to the float at all times.

19.150.665 Recreation: the use and enjoyment of the shoreline by the public, including but not limited to fishing, hiking, swimming and viewing.

19.150.670 Recreational Development: development that provides opportunities for the use and enjoyment of the shoreline by the public, including but not limited to fishing, hiking, swimming and viewing. This includes both commercial and public recreational facilities.

19.150.675 Residential Development: development for the purpose of human habitation. Residential development includes the construction or modification of one- and two-family detached structures, multi-family structures, condominiums, townhouses, mobile home parks, and other similar group housing, together with accessory dwelling units, accessory uses and structures common to residential uses. Residential development also includes the creation of new residential lots through the subdivision of land. Residential development does not include hotels, motels, bed and breakfasts, or any other type of overnight or transient housing or camping facilities.

Comment [D37]: the wording "accessory uses and structures" is used here but in SMP 19.150.145 the word is "appurtenances". Are they intended to be the same? This definition affects interpretation of "normal maintenance and repair" and whether existing uses and structures and "development" are conforming.

19.150.680 Resource-based Uses: low-intensity uses, which may include agriculture, aquaculture, forestry, recreation and designated open-space.

19.150.685 Restoration: the reestablishment or upgrading of impaired ecological shoreline processes and functions. This may be accomplished through measures including, but not limited to, revegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

19.150.690 Revision: the modification or change to a permit authorized under this Program.

19.150.695 Setback: the distance a use or development must be from the edge of a buffer to prevent construction and other activities from intruding into the buffer.

Comment [D38]: This is the distance from the shoreline to the structure. It has nothing to do with the buffer. This indicates that the setback starts at the buffer so a prudent person would assume you would have to double the setback or the buffer. In addition you are implying that being in the space created by the setback is causing some net loss to the ecological function. The setback is not the buffer and the buffer is not the setback. In addition "setback" is not a required definition that we can find, so you have latitude in changing it.

19.150.700 Shall: a mandatory term that means an action is required.

19.150.705 Shellfish Beds: a general area of shoreline, both intertidal and subtidal, where shellfish congregate. This includes natural subsistence, recreational and commercial beds. Shellfish include, but are not limited to, abalone, hardshell clam, subtidal clam, dungeness crab, geoduck clam, manila clam, oysters, razor clam, pandalid shrimp and red urchin. Where disputed as a critical saltwater habitat, appropriate state agencies and affected tribes shall be consulted in order to assist with the determination.

19.150.710 Shorelands: those lands extending landward for two hundred feet in all directions as

measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the department of ecology.

19.150.715 Shoreline Management Act (Act): the Washington State Shoreline Management Act, Chapter 90.58 RCW.

19.150.720 Shoreline Stabilization: actions taken to address erosion impacts to property and dwellings, businesses, or structures caused by natural processes, such as current, flood, tides, wind or wave action.
These actions include structural and nonstructural methods. Nonstructural methods, for example, include approaches such as building setbacks, structure relocation, groundwater management, and land use planning. Structural methods can be "hard" or "soft". "Hard" structural stabilization measures refer to those with solid, hard surfaces, such as concrete bulkheads, while "soft" structural measures rely on less rigid materials, such as bioengineering vegetation measures or beach enhancement. "Hybrid" structures are a composite of both soft and hard elements along the length of the armoring. Generally, the harder the construction measure, the greater the impact on shoreline processes including sediment transport, geomorphology, and biological functions.

Comment [D39]: This is not the case on lakes. You need to provide different definitions based on type of shoreline. Even in the marine environment there are different needs in bays, main channels ar estuaries. With teak skiing and surfing the new ballast boats produce 3 - 4 foot waves going 10 miles per hour. The "soft"-scapes wouldn't last a weekend let alone be in tact after one winter of flooding.

There are a range of measures for shoreline stabilization, varying from soft to hard that include, but are not limited to:

A. Soft
1. Vegetation enhancement;
2. Beach enhancement;
3. Bioengineering measures;
4. Anchor logs and stumps; and
5. Gravel placement/beach nourishment.

B. Hard
1. Rock revetments;
2. Gabions;
3. Groins;
4. Bulkheads; and
5. Seawalls.

19.150.725 Shoreline Structure Setback Line: the closest distance measured on a horizontal plane between the ordinary high water mark and the building line.

19.150.730 Shorelines of the State: includes all "shorelines" and "shorelines of statewide significance" within the state, as defined in RCW 90.58.030.

19.150.735 Shorelines: means all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except (i) shorelines of statewide significance; (ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and (iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes;

19.150.740 Shorelines of Statewide Significance: shorelines in Thurston County designated as shorelines of statewide significance are:

A. Nisqually Delta – from DeWolf Bight to Tatsolo Point, between the ordinary high water mark

and the line of extreme low tide, together with shorelands associated therewith per RCW 90.58.030(2)(f)(vi).

B. Puget Sound – seaward from the line of extreme low tide.

C. Lakes, whether natural or artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark.

D. Natural rivers or segments thereof downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more.

E. Shorelands and wetlands associated with A through D above.

19.150.745 Should: a term that means a particular action is required unless there is a demonstrated, sufficient reason, based on a policy of the Act or this Program, for not taking the action.

19.150.750 State Environmental Policy Act (SEPA): An environmental review process designed to work with other regulations to provide a comprehensive review of a proposal. Most regulations focus on particular aspects of a proposal, while SEPA requires the identification and evaluation of probable impacts for all elements of the environment. See Chapter 197-11WAC.

19.150.755 Streams: means those areas of Thurston County where surface waters flow sufficiently to produce a defined channel or bed. A "defined channel or bed" is an area which demonstrates clear evidence of the passage of water and includes but is not limited to bedrock channels, gravel beds, sand and silt beds and defined-channel swales. The channel or bed need not contain water year-round. This definition is not meant to include irrigation ditches, canals, storm or surface water runoff devices or other entirely artificial watercourses unless they are used by salmon or used to convey streams naturally occurring prior to construction.

"Stream and water body types" means as follows:

1. **Type S waters** include all aquatic areas inventoried as "shorelines of the state," in accordance with Chapter 90.58 RCW, including segments of streams where the mean annual flow is more than twenty cubic feet per second, marine shorelines and lakes twenty acres in size or greater.

2. **Type F waters** include all segments of aquatic areas that are not type S waters and that contain fish or fish habitat including waters diverted for use by a federal, state or tribal fish hatchery from the point of diversion for one thousand five-hundred feet or the entire tributary if the tributary is highly significant for protection of downstream water quality.

3. **Type N waters** include all segments of aquatic areas that are not type S or F waters and that are physically connected by an above-ground channel system, stream or wetland to type S or F waters.

19.150.760 Stormwater Facility: A constructed component of a stormwater drainage system designed or constructed to perform a particular function, or multiple functions. Stormwater facilities include, but are not limited to, pipes, swales, ditches, culverts, street gutters, detention ponds, retention ponds, constructed wetlands, infiltration devices, catch basins, oil/water separators, and biofiltration swales. An engineered or natural dispersion area that is dedicated to strormwater use is also considered a stormwater facility for purposes of this Program.

19.150.765 Structure: a permanent or temporary edifice or building, or any piece of work artificially

built or composed of parts joined together in some definite manner, whether installed on, above, or below the surface of the ground or water, except vessels.

19.150.770 Substantial Development: any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state. The dollar threshold must be adjusted for inflation every five years, as defined in WAC 173-27-040(2). On September 15, 2012, the amount was increased to six thousand four hundred and sixteen dollars ($6,416).

Comment [D40]: Again, the use of the word "development" goes back to 19.100.110 which is referring to a major project not a remodel or maintenance which is implied by the $6416 figure. Choose another word and insert the exclusions. A prudent person would not think painting their hom or remodeling their kitchen as being a developmen

19.150.775 Substantial Development Permit: a permit for any substantial development.

19.150.780Transportation: systems for automobiles, public transportation, pedestrians, and bicycles. This includes, but is not limited to, roads, parking facilities, bridges, sidewalks and railroads.

19.150.785 Urban Growth Area (UGA): those areas designated by Thurston County pursuant to RCW 36.70A.110 for urban development.

19.150.790 Use: the end to which a land or water area is ultimately employed.

19.150.795 Utilities: services and facilities that produce, convey, store or process electric power, gas, sewage, water, communications, oil, stormwater, and waste. This includes drainage conveyances and swales.

19.150.800 Variance: granting relief from specific bulk, dimensional or performance standards set forth in this Master Program and not a means to vary a use of a shoreline.

19.150.805 Vascular Plants: all seed-bearing plants that have vascular tissue (xylem and phloem).

19.150.810 Vegetation, Native: Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include, but are not limited to, trees such as Douglas Fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.

Add a new definition: **Vegetation, Non-native:**

Comment [D41]: Add a new definition for Non-native Vegetation. There are many non native or highbred plants that can perform the function of th native plants without being invasive.

19.150.815 WAC: Washington Administrative Code.

19.150.820 Water-Dependent Use: a use or portion of a use that cannot exist in a location that is not adjacent to the water and that is dependent on the water by reason of the intrinsic nature of its operations.

19.150.825 Water-Enjoyment Use: a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment.

19.150.830 Water-Oriented Use: a use that is water dependent, water-related, or water-enjoyment, or a combination of such uses.

19.150.835 Water-Related Use: a use or portion of a use that is not intrinsically dependent on a

waterfront location, but whose economic viability is dependent upon a waterfront location because:

A. The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or

B. The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

19.150.840 Weir: a structure that impounds, diverts or uses water for hydraulic generation and transmission, flood control, irrigation, water supply, recreational or fisheries enhancement.

19.150.845 Wetlands: areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

19.150.852 Water Enjoyment Use - Why do you exclude use by the single family resident/parcels? If this is to be covered elsewhere, then the title should be Water-Enjoyment General Public Use. While this is a required definition, discussion should be started with Ecology to change it.

Comments by the Thurston County Stakeholders Coalition

Chapter 19.200 Shoreline Jurisdiction and Environment Designation

19.200.100 Shoreline Jurisdiction

A. The Shoreline Master Program ~~jurisdiction applies to all shorelines of the state in Thurston County and their associated shorelands. This includes:~~ applies to the following shorelines of the state (RCW 90.58.030) in Thurston County:

1. All marine waters;
2. Rivers and streams with more than 20 cubic feet per second (cfs) mean annual flow;
3. Lakes and reservoirs 20 acres and greater in area;
4. Associated wetlands;
5. Shorelands adjacent to these waterbodies, typically within 200 feet of the ordinary high water mark (OHWM);
6. Buffers necessary to protect critical areas that are located within shoreline jurisdiction as described in this program.*

**- optional jurisdiction*

B. Associated estuarine wetlands: the jurisdictional boundary shall extend 200 feet landward of the delineated edge of the wetland.

C. Associated wetlands that extend greater than 200 feet landward of the OHWM of the shoreline: the jurisdictional boundary shall extend to the delineated edge of the wetland.

D. Critical areas designated pursuant to Chapter 36.70A RCW and located within shoreline jurisdiction shall be subject to the regulations of this Program.

Comment [M1]: Because of its phrasing, this statement ends up being more expansive than required by statute. Recommend Dept. of Ecology wording:
The SMA applies to the following shorelines of the state [RCW 90.58.030] in Thurston County:

Comment [M2]: Where are the "not typical" exceptions or exemptions explained?

Comment [M3]: Optional to who?

Comment [D4]: This jurisdiction should extend 200 feet from the landward edge of the associated wetlands. This would reduce confusion and overla of jurisdiction. The CAO specifically states that the wetlands associated with shorelines belong to the SMP

19.200.105 Shoreline Environment Designations

In order to plan and manage shoreline resources effectively and to provide a uniform basis for applying policies and regulations within distinctively different shoreline areas, a system of categorizing shoreline areas is necessary. Under the following system, shoreline environment designations are given to specific areas based on the existing development pattern, the biophysical capabilities and limitations of the shoreline being considered for development, and the provisions of WAC 173-26-211, ~~and the goals and aspirations of the citizens of Thurston County as expressed in the Comprehensive Plan.~~ The existing development pattern and the biophysical information of the shoreline was compiled in a *Thurston County Shoreline Master Program Update Inventory and Characterization Report* (Thurston County 2013) and was included as the basis for the environment designations.

Environment designation assignment to shoreline reaches must assure the protection of existing shoreline ecological functions with the proposed pattern and intensity of development as well as be consistent with policies for restoration of degraded shorelines [WAC 173-26-211 (4) (b)].

Comment [M5]: ...protect our shoreline resources and manage their use effectively...

Comment [M6]: The relationship of the SMP to coordinate and reflect the Comprehensive Plan i already stated in the SMP at 19.100.110. Also, a few paragraphs later, the SMP explains its uniqueness from the Comprehensive Plan: "The shoreline environment designations are not intende to be land use designations. They do not imply development densities, nor are they intended to mirror the Comprehensive Plan designations. The system of categorizing shoreline environment designations is derived from Chapter 173-26 WAC.

Thurston County is using five of the six Ecology recommended Shoreline Environment Designations (SED's) and criteria consistent with Ecology's provided criteria for each of the environment designations;

(see continuation of page below)

Aquatic, Natural, Urban Conservancy, Rural Conservancy, and Shoreline Residential [WAC 173-26-211(5)]. Thurston County does not have any "High Intensity" shorelines within its jurisdiction. In addition to the five Ecology recommended SEDs, Thurston County is proposing to use one additional SED: Mining (*Shoreline and Environmental Designations Report*, Thurston County 2013). A map of the environment designations can be found in Appendix A.

This Program is designed to encourage, in each environment, uses which enhance the character of that environment. At the same time, the Program imposes reasonable standards and restrictions on development so that such development does not disrupt or destroy the character of the environment or result in a net loss of shoreline ecosystem functions.

The shoreline environment designations are not intended to be land use designations. They do not imply development densities, nor are they intended to mirror the Comprehensive Plan designations. The system of categorizing shoreline environment designations is derived from Chapter 173-26 WAC.

The basic intent of this system is to utilize performance standards that regulate activities in accordance with goals and objectives defined locally rather than to exclude any use from any one environment. Thus, the particular use or type of developments placed in each environment must be designed and located so that there are no effects detrimental to achieving the objectives of the shoreline environment designations and local development criteria.

This approach provides an "umbrella" environment class over local planning and zoning on the shorelines. Since every area is endowed with different resources, has different intensities of development and attaches different social values to these physical and economic characteristics, the environment designations should not be regarded as a substitute for local planning and land-use regulations.

Comment [D7]: Since the County SMP is intended for unincorporated Thurston County, why are we referring to local planning of cities? Or are you referring to the Comprehensive Plan?

19.200.110 Mining

A. Purpose. To protect shoreline ecological functions in areas with mining activities within shoreline jurisdiction. To provide sustained resource use, and protect the economic base of those lands and limit incompatible uses.

B. Designation Criteria.

1. Outside incorporated municipalities and outside urban growth areas, AND:
2. Contains shorelines created from mining activity in areas where no previous naturally occurring SMA shoreline existed.

C. Management Policies.

1. First priority should be given to water-dependent uses. Second priority should be given to water-related and water-enjoyment uses.
2. Non-water-oriented uses should not be allowed except:
   a. As part of mixed used development;
   b. In limited situations where they do not conflict with or limit opportunities for water-oriented uses; or
   c. On sites where there is no direct access to the shoreline.
3. Policies and regulations shall assure no net loss of shoreline ecological functions as a result of new development. Where applicable, new developm~~ent~~

shall include environmental cleanup and restoration of the shoreline to comply with any relevant state and federal law.

4. Where feasible, visual and physical public access should be required.
5. Aesthetic objectives should be implemented by means such as sign control regulations, appropriate development siting, screening and architectural standards, and maintenance of natural vegetative buffers.
6. Full utilization of existing urban areas should be achieved before further expansion of intensive development is allowed. Consideration should be given to the potential for displacement of non-water-oriented uses with water-oriented uses when analyzing full utilization of urban waterfronts and before considering expansion of such areas.

19.200.115 Shoreline Residential

A. Purpose. To accommodate residential use and new and existing residential development ~~and appurtenant structures~~ that are consistent with this Program, and to provide ~~appropriate~~ public access and recreational uses limited to conditional use projects meeting the established criteria~~.~~

B. Designation Criteria.

1. Does not meet the criteria for the Natural or Rural Conservancy Environments.
2. Predominantly single-family or multifamily residential use and development or are planned and platted for residential development.
3. Majority of the lot area is within the shoreline jurisdiction.
4. Ecological functions have been impacted by more intense modification and use.

C. Management Policies.

1. Standards for buffers, shoreline stabilization, vegetation conservation, critical area protection, and water quality should be set to ~~assure~~ determine no net loss of shoreline ecological functions as defined in this Program.
2. Multi-family and multi-lot residential and recreational developments should provide public access and joint use for community recreational facilities. If public access is not feasible on site, off-site options such as an in-lieu fee may be recommended.
3. For new multi-family and multi-lot residential and recreational developments, Access, utilities, and public services should be available and adequate to serve existing needs and/or planned future development.
4. ~~Commercial development should be limited to water-oriented uses. Water-oriented includes water-dependent, water-related and water-enjoyment uses.~~

19.200.120 Urban Conservancy

A. Purpose. To protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.

B. Designation Criteria. Shoreline areas within UGAs or LAMIRDs that are appropriate and

Comment [M8]: Add the word "use" and clarify that "development" is residential

Comment [M9]: Which definition of "development" is being used? The definitions in Chapter 100 vary and affect application of the SMP in these later sections.

Comment [M10]: Aren't appurtenant structure part of development? Why are they being singled out here? Are other structures not going to be accommodated?

Comment [D11]: Should these be included: setbacks, buffers or yards; area; bulk; height or density?

Comment [M12]: Why would unlimited Commercial development be allowed in a Residential SED with an underlying GMA residentia designation? Instead: "Commercial development limited to providing public access and recreational water-enjoyment uses and is subject to the following criteria ---(need to define these criteria).' This means the matrix in Chapter 600 needs to be revised.

planned for development that is compatible with maintaining or restoring of the ecological functions of the area and generally are not suitable for water-dependent uses. Such areas must also have any of the following characteristics:

1. Area suitable for low-intensity water-related or water-enjoyment uses without significant adverse impacts to shoreline functions or processes;
2. Open space, flood plain or other sensitive areas that should not be more intensively developed or supporting resource-based uses;
3. Potential for ecological restoration;
4. Retained important ecological functions, even though partially developed; or
5. Potential for development that is compatible with ecological restoration or Low Impact Development techniques.
6. Does not meet the designation criteria for the Natural Environment.
7. Land having any of the above characteristics and currently supporting residential development may be Urban Conservancy, as may those areas into which a UGA boundary is expanded and thus has any of the above characteristics.

C. Management Policies.

1. Uses that preserve the natural character of the area or promote preservation of open space, floodplain or other sensitive lands either directly or over the long term should be the primary allowed uses. Uses that result in restoration or preservation of ecological functions should be allowed if the use is otherwise compatible with the purpose of the environment and the setting.
2. Standards for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications shall ensure that new development does not result in a net loss of shoreline ecological functions, or further degrade other shoreline values.
3. Public access and public recreation objectives should be implemented whenever feasible and ecological impacts can be mitigated.
4. Water-oriented uses should be given priority over non-water oriented uses. For shoreline areas adjacent to commercially navigable waters, water-dependent uses should be given highest priority.
5. Any development in the Urban Conservancy designation should implement Low Impact Development techniques, as much as is feasible, in order to maintain ecological functions.

19.200.125 Rural Conservancy

A. Purpose. Provide for sustained resource use, public access, and recreational opportunities while protecting ecological functions, and conserving existing ecological, historical, and cultural resources.

B. Designation Criteria. Shorelines outside the UGA or LAMIRD that have any of the following characteristics:

1. Currently support lesser-intensity resource-based uses, such as agriculture, aquaculture, forestry, or recreational uses, or are designated agriculture or forest lands;

2. Currently accommodate residential uses but are subject to environmental limitations, such as properties that include or are adjacent to steep banks, feeder bluffs, or flood plains or other flood-prone areas;
3. Can support low-intensity water-dependent uses without significant adverse impacts to shoreline functions or processes;
4. Private and/or publically owned lands (upland areas landward of OHWM) of high recreational value or with valuable historic or cultural resources or potential for public access;
5. Does not meet the designation criteria for the Natural environment;
6. Land designated Urban Conservancy and from which a UGA boundary is retracted may be designated as Rural Conservancy, if any of the above characteristics are present.

C. Management Policies.

1. Uses should be limited to those which sustain the shoreline area's physical and biological resources, and those of a non-permanent nature that do not substantially degrade ecological functions or the rural or natural character of the shoreline area. Developments or uses that would substantially degrade or permanently deplete the physical and biological resources of the area should not be allowed.
2. New development should be designed and located to preclude the need for shoreline stabilization. New shoreline stabilization or flood control measures should only be allowed where there is a documented need to protect an existing structure or ecological functions and mitigation is applied.
3. Residential development standards shall ensure no net loss of shoreline ecological functions and should preserve the existing character of the shoreline consistent with the purpose of the "Rural Conservancy" environment.
4. Low-intensity, water-oriented commercial uses may be permitted in the limited instances where those uses have been located in the past or at unique sites in rural communities that possess shoreline conditions and services to support the development.
5. Water-dependent and water-enjoyment recreation facilities that do not deplete the resource over time, such as boating facilities, angling, hunting, wildlife viewing trails and swimming beaches, are preferred uses, provided significant adverse impacts to the shoreline area are mitigated.
6. Agriculture, commercial forestry and aquaculture, when consistent with the Program, may be allowed.

19.200.130 Natural

A. Purpose. To protect those shoreline areas that are relatively free of human influence, and/or that include intact or minimally degraded shoreline functions intolerant of human use. Only very low intensity uses are allowed in order to maintain the ecological functions and ecosystem-wide processes. Restoration of degraded shorelines should be planned within this environment.

B. Designation Criteria. Shorelines having a unique asset or feature considered valuable for its natural or original condition that is relatively intolerant of intensive human use. This includes shorelines both in and out of the UGA or LAMIRD when any of the following characteristics apply:

1. The shoreline is ecologically intact and currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity; or
2. The shoreline is considered to represent ecosystems and geologic types that are of scientific and educational interest;
3. The shoreline is unable to support new development or uses without adverse impacts to ecological functions or risk to human safety.
4. The shoreline includes largely undisturbed portions of shoreline areas such as wetlands, estuaries, unstable bluffs, coastal dunes, spits, and ecologically intact shoreline habitats.
5. Retain the majority of their natural shoreline functions, as evidenced by shoreline configuration and the presence of native vegetation.
6. Generally free of structural shoreline modifications, structures, and intensive human uses.

C. Management Policies.

1. Any use that would substantially degrade or result in a net loss of ecological functions or natural character of the shoreline area should not be allowed. The following new uses should not be allowed: commercial, industrial and non-water-oriented recreation.
2. Any alteration should be designed with low impact development methods, or be capable of restoration to the natural condition, where feasible. New development or significant vegetation removal that would reduce the capability of vegetation to perform normal ecological functions should not be allowed.
3. Single-family residences, roads, parking areas and utility corridors may be allowed as a conditional use only if they cannot be located outside the Natural Designation or shoreline jurisdiction, provided that the density and intensity of such use is limited to protect ecological functions and is consistent with the purpose of the designation.
4. Low-intensity, water-oriented recreational access, scientific, historical, cultural, educational research uses may be allowed provided that no significant ecological impact on the area will result.

19.200.135 Aquatic

A. Purpose. To protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark (OHWM).

B. Designation Criteria. Lands waterward of the OHWM and within the 200-foot jurisdiction of the SMP, which include tidelands, bedlands, and lands beneath freshwater shorelines of the state (may also include wetlands) except for the exemptions listed at (….for example, wild geoduck on DNR-managed land are not covered).

C. Management Policies.

1. Unless otherwise authorized by other authorities, New over-water structures and development on navigable waters ~~and their beds~~ should be ~~allowed~~ permitted as development only for commercial water-dependent uses, public access or ecological restoration, and when:

Comment [M13]: Dealing with lands under the water requires its own management policy to refle factors of private ownership, state ownership, federal ownership, protected species, impacts upo upland use, etc.

a. They do not preclude attainment of ecological restoration; and

b. The size of the new over-water structure is limited to the minimum necessary to support the structure's intended use; and

c. Multiple use of the over-water facility has been encouraged; and

d. The structure or use is located and designed to minimize interference with surface navigation, to consider impacts to public views, to allow for the safe, unobstructed passage of fish and wildlife, particularly those species dependent on migration and to ensure that the project does not conflict with existing water dependent uses; and

e. The use or modification is designed and managed to prevent degradation of water quality and alteration of natural hydrographic conditions.

Comment [M14]: ...address aesthetic impacts and degradation and blocking of public and residential views,

ADD New structures and development on marine tidelands within the SMP jurisdiction are subject to the following: (needs to be defined)

ADD New structures and development on lands under fresh waters within the SMP jurisdiction are subject to the following: (needs to be defined)

2. When new over-water structures are proposed for residential development of two or more dwellings, joint use or community dock facilities should be utilized rather than single-use facilities.

3. Development should be compatible with the adjoining upland designation.

4. Existing over-water residences may continue through normal maintenance and repair, but should not be enlarged or expanded. New over-water residences should be prohibited.

5. Applicants for any use or modification should schedule a staff consult to review the site conditions, and potential habitats and species. This consult should result in a general understanding of applicable development standards for the proposal.

Comment [D15]: What is definition of "use or modification"? Are the exclusions in 500.100.C.3 included here? Why is a procedure listed here?

6. Development over or in critical freshwater or saltwater habitats should be limited to those which mitigate impacts according to mitigation sequencing, and development standards for that development activity.

19.200.140 Official Shoreline Map

A. As part of this Program, there is one official Thurston County Shoreline Environment Designations Map, which shall be in the custody of the Department of Resource Stewardship and available for public inspection during normal business hours and on the Thurston County website. Unofficial copies of the official map or portions thereof may be included or distributed with copies of this Program (see Appendix A).

B. The purpose of the official Shoreline Environment Designations Map is to depict graphically those areas of Thurston County falling under the jurisdiction of this Program, and the shoreline environment designations of those areas.

19.200.145 Map Boundaries and Errors

A. Mapping Boundaries. Where the exact location of a jurisdiction or environment designation boundary line is uncertain, the official Shoreline Environment Designations Map will be used to determine the location of such line. When resorting to the Shoreline Environment Designations Map does not resolve the conflict, the following rules will apply:

1. Boundaries indicated as approximately following the center lines of streets, highways, alleys or other roadways shall be construed to follow such center lines;
2. Boundaries indicated as approximately following lot, fractional section or other subdivision lines shall be construed as following such subdivision lines;
3. Boundaries indicated as approximately following any lines of corporate limits or other local government jurisdictional lines shall be construed as following such lines;
4. Boundaries indicated as following railroad lines shall be construed as following the center line of the railroad right-of-way;
5. Boundaries indicated as parallel to or extensions of features identified in subsections 1. through 4. above shall be so construed;
6. Boundaries between parallel environment designations shall be construed as the top of the bluff or vegetation line that distinguishes existing development from the critical area abutting the shoreline;
7. When not specifically indicated on the Shoreline Environment Designations Map, distances shall be determined by the scale of the map;
8. Where existing physical or cultural features are at variance with those shown on the Shoreline Environment Designations Map and cannot be determined with certainty by applying subsections one through six above, the Director shall determine the location or existence of such feature utilizing the provisions of WAC 173-27-211, the policies of RCW 90.58.020, TCC 24.01.040, and the corresponding Master Program provisions herein; and
9. Where a parcel within the shoreline jurisdiction is separated from the water by an existing developed road or an additional parcel that serves to create a distinct break in connectivity to the shoreline, the parcel on the landward side may not be required to meet certain development regulations for that designation (such as public access, water-oriented use, or vegetation conservation standards), provided all other applicable provisions of this Program are met, including no net loss of shoreline ecological functions.

B. Mapping Errors. Some mapping errors may be adjusted prior to a Master Program amendment to assign the appropriate designation to that area by the following methods:

1. The common boundary descriptions and the criteria in RCW 90.58.030(2) and Chapter 173-22 WAC supersede the map when there are mapping error conflicts, other than those with a solution provided in this section.
2. In the event that a jurisdictional area is not mapped, it will automatically be assigned a "Rural Conservancy" or "Urban Conservancy" designation depending on its location outside or inside of a UGA or LAMIRD. Such designation will apply until a Master Program amendment is approved that assigns the appropriate designation to the subject area.
3. In the event that a parcel was inadvertently assigned more than one designation, the more restrictive designation shall apply.
3.4. ADD A parcel which includes tidelands will be assigned a designation landward of the OHWM and a second designation waterward of the OHWM.
4.5. In the event that a parcel on the boundary between two designations appears to be a mapping error based on the criteria in this section, the County shall apply the most appropriate of the two designations, until such time as the map can be formally corrected consistent with WAC 173-26-100 and Section 19.500.105(I) (Shoreline

Comment [M16]: Parcels with tidelands will have more than one designation: Residential and Aquatic. This situation should have its own item description here, such as "A parcel which includes tidelands will be assigned a designation landward c the OHWM and a second designation waterward o the OHWM.

Master Program Amendment).

5.6. In the event of an environment designation mapping error where the Master Program update or amendment record, including the public hearing process, is unclear in term of the correct environment designation to apply to a property, the County shall apply the environment designation approved through the Master Program Update or Amendment process and correct the map.

6.7. If the environment designation criteria were misapplied, but the update or amendment record, including the public hearing process, does not clearly show that a different designation was intended to be shown on the map, a Master Program amendment may be obtained consistent with WAC 173-26-100 and Section 19.500.105(I) (Shoreline Master Program Amendment). This process is intended to allow for reasonable corrections to the Shoreline Environment Designation process. Such process shall include early consultation with the Department of Ecology and other agencies with jurisdiction, affected tribes, and appropriate public notification prior to local approval. Current designations are reflected in the Shoreline Environment Designations Map (Appendix A).

Public Comment
Written Comment
received 9.19.18

5 Effects of Development with Application of the SMP

5.1 Environment Designations

5.1.1 Purpose and Distribution

The first line of protection of the County's shorelines is the environment designation assignments (see SMP Appendix A). According to the Guidelines (WAC 173-26-211), the assignment of environment designations must be based on the existing use pattern, the biological and physical character of the shoreline, and the goals and aspirations of the community as expressed through a comprehensive plan.

The assignment of environment designations can help minimize cumulative impacts by concentrating development activity in lower functioning areas that are not likely to experience significant function degradation with incremental increases in new development or redevelopment.

Consistent with WAC Shoreline Master Program Guidelines, the County's environment designation system is based on the existing use pattern, the biological and physical character of the shoreline, and community interests. The *Shoreline Inventory and Characterization* report provided information on shoreline conditions and functions that informed the development of environment designations for each of the shoreline waterbodies. The proposed environment designations, consistent with SMP Guidelines, include: Natural, Rural Conservancy, Urban Conservancy, and Shoreline Residential, listed in order by increasing level of use. An Aquatic environment designation applies to most shorelines waterward of the ordinary high water mark (OHWM).

In general, the Natural environment designation was recommended for shorelines with unique features that are generally incompatible with intensive human use. These areas include undisturbed portions of wetlands, estuaries, unstable bluffs, spits, and other ecologically intact areas. Approximately 31 percent of the County's total shoreline area is in the Natural environment designation.

The Rural Conservancy designation covers just over 60 percent of the County's entire shoreline jurisdiction (Figure 5-1). The Rural Conservancy environment designation was assigned to areas supporting low-intensity resource-based uses (e.g., agriculture, forestry, and recreation) or areas with existing residential development that are subject to environmental limitations (e.g., steep banks, feeder bluffs, and floodplains).

The Urban Conservancy designation is limited to 1.1 percent of the total shoreline area in the County (Figure 5-1). The designation applies to areas within UGAs or LAMIRDs,

where existing and planned development is compatible with maintaining and restoring ecological functions.

The Shoreline Residential designation applies to 3.5 percent of the shoreline area (Figure 5-1) and nearly half of the total number of parcels (Figure 5-2). The designation applies to areas that are predominantly single-family or multi-family residential development, excluding areas where further residential development would cause adverse ecological impacts to sensitive environments (e.g., steep slopes, floodplains, wetlands).

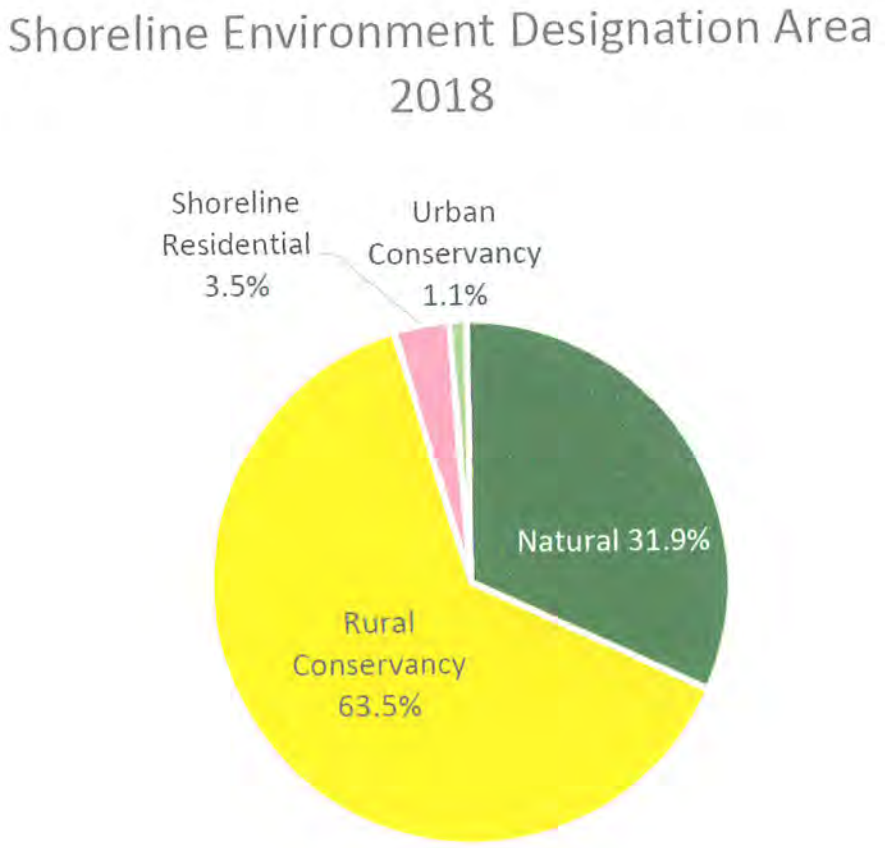


Figure 5.1 Distribution of Shoreline Environment Designations by Acres in Thurston County

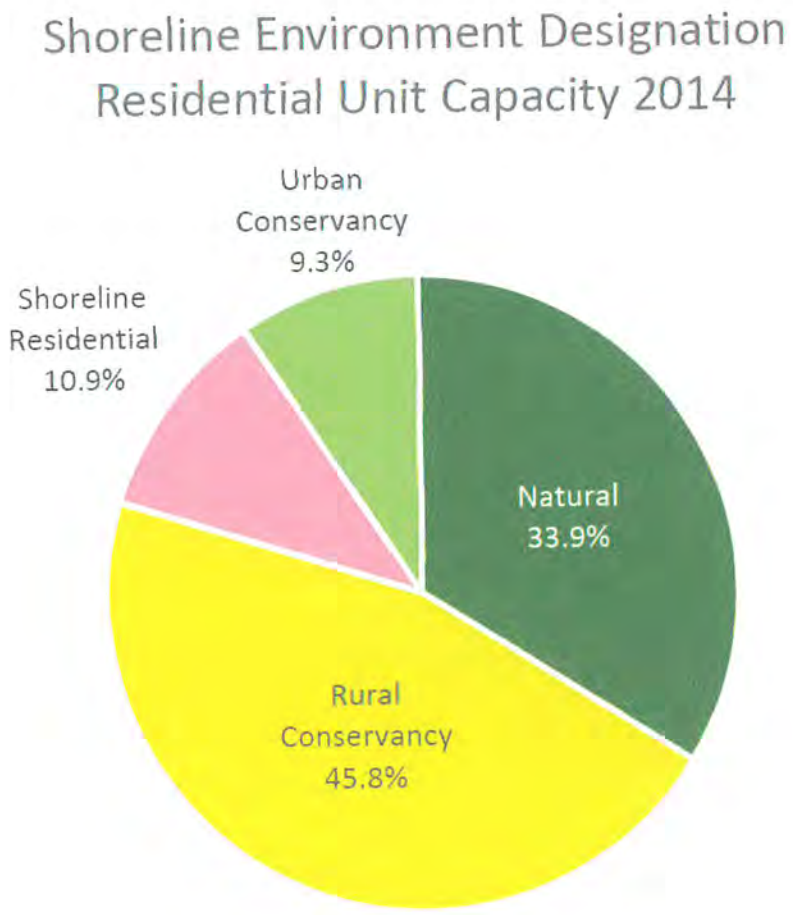


Figure 5-2. Distribution of Shoreline Environment Designations by Number of Parcels in Thurston County

5.1.2 Use and Modification Matrix

The Use and Modification Matrix (Chapter 19.600 and Appendix D of this document) identifies the prohibited and allowed uses and modifications in each of the shoreline environments, and clearly shows a hierarchy of higher-impacting uses and modifications being allowed in the already highly-altered shoreline environments, with uses more limited in the less developed areas either through prohibition or a requirement for a Shoreline Conditional Use Permit.

The allowed and prohibited uses established in the Use and Modification Matrix help minimize cumulative impacts by concentrating development activity in lower

functioning areas that are not likely to experience significant function degradation with incremental increases in new development. Furthermore, prohibited and permitted uses specific to environment designations limit potential conflicts between neighboring uses and ensure that uses are consistent with comprehensive plans, zoning, and existing functions.

5.1.3 Relationship to Marine Functions

Existing analyses of shoreline functions were used to evaluate how the distribution of environment designations correlates to existing levels of ecological functions. In the marine shoreline, the distribution of environment designations was compared to the level of direct disturbance on controlling factors (i.e. substrate, wave energy, depth/slope, light, frequency of disturbance, and water quality) as reported by Borde et al. (2009) and Judd (2010) and used in the Thurston County *Shoreline Inventory and Characterization* report. Direct disturbances included in the evaluation are armoring, boat launches, overwater structures, heavily modified areas, and impervious surface coverage (Borde et al. 2009). The direct disturbance score was used to provide a comparison of site-specific functions relevant to existing local land use conditions. It should be noted, however, that landscape-scale disturbances and factors also play a significant role in overall shoreline functions, and these factors are not explicitly considered in the functional score.

5.2 General Policies and Regulations

The SMP contains numerous general policies, with supporting regulations (see SMP Chapters 19.300 and 19.400), intended to protect the ecological functions of the shoreline and prevent adverse cumulative impacts and to satisfy the main objectives of the SMA. The General Policies and Regulations chapter applies to all activities, uses and modifications.

The proposed SMP requires mitigation sequencing for all permitted activities within shoreline jurisdiction to protect current ecological conditions and prevent or mitigate for adverse impacts (SMP 19.400). Mitigation sequencing involves first avoiding impacts where possible, and then minimizing the intensity of impacts; finally, where remaining impacts are unavoidable and cannot be reasonably minimized, mitigation is required to compensate for those remaining unavoidable impacts and ensure that shoreline functions are retained.

Among the general regulations, the Thurston County Critical Areas Ordinance (Title 24 TCC) is amended and incorporated by reference into the proposed SMP (19.400.115). In addition to critical areas established in the existing Critical Areas Ordinance, the SMP establishes "Critical Freshwater Habitats" and "Critical Saltwater Habitats." Critical Freshwater Habitats include all lakes and streams that qualify as Shorelines of the State (SMP 19.400.115(C)). Critical Saltwater Habitats (19.400.115 (D)) include kelp and eelgrass beds, forage fish spawning and holding areas, shellfish beds, mudflats, intertidal habitats with vascular plants, and areas with which priority species have a primary association. The basic components of Thurston County's critical areas regulations include Ecology's four-tiered wetland rating system with standard buffers ranging from 50 to 300 feet

Written comment received during public comment

A Washington State Chapter of the National Audubon Society
P.O. Box 2524, Olympia, WA 98507
(360) 352-7299 www.blackhills-audubon.org

Black Hills Audubon Society is a volunteer, non-profit organization of more than 1,300 members in Thurston, Mason, and Lewis Counties whose goals are to promote environmental education and protect our ecosystems for future generations.

Testimony before the Thurston County Planning Commission October 10, 2018 Comments concerning the proposed Shoreline Master Program Update

Sam Merrill, Chair of the Conservation Committee of Black Hills Audubon Society, the chapter of the National Audubon Society covering Thurston, Mason, and Lewis Counties

The Thurston County Shoreline Master Plan states that Thurston County's shorelines provide valuable habitat for fish and wildlife, economic opportunities derived from shoreline natural resources, and recreational opportunities used by residents of all ages. Shorelines play an important role in enhancing the quality of life for our County's citizens.

We are concerned about the trend in Thurston County of converting shorelines to other uses.

We support management designed to achieve *no net loss* of shoreline ecological functions; this follows the SMP guidelines (WAC 173-26-186(8)). Management of shoreline aquatic systems is critical for the health and safety of the public.

Specifically, we support:

- **Buffers: Maintain the 2017 (not 7/2018) draft SMP standard buffer widths or setbacks, without modification. Buffers protect, not only habitats, but people from future sea level rise.**

- **Mitigation: Developers should AVOID adverse effects to habitats first. If not possible, require compensatory mitigation to occur in the same or related habitat area.**

- **Aquaculture: We recommend avoiding plastics, particularly those that break down into microplastics, such as bags and netting. If not possible, minimize and restrict their use. Do not use biodegradable plastics, which can break down and release toxins. Mandate what is necessary to keep birds, fish, whales, and wildlife from ingesting micro-plastics, which cause starvation. Limit changes in the ocean floor communities by using little or no scraping or dredging. To reduce the risk of birds being trapped, limit the use of predator control area netting.**

We urge you to take the necessary steps to protect the county's natural environment, habitats, and shoreline ecological functions, so the marine and freshwater shorelines of our county will flourish into the future.

Heavy Metal: The New Toxic Danger Posed by Ocean Plastic Trash

Plastics entering coastal waters both absorb and release cadmium, lead and other toxic metals. Scientists are now trying to determine the impact of metal-contaminated plastic on marine life and ocean ecosystems.

WRITTEN BY
Danielle Beurteaux

PUBLISHED ON
April 3, 2018

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Metals can accumulate on the surface of plastic trash, researchers have found. Sutanta Aditya/Barcroft Images/Barcroft Media via Getty Images

WE KNOW THAT plastic waste is overwhelming the ocean, sea life is dying from ingesting it and some even ends up in seafood. But scientists also now worry that plastic trash is coming with a side helping of toxic metals that latch onto plastic surfaces and enter the marine environment and food chain – and eventually, what people eat.

Metals, such as cadmium and lead, are often used in manufacturing plastic and over time can enter coastal waters. Once floating in the ocean or discarded on a beach and washed by the tides, plastics can also attract and concentrate a variety of metals already present in the environment that attach themselves, or "sorb," to the surface. In both cases, the worry is that these metals – often toxic ones such as cadmium that are health concerns for both wildlife and humans – can

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contaminate waters or harm wildlife that ingest plastics, especially those that live in intertidal zones near sources of plastic pollution.

Researchers, however, are only just starting to understand how metal-tainted plastics interact in coastal environments, said Leah Bendell, professor of marine ecology and ecotoxicology at Simon Fraser University in British Columbia.

Bendell led one recent study, published in February in the journal PLOS ONE, that examined how four metals – cadmium, lead, zinc and copper – both attach onto and are released from plastics found on Canada's beaches. She said her results show how a whole host of metals can enter the marine food chain or coastal waters.

"Not only were these plastics serving as a way of metal getting into these lower trophic levels, but also they were a source of the metal into the water column and they can be acutely toxic," said Bendell. "It was a little bit of an eye-opener to the multifaceted role the plastics played."

For the study, Bendell's graduate student, Bertrand Munier, picked up every bit of plastic waste from transects on nine Vancouver-area beaches, gathering 144 unique plastic items, mostly food packaging and takeout containers. They sorted the plastics into 11 types and then used a weak acid to extract and separate the four metals – this kind of analysis is often used to

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estimate levels of toxins that could enter the tissues of wildlife if eaten. As a point of comparison, they also did the same for newly manufactured plastic samples. The goal was to distinguish metals that came from the plastic itself and those that had sorbed to the surface of the beach debris from the environment.

Of the collected items, five samples released what the study said were "extreme" high levels of metals – including a plastic tampon applicator tested for high levels of zinc – and all had at least trace amounts of the four metals tested. Different kinds of plastic also released different levels of metals. For example, PVC, the most commonly found plastic, had high levels of lead and copper attached to its surface. The comparison of the new and debris plastic also showed how some of the chemicals used in plastic production may release over time – including cadmium, which is used to make plastic rigid and resistant to UV light. The researchers found that new PVC releases zinc and cadmium.

3 **How a Celebrity Chef Learned to Love Farmed and Frozen Fish**
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REPUBLISH THIS ARTICLE

Plastic is accumulating on beaches and in oceans all over the world. (THOMAS WATKINS/AFP/Getty Images)

A previous study examining metals sorbing onto plastics have found that the age of the material also matters. Chelsea Rochman, an assistant professor at the University of Toronto's department of ecology and evolutionary biology, led a study when she was at San Diego State University in which her team dropped mesh bags of various kinds of plastic pellets into three areas around San Diego Bay in California. They measured how much aluminum, chromium, manganese, iron, cobalt, nickel, zinc, cadmium and lead from the environment sorbed onto their samples.

The year-long study, also published in PLOS ONE, found that metal levels increased the longer the plastic samples were in the water. That's probably because surface area increases as the plastics degrade over time and biofilms form, Rochman said.

Biofilms are collections of unattached microorganisms that put down roots on surfaces and can act as a surface for metals to latch onto. Fungi are a type of biofilm, as are bacteria. "Basically, over time there's more space for these metals to bind to," said Rochman.

There's still a lot scientists don't know. For example, it's unclear how big a role biofilms play in the concentration of metals on plastics and the ultimate effects of the metals on wildlife that ingest plastics. It's possible, for example, they may digest the biofilm, metals or chemicals – even if they ultimately expel the plastic itself. "If the metals are bound on the biofilm, the question is are they even more bioavailable than we think?" asked Rochman.

The presence of a toxic metals-saturated biofilm on plastics could be both an ecological and human health problem, said Bendell. The bacterial growth on the biofilm could potentially pick up pathogens in and around coastal areas. And as these plastics break down into smaller and smaller pieces, they're more easily ingested by marine life, and now it looks like they're bringing dangerous metals along for the ride. While the studies were conducted in North America, the environmental risks may be far greater in regions like Southeast Asia that lack waste management infrastructure and where more plastic pollution makes its way to the coast.

The actual risk of metals associated with plastics to human health is unknown, said Bendell. But as plastic pollution grows, it's concerning to scientists like Bendell. "We need to change from thinking everything can be thrown away to you are accountable and responsible for every piece of plastic that comes into your house," she said. ■

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Danielle Beurteaux is a New York-based freelance journalist who writes about science, technology and food.

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PLOS ONE

Macro and micro plastics sorb and desorb metals and act as a point source of trace metals to coastal ecosystems

B. Munier , L. I. Bendell

Published: February 14, 2018 • https://doi.org/10.1371/journal.pone.0191759

Abstract

Nine urban intertidal regions in Burrard Inlet, Vancouver, British Columbia, Canada, were sampled for plastic debris. Debris included macro and micro plastics and originated from a wide diversity of uses ranging from personal hygiene to solar cells. Debris was characterized for its polymer through standard physiochemical characteristics, then subject to a weak acid extraction to remove the metals, zinc, copper, cadmium and lead from the polymer. Recently manufactured low density polyethylene (LDPE), nylon, polyethylene terephthalate (PET), polypropylene (PP), polystyrene (PS) and polyvinyl chloride (PVC) were subject to the same extraction. Data was statistically analyzed by appropriate parametric and non-parametric tests when needed with significance set at $P < 0.05$. Polymers identified in field samples in order of abundance were; PVC (39), LDPE (28), PS (18), polyethylene (PE, 9), PP (8), nylon (8), high density polyethylene (HDPE, 7), polycarbonate (PC, 6), PET (6), polyurethane (PUR, 3) and polyoxymethylene (POM, 2). PVC and LDPE accounted for 46% of all samples. Field samples of PVC, HDPE and LDPE had significantly greater amounts of acid extracted copper and HDPE, LDPE and PUR significantly greater amounts of acid extracted zinc. PVC and LDPE had significantly greater amounts of acid extracted cadmium and PVC tended to have greater levels of acid extracted lead, significantly so for HDPE. Five of the collected items demonstrated extreme levels of acid extracted metal; greatest concentrations were 188, 6667, 698,000 and 930 $\mu g g^{-1}$ of copper, zinc, lead and cadmium respectively recovered from an unidentified object comprised of PVC. Comparison of recently manufactured versus field samples indicated that recently manufactured samples had significantly greater amounts of acid extracted cadmium and zinc and field samples significantly greater amounts of acid extracted copper and lead which was primarily attributed to metal extracted from field samples of PVC. Plastic debris will affect metals within coastal ecosystems by; 1) providing a sorption site (copper and lead), notably for PVC 2) desorption from the plastic i.e., the "inherent" load (cadmium and zinc) and 3) serving as a point source of acute trace metal exposure to coastal ecosystems. All three mechanisms will put coastal ecosystems at risk to the toxic effects of these metals.

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Competing interests: The authors have declared that no competing interests exist.

Introduction

Rates of plastic production have increased 20 fold since 1964 which has resulted in an estimated 311 million tonnes of plastics within the ocean as of 2014 [1]. Further estimates are that at current rates of plastic production, by 2050, the total mass of plastics will outweigh the biomass of fish[1]. The occurrence of plastics within our environment has become so pervasive that for geologists it has defined the Anthropocene, an epoch of time where humans are the main forcing agents of geological and biological change [2]. When discovered, plastic materials became integrated into all aspects of a modern human lifestyle. However, the very nature of the plastic which provides all of its multiple uses also leads to their permanent nature and hence accumulation within ocean ecosystems. Further, of the plastics now being generated, by some estimates, only 9% is recycled[3]. The result is possibly one of the greatest environmental challenges we as a society have been presented with; what are the impacts of plastics on ocean ecosystems and once identified, can we reverse or mitigate these negative impacts?

Plastic materials are polymers whose chemical structure allows them to be shaped at elevated temperatures and pressures i.e., the long-chain polymers exhibit "plastic flow" when heated. The plastic polymer can be modified with other materials (e.g., plasticizers, fillers and stabilizers), prior to being processed in a molten state [4]. Plastics have been conveniently described based on size with

macroplastics being all plastics greater than 5 mm and microplastics, those particles originating from macroplastics less than 5 mm in size. Microplastics also include plastics that are manufactured less than 5 mm in size (e.g. microbeads) [5].

Vethaak and Leslie [6] have outlined three mechanisms by which persistent plastic waste present significant risks to aquatic ecosystems and humans who rely on these ecosystems; 1) Direct toxicity of the plastic particles themselves e.g., oxidative stress, cell damage, inflammation and impairment of energy allocation functions. 2) Chemical toxicity of the plastic debris. These can include heat stabilizers, UV stabilizers, and plasticizers, processing aids, impact modifiers, thermal modifiers fillers, flame retardants, biocides and smoke suppressors. Heat stabilizers and slip agents are of particular concern as they contain the trace metals, cadmium, zinc and lead and can comprise up to 3% of the polymers composition [7] PVCs also contain phthalate plasticizers to improve performance. PVC objects such as piping can be mechanically broken down into increasingly smaller pieces. By doing so, the chemical toxicity of the tubing becomes increasingly of concern as the smaller particles can be ingested by marine organisms. 3) By acting as substratum, plastic particles provide the vector for pathogenic micro-organisms and parasites (e.g., *Escherichia coli*, *Bacillus cereus* and *Stenotrophomonas maltophila*).

A fourth mechanism and one of equal concern to the direct effects of plastics within aquatic ecosystems is the role they play in the sorption of priority pollutants [8,9] thus providing an alternate means of introducing pollutants into freshwater and marine food webs. Recent studies that have addressed the ability of microplastics to sorb trace metals from aquatic and sedimentary environments have indicated that plastic debris can act both as a sorption site for trace metals [10–12], thus allowing for accumulation, or provide an "inherent" load that could also present a source of toxic metal to aquatic ecosystems [13]. Ashton et al.[10] determined the association of metals with plastic production pellets (PPP), sampled from four beaches in SW England and noted that pellets were enriched with cadmium and lead with PPP's able to accumulate metals to concentrations approaching those of sediment and algal fragments. Holmes et al. [11] assessed the interactions between trace metals and PPP's, virgin and aged, under estuarine conditions and concluded that plastic pellets effectively sorb trace metals; short term attributed to adsorption of organic matter and long-term which incorporated the aging of the pellet. Rochman et al.[12] compared the long-term sorption of metals among plastic types in seawater and found that in general all types of plastic tended to accumulate similar concentrations of metals and that over a 12 month study period the concentrations of all metals increased over time and did not reach saturation. Wang et al. [13] however, concludes that toxic metals associated with plastic debris are "inherent" rather than accumulated, with this inherent load presenting toxicology threats to the receiving environments.

Hence, our primary objective was to determine the potential role of both macro and micro plastics in providing a source of the trace metals, zinc, copper, cadmium and lead into intertidal foodwebs. To meet our objective we sampled 9 urban intertidal regions within Burrard Inlet, Vancouver, B.C., Canada for plastic debris. Debris was identified for polymer type and subject to a weak acid extraction. Recovered metal was compared among polymers to identify which polymer had the greatest amounts of extracted metal and thus would pose the greatest risk for introducing toxic metals into intertidal food webs. Our hope is to add to the increasing knowledge base on how plastic debris is impacting our marine environment, in this case by providing another vector for the entry of contaminants into marine ecosystems.

Methods

Study site and sample collection

Nine beaches within Burrard Inlet (Fig 1) were sampled for plastics. Sampling occurred at low tide such that at least 10 meters of intertidal was exposed. At each site, a 1–5 km line was drawn parallel to the shoreline and a 10 meter line drawn perpendicular to the shoreline and tideline. Within this defined area, every piece of plastic debris that was observed was photographed and placed into a zip lock bag. Twenty six km of beach was surveyed and 150 samples collected. Each item was categorized based on where sampled and object type. No specific permissions were required for the collection of debris from public beaches located in Burrard Inlet, Vancouver BC, Canada. Field studies did not involve endangered or protected species.

Fig 1. Location of the 9 urban intertidal regions sampled for plastics within Burrard Inlet, Vancouver, B.C. Insert in upper left hand corner indicates location relative to the rest of the Salish Sea, Canada.
https://doi.org/10.1371/journal.pone.0191759.g001

Polymer identification

Each collected plastic was identified for its polymer based on physical tests which included density, flame color and emission characteristics [14–16]

Trace metal analysis

Field collected samples were weighed and those greater than 1 gram were cut to meet the ca. 1 gram requirement for trace metal extraction. Final sample weights ranged from 0.012 grams to 1.5 grams. Also included in our analyses were six recently manufactured known polymers purchased from a local hardware store. It was assumed that purchased polymers had not been in an environment where exposure to trace metals could have occurred. As we wanted to determine only those metals associated with the surface of the plastics and not those associated with compounds within the plastics, we used a dilute acid extraction. Preliminary extraction experiments where test samples were extracted for one, two and three hours indicated that optimum removal of the metal occurred at 2 hours when gently washed in 10 mL of 10% nitric acid at 30°C. It is important to note that this extraction procedure cannot identify inherit versus sorbed metal associated with the polymer, but rather will the sum of both sources of metal from the plastics. All samples were first rinsed with distilled, deionized water to remove attached materials (e.g., sand) prior to extraction. Once extraction was complete, the 10 mLs was recovered from the digestion flask, tightly covered and stored at 4°C in 15 mL Falcon ™ tubes until analysis. Acid extractions were analyzed for copper, zinc, cadmium and lead via atomic absorption spectroscopy (PinAAcle 500, Perkin Elmer). Standards and blanks were run with each set of analyses to ensure quality assurance and quality control. Blanks were always below limits of detection which were 1 μgL^{-1} for all four metals with precision of the analysis between 3–5%.

Statistical methods

Statistical analysis was performed using Sigma Plot 12 (SYSTAT Software, Chicago IL). Shapiro-Wilk tests for normality and equal variance tests were applied to ensure that data met the assumptions of the parametric tests. One-way and two ANOVA's were applied to determine significant differences in trace metal concentrations among polymer types. Where significant differences occurred a Holm-Sidak method was applied to determine where the differences were. If data were not normally distributed, even after transformation, then data was ranked and analyzed by one-way or two-way ANOVA's on ranks using a Kruskall-Wallace test to determine significance. T-tests on ranked data were applied to determine differences in polymer (all polymer types pooled) metal concentrations between field and recently manufactured samples using a Mann-Whitney Sum test to determine where significant differences occurred. Level of significance was set at 0.05, with 0.1 used to indicate "trends".

We applied the following statistical analysis;

1. One-way ANOVA for differences in acid extracted metal among recently manufactured polymer samples (nylon, PET, PP, PS and PVC)
2. One-way ANOVA for differences in acid extracted metal among field polymer samples (HDPE, LDPE, nylon, PC, PE, PET, PP, PS, PUR and PVC)
3. Two-way ANOVA for differences in acid extracted metal with field versus recently manufactured and polymer type as the two factors (nylon, PET, PP, PS and PVC).
4. T-tests to determine differences in acid extracted metal between field and recently manufactured polymers.
5. We also where possible tested for differences in color within polymer type. Each field collected polymer was identified by color (i.e. from transparent to black) and differences in acid extracted metal within a polymer type determined by one-way ANOVA. There were only enough samples for PVC and PET for this analysis.
6. Simple linear regressions were applied to determine if amounts of acid extracted metal from field collected samples were dependent on sample weight.

Results

All data is available in supporting information S1 File.

Field collection-item identification

An incredibly diverse number of items were recovered from the urban beaches. One hundred and fifty items were collected of which 144 were plastics. Of the 144, we were able to identify the original use of 85 (Fig 2). These recovered plastics fell into 7 major user groups; bags, car/bike parts, everyday items (e.g., ear buds, glasses), food associated (cup, straw, forks), packaging, functional use (ties, nylon, gloves), and children's toys (e.g., miniature bicycle). The majority of plastics were wastes associated with food consumption and packaging. Unlike other shore line clean up initiatives [17] that find that the main items collected are cigarette butts, food wrappers and plastic bottle caps, the majority of collected items only occurred once. An important aspect of our collection was that items were both greater and less than 5 mm with some just at the 5 mm limit that distinguished macro from micro plastics. Hence, collected samples represented the transition of macro plastics to micro plastics.

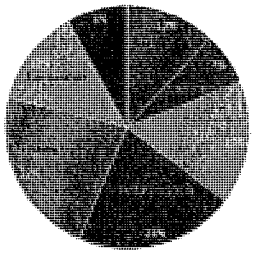

Fig 2. Classification of collected plastics based on original use.
https://doi.org/10.1371/journal.pone.0191759.g002

Polymer Type; field samples

Of the 144 items, 12 polymers were identified. Polymers in order of abundance were; polyvinyl chloride (PVC, 39), low density polyethylene (LDPE, 28), polystyrene (PS, 18), polyethylene (PE, 9), polypropylene (PP, 8), nylon (8), high density polyethylene (HDPE, 7), polycarbonate (PC, 6), polyethylene terephthalate (PET, 6), polyurethane (PUR, 3) and polyoxymethylene (POM, 2). Also identified were rubber (2), amino plastics (1), and nitrile rubber (NBR 1) with 6 unknowns. Not surprisingly, six of the eight most common types of synthetic organic polymers commonly found in households include LDPE, HDPE, PP, PVC, PS and nylon with these polymers accounting for 81% of all samples collected.

Acid extracted metals from polymers; recently manufactured samples

Polymers purchased from a local hardware store included PVC, nylon, PP, PET, PS and LDPE. Amounts of metal extracted from recently manufactured polymers, PVC, nylon, PP, PET, PS and LDPE are presented in Table 1.

Table 1. Concentrations ($\mu g g^{-1}$ dry weight of polymer) of cadmium, copper, zinc and lead recovered by a weak acid extraction from "recently manufactured" polymers.
Values are means of 3 with standard deviations.
https://doi.org/10.1371/journal.pone.0191759.t001

One-way ANOVAs indicated that for cadmium, copper and lead, amounts of metal recovered from the polymers were not different ($P > 0.05$; LDPE was excluded due to the very high values of acid extracted metal). The exception was for zinc, with nylon and PET both having greater amounts of extracted metal as compared to PVC, but not for PP and PS ($F = 4.88$; $P = 0.019$).

Acid extracted metals from polymers; field samples

One-way ANOVA among polymer types for copper indicated a significant difference ($F = 2.448$; $P = 0.014$), with PVC having greater copper concentrations as compared to nylon and PC ($F = 1.3$; $P < 0.05$) (Fig 3A). Zinc also differed among polymers ($F = 7.183$; $P < 0.001$) with LDPE having greater concentrations as compared to PC, PS, nylon, PP, PET and PVC. PC had the lowest amounts of acid extracted zinc as compared to PE, PUR and PVC (Holm-Sidak, $P < 0.05$, Fig 3B). One-way ANOVA's for cadmium and lead among polymer type indicated that except for PVC which was greater than PP for cadmium ($F = 2.84$, $P = 0.005$, Fig 3C) and greater than HDPE and PC for lead ($F = 2.51$, $P = 0.012$, Fig 3D) amounts of acid extracted metal were similar among polymers.

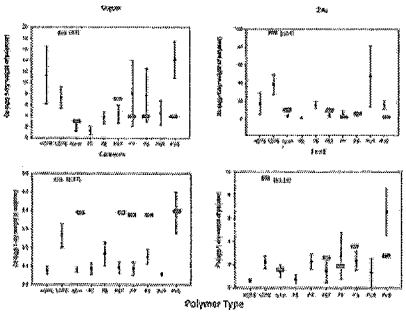

Fig 3.
a, b, c and d. Amounts of metal extracted from 10 polymers collected from 9 urban intertidal regions, Burrard Inlet, Vancouver, B.C. Canada; a) copper, b) zinc, c) cadmium and d) lead. Values are in $\mu g g^{-1}$ dry weight of polymer and are means with 1 standard deviation. Metals extracted from recently manufactured polymers are over-laid with blue bars for comparison. Two additional polymers were identified however; the number of samples was less than 3 so they were not included in the statistical analyses.
https://doi.org/10.1371/journal.pone.0191759.g003

Differences in acid extracted metal; recently manufactured versus field polymers

When entered into a two-way ANOVA with ID (field versus recently manufactured) and polymer type as the two factors, metal concentrations among polymers were not different, however, amounts of extracted metal was source dependent i.e., either field or recently manufactured (Table 2). (Only those polymers which included both recently manufactured and field samples, nylon, PET, PP, PS and PCV were entered into the two- way ANOVA. Due to the high amounts of sorbed metal recovered from the LDPE, this polymer was excluded from the two-way ANOVA).

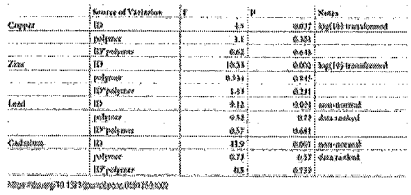

Table 2. Results of the two-way ANOVA with ID and polymer type as the two factors.
F and P are provided for each factor and their interactions. ID is the source of the polymer, either field or recently manufactured.
https://doi.org/10.1371/journal.pone.0191759.t002

When all polymer types were pooled for recently manufactured and field samples, a Mann-Whitney Sum test indicated that field polymers contained greater amounts of copper and lead, whereas recently manufactured polymers had greater amounts of zinc and cadmium (Table 3). Differences in field and recently manufactured polymers for copper and lead were driven primarily by amounts of metal extracted from PVC (Fig 3A and 3D).

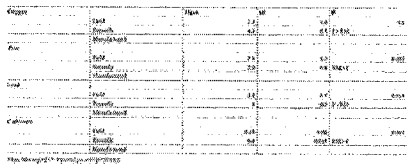

Table 3. Results of the T-test between recently manufactured and field collected polymers.
As data was non-normal, a Mann-Whitney Sum test on ranks is presented. Means with SE values are provided although data was ranked for statistical analysis.
https://doi.org/10.1371/journal.pone.0191759.t003

Differences in metal desorption, color and weight

Because metals such as cadmium and zinc are used extensively in paint pigments [18], especially for the color red, we determined if color affected amounts of metal recovered from two polymers, PET and PVC. Colors entered into the ANOVA were; transparent, pink red, orange, green, white, yellow, blue, grey and black. One-way ANOVA's with color as the dependent factor indicated that amounts of extracted metal were not color dependent ($F = 0.6$; $P > 0.05$). Simple regression also indicated that the size of the sample did not influence amounts of metal recovered for zinc, copper or lead ($R^2 < 0.2$; $P > 0.05$). However, cadmium did show a slight relationship ($R^2 = 0.6$; $P < 0.05$) with the two smallest samples desorbing the greatest amounts of metal and likely related to the surface area to volume ratio of the sample. This could be of importance for cadmium in that as compared to lead, copper and zinc, cadmium is an important additive during polymer formation. Of the four metals it could be more liable, thereby presenting a greater risk to aquatic environments.

Collected samples with acutely toxic amounts of acid extracted metal

Perhaps the finding of most concern was the number of debris items, n = 5, that contained extremely high concentrations of metal Fig 4A, 4B and 4C, Table 4). One sample in particular, #47 (Fig 4A), contained over three orders of magnitude the concentrations of extracted metal as compared to all other samples.

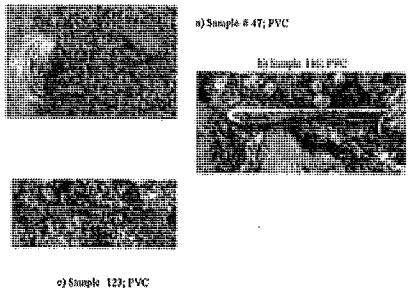

Fig 4.
a, b and c. Items collected from intertidal regions of Burrard Inlet, Vancouver B.C., Canada with high concentrations of extracted metal. 4a) unknown, 4b) unknown, 4c) tampon applicator.
https://doi.org/10.1371/journal.pone.0191759.g004

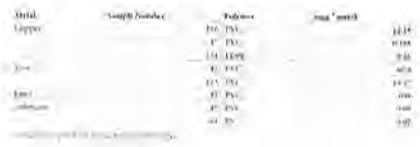

Table 4. High metal concentrations recovered from 5 field samples collected from the intertidal regions of Burrard Inlet, Vancouver B.C. Canada. Note units are in mgg^{-1}.
https://doi.org/10.1371/journal.pone.0191759.t004

The green color of sample 116 (Fig 4B) suggests a copper compound of some sort although its exact origin is unknown. Sample 123 (Fig 4C) was identified as a tampon applicator. Sample # 47 (Fig 4A) is unknown but the high concentrations of metals especially lead could suggest an item related to munitions or explosives.

Discussion

A random collection of plastics both macro and micro collected from 9 urban intertidal regions revealed an astonishing range in diversity of items reflecting our human culture. Items included children's toys, bicycle parts, personnel hygiene items and food packaging. Despite the diversity of items, of the 12 polymers identified, ca. 50% of the collected samples were PVC and LDPE.

Using a weak acid extraction our objectives were to determine of the polymers identified, which would pose the greatest risk with respect to the introduction of trace metals into benthic food webs. We assumed that the extraction would remove only those metals loosely associated or surface sorbed to the polymer. Based on a comparison of amount of metal extracted from field collected versus recently manufactured polymers, plastics debris notably PVC, will be sites of sorption for copper and lead, and by contrast an inherent source of zinc and cadmium. PVC was the most abundant polymer recovered from the intertidal amplifying its role in providing a vector for the entry of metals into marine food webs. Also found were 5 samples which contained extremely high concentrations of trace metals.

The greater amounts of extracted cadmium and zinc found for the recently manufactured samples are likely related to the polymer manufacturing process. The International Cadmium Association[19] report that cadmium-bearing stabilizers are used to retard the degradation processes which occur in PVC and related polymers on exposure to heat and sunlight. Cadmium in the form of stearate or laurate is incorporated into the polymer before processing and can account for 0.5–2.5% of the final polymer compounds. Similarly and as noted previously zinc as zinc stearate at amounts up to 3% is commonly used as a plastics stabilizer. This equates to 300 μgg^{-1} of zinc and cadmium being introduced into marine ecosystems by polymers such as PVC.

Of note were the order of magnitude greater concentrations of metals extracted from the recently manufactured LDPE as compared to all other polymers. We used recycled new plastic bags as our source of LDPE, without any coloring. Imhof et al. [18] reports for recently manufactured plastic bags of which two were comprised of PET, both non pigmented and pigmented concentrations ranges of 0.15–373, 1.42–80 and ND to 43 μgg^{-1} for copper, zinc and lead respectively. Cadmium was not detected. We found for recently manufactured white plastic bags concentrations of 47, 604, 52 and 1.7 μgg^{-1} for copper, zinc, lead and cadmium respectively. With the exception of cadmium, concentrations of recovered metal are similar from the two sources of polymers, that is, values were equally as great. This poses an interesting finding in that it could be that inherent metals within recycled materials and associated paints are much more liable as compared to non-recycled materials and this finding warrants further study.

The studies of Rochman et al.[12] have found that the long-term sorption of metals is similar among plastic types. Using recently manufactured samples of PET, HDPE, PVC, LDPE and PP, these authors measured the accumulation of metal over a 12 month period at three locations in San Diego Bay, USA. The final average concentrations for all polymers at the end of the 12 months were 4.16, 3.8 and 0.8 μgg^{-1} for zinc, cadmium and lead respectively. Copper was not determined. Values for zinc, cadmium and lead are within the range of what we found in our study. By contrast, Wang et al.[13] have recently concluded that the majority of metals associated with plastics debris are derived from an "inherent load". Their conclusions were based on data from the long-term sorption of metals by microplastics and a comparison of metal burden among microplastics, macro-litters and fresh plastic products.

We used a weak acid extraction of 10% nitric acid, similar in concentration to extractions that are used to estimate metal bioavailability from sediment components such as iron oxides and organic matter [20]. Amounts of metal extracted from the polymers were similar to or greater than that recovered from the bioavailable fraction sediments [20]. It is feasible then that amounts of metal recovered from the plastics will be bioavailable and hence a source of metal to those organism that ingest plastic debris as food items. Our findings suggest then, that plastic debris can be both source (inherent load) and sink (sorption) for trace metals, providing two chronic routes for the entry of trace metals into aquatic food webs; via water for zinc and cadmium and through ingestion for copper and lead. Of great concern was the discovery of plastic items, some less than 5 mm that contained very high concentrations of metals. These items contained copper, lead, zinc and cadmium at levels that would be considered point sources of contaminants into intertidal ecosystems.

In sum, depending on the metal and the type of polymer, plastics will have three modes of action affecting trace metals in intertidal ecosystems, 1) direct release into the overlying water column as a consequence of leaching from the plastic itself, i.e. for cadmium and zinc, 2) entry into benthic food webs through ingestion of plastic particles, notably for PVC, that have accumulated metal i.e., copper and lead and 3) as a point source of toxic metal. All three mechanisms will present toxicological threats to our coastal ecosystems.

Supporting information

S1 File. Metal concentrations for all plastics collected from 9 intertidal regions in Burrard Inlet, BC, Canada.

https://doi.org/10.1371/journal.pone.0191759.s001
(XLSX)

Acknowledgments

The authors gratefully acknowledge Dr. Tamara Kazmiruk for her scientific rigor and technical advice throughout the study. We also thank Ross Kukard for equipment technical support. This study was in part support by an NSERC Discovery grant, 31–611307 to LB.

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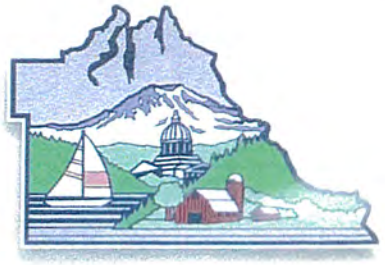
OUR VISION



Thurston County is a vibrant community ensuring the health, safety, and wellbeing of generations to live, work, and play.

OUR MISSION

To create a community that promotes health, commerce, and environmental protection with transparency and accountability.

Department of Ecology Shoreline Master Program Handbook, Chapter 6 "Public Participation"

(http://www.ecy.wa.gov/programs/sea/shorelines/smp/handbook/Chapter6.pdf)

Stakeholders

Local governments should seek out all shoreline users and stakeholders and encourage their participation. An adequate public participation process ensures that everyone is well-informed and provided convenient and meaningful ways to participate.

Identifying stakeholders

Stakeholders are those parties who have an interest in the outcome of the SMP process. They range from the occasional beach walker or visitor to the container-shipping industry to regulatory agencies, as well as residents and local officials. SMP policies and regulations may affect all of them, so they have a "stake" in the development of the SMP. The list below provides examples of stakeholders and likely does not include all shoreline stakeholders.

Shoreline property owners

Home and residential property owners
Homeowners associations
Business and industry owners
Port districts
Railroads
Public property owners (park districts, municipalities, state agencies)
Public and private utilities, water districts Individual shoreline users

Shoreline area residents

Shoreline users – those who fish, swim, paddle, boat and walk
Residents generally interested in local planning
Non-English speaking populations
Tourists and visitors
Shoreline user groups
Boating and paddling organizations
Swimming clubs
Fishing groups
Beach watcher organizations
Research, academic and educational institutions

Local and regional organizations

Business groups such as the Chamber of Commerce
Environmental organizations
Restoration and enhancement organizations
Land use organizations
Property rights organizations
Ethnic organizations
Neighborhood associations
Real estate associations
Tourism agencies

State agencies

Department of Ecology
Department of Fish and Wildlife
Department of Natural Resources
Department of Commerce
Puget Sound Partnership
Department of Health

Tribes

Tribes with local or nearby reservations
Tribes with local hunting and fishing rights
Northwest Indian Fisheries Commission

Federal agencies

Fish and Wildlife Service
National Marine Fisheries Service
Army Corps of Engineers
Federal Emergency Management Agency
Elected officials

Local officials

Neighborhood planning advisory groups
Planning Commission
SMP advisory groups
Elected officials

Others

Neighboring jurisdictions
Shoreline contractors (bulkheads and homes, for example)

Thurston County Shoreline Stakeholders Coalition

4108 Kyro Rd SE. Lacey, WA 98503

October 10, 2018

JOHN H. WOODFORD
AIA
ARCHITECT

JOHN WOODFORD
PRINCIPAL

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TO: Thurston County Planning Commissioners

From: John Woodford, Chairman
Doug Karman, Vice-Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Draft Update of the Shoreline Master Program (SMP)

As shoreline home owners in unincorporated Thurston County, we continue to have issues with not only the draft SMP but also the process of updating. Following are some of our specific issues:

- The current draft has very minor changes from when it was first written. It has now been two months since the appendices to the SMP were available for review.
    - **SMP TIMELINE**: We have received the timeline which will be presented to you at tonight's meeting. Up until now we have been told that "Staff is awaiting additional feedback from the BoCC on the scheduling/timeline."
    - **NO LINE OUT OR TRACK CHANGES VERSION HAS BEEN DONE:** There are hundreds of pages of comments on the draft SMP from stakeholders. However, we do not see a timeline or process to bring these comments to the surface and to negotiate with stakeholders so well thought out revisions can be presented to the Planning Commission to evaluate, discuss and make decisions. **When will a "redline" draft be available?**
    - **NOVEMBER 14 SPECIAL MEETING TO SCHEDULE A PUBLIC HEARING:** If scheduled, according to law, no changes can be made to the draft for 20 days. Therefore, the **redline draft must be available prior to the Nov 14 special meeting.**

- Work Sessions are required to help the Planning Commissioners and the BoCC to understand, comment, question and give direction on the draft SMP.
    - **DOCUMENTED WORK SESSIONS, LIKE TONIGHT'S, DO NOT MEET THE DEFINITION**: Work sessions on the SMP have been nothing more than an inadequate power point made by the Planning Department. This meets no definition of a "work session" that we have ever been a part of or seen. The impression we get is that the Planning Commissioners are expected to just rubber stamp whatever the Planning Department presents. Work sessions should deal with the major issues/comments made by stakeholders so the Commissioners can give direction.

- The BoCC has instructed the Planning Department to draft the new SMP with the least restrictive criteria allowed by Ecology. **The current draft does not meet this direction**. The designations of Rural Conservancy and Natural represents 95.1% of the shorelines in Thurston County and are not supposed to be developed. Shoreline Residential represents only 3.5%. Why is Shoreline Residential expected to carry the disproportionately high burden for shoreline restoration?

- **PEOPLE NEED TO BE ABLE TO CONSTRUCT A 600 SQ FT ADDITION TO THE SIDE OF THEIR EXISTING HOME.** In the current SMP people can add 500 sq ft to the side of their home within the buffer without a Substantial Development permit. The current draft only allows this landward of the home. There are many reasons to expand laterally. Perhaps to accommodate stairways to the second floor, an elevator needed for the aging homeowner, or just that your living space needs to be expanded to accommodate your family members growing in size and the only way is laterally. This should not require a Substantial Development permit and mitigation.
- **BUFFER/SETBACK NEEDS TO BE MODIFIED:** The current SMP has a 50 ft buffer. The draft has a 50 ft buffer plus a 15 ft setback. This needs to be changed to a total of 50 ft buffer/setback. So, either a 35 ft buffer with a 15 ft setback or a 50 ft buffer with no setback.
- **LEGALLY CONSTRUCTED RESIDENCES THAT ARE NOW IN THE BUFFER SHOULD BE DECLARED "LEGALLY CONFORMING" OR "CONFORMING" NOT "NONCONFORMING":** The Planning Dept says that they need to use the term "Nonconforming" for consistency with other regulations/codes. This is not correct. There are many instances where you are conforming in one regulation/code and nonconforming in another. Nonconforming is not just a word. It has consequences.
- **MITIGATION CREDIT SHOULD BE GIVEN FOR PRIOR IMPROVEMENTS TO SHORELINE ECOLOGICAL FUNCTION:** If a homeowner voluntarily takes action to improve the shoreline function without being required through mitigation, this should count towards any future required mitigation. Without this provision the homeowner is motivated to wait to take this action until they have to.

There are many more areas that need to be discussed in order to get a workable document that doesn't overly restrict and regulate Shoreline Residential which is the preferred use.

Respectfully submitted,

John Woodford, Chairman

Doug Karman, Vice-Chairman

Submitted 10/17

October 17, 2018

RE: Draft Update of Thurston County Shoreline Master Program
By: Meredith Rafferty, resident and homeowner
Comments to Planning Commission regarding "Shorelines of Statewide Significance"

On the State Department of Ecology's website (see the long link in blue below), it says the Puget Sound shoreline areas for statewide significance are defined by state law as ***waterward and are not the shorelands*** as excerpted below*:*

"Shorelines of statewide significance" (per Dept. of Ecology website)

"The state **Shoreline Management Act (SMA)** defines a special category of shorelines where statewide interests take priority and specific uses are preferred. These "shorelines of statewide significance" include certain marine areas and larger streams, rivers, and lakes in Washington.

"Marine areas"
There are three different types of marine areas considered to be shorelines of statewide significance:

- **Pacific Ocean coastline,** from Cape Disappointment to Cape Flattery — including all the harbors, bays, estuaries, and inlets seaward from the ordinary high water mark and all associated shorelands.
- **Specific estuarine areas,** including Birch Bay, Hood Canal, Nisqually River delta, Padilla Bay and Skagit Bay situated between the ordinary high water mark and the extreme low tide line and associated shorelands.
- All other areas of **Puget Sound, Strait of Juan de Fuca,** and **adjacent saltwater areas** lying waterward of the extreme low tide, excluding adjacent tidelands and shorelands."

https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Management-Act-SMA/Shoreline-Management-Act-jurisdiction/Shorelines-of-statewide-significance

However, the County's draft SMP continues to expand the definition by the way item E. is worded in its definition (pg. 17):

(per draft Thurston County SMP, pg. 19)

"19.150.740 Shorelines of Statewide Significance:
shorelines in Thurston County designated as shorelines of statewide significance are:

A. Nisqually Delta – from DeWolf Bight to Tatsolo Point, between the ordinary high water mark and the line of extreme low tide, together with shorelands associated therewith per RCW 90.58.030(2)(f)(vi).
B. Puget Sound – seaward from the line of extreme low tide.
C. Lakes, whether natural or artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark.
D. Natural rivers or segments thereof downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more.
E. Shorelands and wetlands associated with A through D above"

Three-minute comment provided by Meredith Rafferty on October 17, 2018:

Planning Commissioners, thank you for being our citizen representatives.
My name is Meredith Rafferty, my husband and I are home owners on salt water property in unincorporated Thurston County.
I have been a homeowner in Thurston County for some 50 years; you could say that I grew up in my home ownership with the Shoreline Management Act and the Growth Management Act.
I am supportive of these Acts and stay involved so I can figure out what's expected of me.
Now, for the first time in some 30 years, the SMP is open for planning the next decades of shoreline use.
From the beginning of reviewing this draft update, you and residents have been asking to focus on what's needed and what the problems are and therefore come up with options on what to do and what to correct.
So I draw your attention to a dramatic change in oversight presented in this draft. And I respectfully request asking staff for their rationale.

The change is on page 19 in the definition of "Statewide Significance". This change would move consideration of what will be allowed on upland salt water properties from local to statewide priorities.
Moreover, Thurston County will be unilaterally taking this stance in opposition to a state law which expressly states that the State Legislature is the only entity authorized to designate the coverage of this definition.
Neighboring counties and cities on the same Puget Sound have not made this change.
What is going on?
This issue has repeatedly been brought to the attention of staff in filed correspondence.
The key words are "shorelands" and exclusions for Puget Sound tidelands and shorelands.

I am providing you a document with the specifics of this definition change and a copy of prior correspondence submitted as comment.

Thurston County Shoreline Stakeholders Coalition
4108 Kyro Rd SE. Lacey, WA 98503

January 31, 2018

TO: Thurston County Planning Commissioners

Thru: Brad Murphy
Senior Planner, Long Range Planning
Thurston County Resource Stewardship

From: John Woodford, Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Shoreline Master Program Update – Shorelines of Statewide Significance

We draw your attention to Section 19.300.100 of the draft Shoreline Master Program update. The proposed wording broadens the definition of "Shorelines of Statewide Significance" to include all uplands and tidelands of Puget Sound. This is in conflict with state law of RCW 90.58.310 which states "Additional shorelines of the state shall be designated shorelines of statewide significance only by affirmative action of the legislature."

The draft wording then continues to apply the more restrictive, priority-ordered goals of the Shorelines of Statewide Significance to all shorelines throughout the County.

This draft wording reads as an attempt to increase shoreline regulations throughout the County by subjecting all properties to the more stringent requirements of the Shorelines of Statewide Significance, over and beyond the County's current regulations. This proposed expansion of regulation would be unilateral; it is not undertaken by any of our neighboring counties.

On November 14, 2017, Senior Planner Brad Murphy reported to the Thurston County Board of Commissioners that "We are following the Board's direction wanting to move forward as quickly as possible with the least restrictive possible shoreline regulations..." This regulatory expansion contradicts that purpose. We request that the draft's definition of Shorelines of Statewide Significance be corrected to the precise wording assigned in the state law.

We also request that the format of the draft section's " County-wide Policies" be returned to those of the current SMP (i.e., 1990 version) and continued input and consideration be given to the policies.

Thank you for your consideration.

John Woodford, Chairman
Thurston County Shoreline Stakeholder Coalition
4108 Kyro Rd SE, Lacey WA 98503

Written Comment received 11/7/18 Mtg

7600 Redstart Dr. SE
Olympia, WA 98513

November 5, 2018

Mr. Brad Murphy
Senior Planner, Shoreline Master Program (SMP)Review
Thurston County
2000 Lakeridge Dr. SW
Olympia, WA 98502

Re: SMP Review

Dear Mr. Murphy,

The South Sound Sierra Club Group is concerned about the County's trend of converting shorelines to other uses. The SMP guidelines (WAC 173-26-186(8) provide for development standards and use regulations designed to achieve no net loss of shoreline ecological functions. The Thurston County SMP is an important tool for the County to protect our shorelines for fish and wildlife as well as public enjoyment.

The following areas need to be addressed:

Buffers: Shoreline buffers are important management tools which protect and provide benefits to water quality and habitat. **Current standard SMP buffer widths or setbacks should not be modified or reduced.**

Mitigation: Encourage **long-term net gains** in both program planning and project specific designs when conducting mitigation sequencing (avoiding, then minimizing, finally compensating for impacts). Require compensatory mitigation to occur in the same habitat area for gain in the same ecological functions.

Aquaculture: Aquaculture's use of shorelines must be consistent with the regulations of the Shoreline Management Act (SMA) , the Shoreline Master Program and Best Available Science. A water dependent use, aquaculture is polluting our shorelines with plastics and will increase with industry expansion. Industrial aquaculture has taken over many of our coves and inlets, altering the habitat, reducing biodiversity, and posing threats to nearshore habitat for eelgrass and forage fish, threatening salmon and Orca recovery. Aquaculture operations have been allowed to *destroy habitat* when preparing shellfish beds, *endanger native species & wildlife* (starfish, crabs, birds and sea mammals) with plastic netting, and *disrupt the substrate* with high pressured hoses when harvesting (without hydraulic permits!) A 2017 Army Corp of Engineers draft Cumulative Impact Analysis concluded: "Given the magnitude of the impacts in acreage, the importance of eelgrass to the marine ecosystem, and the scale of the aquaculture impacts relative to other stressors, the impacts are considered **significant**."

http://users.neo.registeredsite.com/3/7/5/12218573/assets/2017_NWP48_Draft_Cumulative_Imapct_Analysis.pdf

Aquaculture operations and permits need to comply with the Endangered Species Act, the Shoreline Management Act and both the State and National Environmental Policy Act restrictions.

Limit industrial aquaculture expansion to protect forage fish habitat and salmon/Orca recovery.
Ban hydraulic harvesting practices or require an HPA permit
Limit/phase out the use of marine plastics.

Climate Change: Sea level rise associated with climate change may result in efforts to increase armoring (shoreline modifications and development) which often negatively affects spawning sites of forage fish and shortens buffers. The Puget Sound Partnership has identified a goal to remove more shoreline armoring in Puget Sound than is constructed between 2011 and 2020. **Limit armoring projects.**

On behalf of the South Sound Sierra Club Group, representing over 2400 members, I urge you to incorporate these recommendations when finalizing the Thurston County Shoreline Master Plan.

Respectfully,

Phyllis A Farrell

Phyllis Farrell, Chair,
South Sound Sierra Club Group

cc: Thurston County Commissioners
Thurston County Planning Commission

Thurston County Shoreline Stakeholders Coalition

4108 Kyro Rd SE. Lacey, WA 98503

November 7, 2018

TO: Thurston County Planning Commissioners

From: John Woodford, Chairman
Doug Karman, Vice-Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Draft Update of the Shoreline Master Program (SMP)

As shoreline home owners in unincorporated Thurston County, we continue to have issues with not only the draft SMP but also the process of updating. Following are some of our specific issues:

- The designations of Rural Conservancy and Natural represents 95.1% of the shorelines in Thurston County and are not supposed to be developed. Shoreline Residential represents only 3.5% and it is already over 90% + developed.

    - **Maintaining the Shoreline Residential buffer at 50 ft**, as the Planning Department recommends is needed to insure that 90%+ of the Shoreline Residential housing is not classified as "Non Conforming". The poison bullet is that the Planning Department has added a 15 ft setback from the buffer. So now it is 65 Ft.
        - **We recommend that you instruct the Planning Department to set the total buffer/setback at 50 ft. either 35 ft buffer and 15 ft setback or a 50 ft buffer with no setback.**
        - **We recommend that you instruct the Planning Department to correct their drawings in appendix B to more accurately reflect the requirements without asterisks that state "*building setbacks also apply". What does this mean?**

    - **PEOPLE NEED TO BE ABLE TO CONSTRUCT A 500 SQ FT ADDITION TO THE SIDE OF THEIR EXISTING HOME.** In the current SMP people can add 500 sq ft to the side of their home within the buffer without a Substantial Development permit. The current draft only allows this landward of the home. Very few homes if any are totally within the buffer so the drawing in last month's handout is misleading. There are many reasons to expand laterally. Perhaps to accommodate stairways to the second floor, an elevator needed for the aging homeowner, or just that your living space needs to be expanded a little to accommodate your family members growing in size and the only way is laterally. This should not require a Substantial Development permit and mitigation.
        - **We recommend that you instruct the Planning Department to allow a 500 sq ft addition to the side of a home, within the buffer without needing a Substantial Development permit.**
        - **The 500 sq ft addition to the side and back of the residence should be added to the exclusions listed in**

- **LEGALLY CONSTRUCTED RESIDENCES THAT ARE NOW IN THE BUFFER SHOULD BE DECLARED "LEGALLY CONFORMING" OR "CONFORMING" NOT "NONCONFORMING":** The Planning Dept says that they need to use the term "Nonconforming" for consistency with other regulations/codes. This is not correct and is not required by the Dept of Ecology. There are many instances where you are conforming in one regulation/code and nonconforming in another. Nonconforming is not just a word. It has consequences. If a legally constructed residence is declare non conforming due to the buffer/setback, does the homeowner loose the exemptions for a substantial development permit?
  - **We recommend that you instruct the Planning Department to label all legally constructed structures as Legally Conforming or Conforming.**

- **Chapter 19.500.100.A.2:** If a structure of more than 35 ft in height is proposed and no views or views of less than a substantial number of residences are unaffected will the permit be approved?
- **Chapter 19.500.100.C.3. b**: This exemption needs to include "Remodel" and "Reconstruction" within the original footprint. What happens within the footprint of the home should be governed by the Building Code not the SMP.
- **Chapter 19.500.100.C.3.c:** This paragraph needs to be expanded to include protection of the shoreline. If the waves wash away the shoreline the result is a significant loss of shoreline function which would not meet the "No net loss of shoreline function" required of the SMP.
- **Chapter 19.500.100.C.3.g**: This paragraph contains the 35 ft height reference. See comment above for A.2
- **Chapter 10.500.100.C.3.h.i:** The $10,000 fair market value needs to be modified. The Permit cost for a normal 48 ft long pier/dock on a lake is $10,000. Permits/fees need to be excluded from the $10,000 limit.
- **19.500.D:** This paragraph criminalizes the general public who lives on the shorelines. While this is allowed by State Law, it should be a last resort. Mason County has a much better way of handling this requirement.
- **On the Draft Timeline to be presented to the Planning Commissioners tonight:**
  - **Will Shoreline Stakeholders be part of the "Guest Speakers" agenda on Dec. 5th?**
  - **Will Shoreline Stakeholders be part of the "Small Group" meetings sheduled for Dec. 12 & Jan 4th?**
  - **Will the redline version delivered for the Jan. 16th mtg be a complete document? All chapters and appendices?**

There are many more areas that need to be discussed in order to get a workable document that doesn't overly restrict and regulate Shoreline Residential which is the preferred use.

Respectfully submitted,

John Woodford, Chairman

Doug Karman, Vice-Chairman

Geoduck farm: The point source of plastic pollution found on Tolmie State Park shorelines.
Tolmie State Park
Google earth

Thurston County Planning Commission
November 7, 2018
Comments from Patrick Townsend

Re: Army Corps of Engineers 2017 draft Cumulative Impact Analysis regarding adoption of NWP 48 permit for industrial shellfish aquaculture.

Conclusion: Significant cumulative impacts.

We know today that there **are** Cumulative Impacts expected from the industrial scale aquaculture that we see happening around us. This is not, of course, what the Corps told the public when it adopted the aquaculture permit, Nation Wide Permit or NWP 48. It is also not what the industry often claims in their promotional materials or legislative road shows, or in their written comments on projects at the local level.

However, we now know that the Corps actually did - back in 2017 - a draft Cumulative Impact Analysis. That analysis concluded that there **would be significant cumulative impacts** from the adoption of NWP 48 in 2017.

For reasons that we can only speculate about, the Corps has never published or finalized this analysis. Nor did - or do - they acknowledge the well articulated and scientifically based conclusions in the current NWP 48 permitting. We only recently found this document, buried deep in an obscure file in the Administrative Record that was filed with the Court, in a suit pending against the Corps for improperly adopting and administering NWP 48.

This draft Cumulative Impact Analysis (CIA) is an astonishingly frank assessment of what the science shows will likely happen if this industrial scale aquaculture is allowed to continue. For example, with regard to Eelgrass, a critical habitat for Salmon and other listed fish, the Corps concluded:

> "The proposed action **is likely** to adversely affect designated critical habitat for several species listed under the ESA including Puget Sound Chinook salmon, Hood Canal summer run chum salmon, and Puget Sound steelhead."[1]

The Corps went on to conclude that:

> "Given the magnitude of the impacts in acreage, the importance of eelgrass to the marine ecosystem, and the scale of the aquaculture impacts relative to other stressors, the impacts **are considered significant.**"[2]

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[1] Draft CIA p.101, emphasis added.
[2] Draft CIA p.103, emphasis added.

For those of you who care about State law, the Corps also noted that in their view:

> "The action does threaten a violation of State requirements under the Shoreline Management Act to achieve no net loss of eelgrass and Federal requirements to protect eelgrass imposed under the ESA for aquaculture activities. **The proposed action is not consistent with either of these requirements**."[3]

Similarly, for key forage fish species such as Pacific Sand Lance (some times called Candlefish) and Surf Smelt, on which salmon and Orca rely, the Corps concluded in the analysis that:

> "The conclusion therefore is that significant cumulative effects to surf smelt and sand lance spawning habitat **would occur** due to the proposed action."[4]

And with regard to compliance with State law related to these forage fish, the Corps concluded:

> "The proposed action is inconsistent with State requirements under the SMA to protect forage fish spawning habitat."[5]

We hope that now that this analysis is public, the decision makers at all levels of government will take into account the fact that these industrial scale operations are not the old Mom & Pop oyster shops that folks recall nostalgically. These are industrial scale operations with industrial scale impacts that are going to cumulatively cause significant harm to key resources that all of us depend upon.

We are not saying no aquaculture operations should be allowed, ever. We are simply saying that these operations should be subject to the same restrictions as everyone else. They need to comply with the ESA, the SMA and both the State and National Environmental Policy Act restrictions.

All of the permitting agencies involved need to take a hard look at what they are doing. They cannot and should not continue to site these industrial scale operations where they can - and as the Corps draft analysis shows likely will - have significant unacceptable cumulative affects. The law precludes that, and common sense should also preclude that.

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[3] Draft CIA p.101, emphasis added.

[4] Draft CIA p.112, emphasis added.

[5] Draft CIA p.111.

Townsend Comment materials

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1. Introduction

The U.S. Army Corps of Engineers (Corps) issues nationwide permits (NWPs) to authorize activities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 that will result in no more than minimal individual and cumulative adverse environmental effects. There are currently 50 NWPs. These NWPs were published in the February 21, 2012, issue of the Federal Register (77 FR 10184) and expire on March 18, 2017.

The Corps conducts a NEPA and 404(b)(1) analysis for each NWP at a national level and produces a decision document summarizing the results. The decision document for NWP 48 concludes that there will be no individual or cumulative adverse impacts and that regional analysis will be conducted to ensure impacts will be minimal. Identified adverse impacts will be minimized through the use of regional conditions if necessary.

The decision document also indicates that:

"An important aspect for the NWPs is the emphasis on regional conditions to address differences in aquatic resource functions, services, and values across the nation. All Corps divisions and districts are expected to add regional conditions to the NWPs to enhance protection of the aquatic environment and address local concerns. Division engineers can also revoke an NWP if the use of that NWP results in more than minimal individual and cumulative adverse environmental effects, especially in high value or rare wetlands and other waters. When an NWP is issued or reissued by the Corps, division engineers issue supplemental decision documents that evaluate potential impacts of the NWP at a regional level, and include regional cumulative effects assessments.

Corps divisions and districts also monitor and analyze the cumulative adverse effects of the NWPs, and if warranted, further restrict or prohibit the use of the NWPs to ensure that the NWPs do not authorize activities that result in more than minimal individual and cumulative adverse environmental effects. To the extent practicable, division and district engineers will use regulatory automated information systems and institutional knowledge about the typical adverse effects of activities authorized by NWPs, as well as substantive public comments, to assess the individual and cumulative adverse effects on the aquatic environment resulting from regulated activities."

The purpose of this analysis is to assess the cumulative effects associated with authorizing activities under the 2017 NWP 48 in the state of Washington. The analysis assumes only limited general conditions on work conducted under the permit as described below. The purpose of conducting the analysis in this manner is to determine whether or not additional regional conditions may be necessary to ensure that only minimal cumulative adverse environmental impacts occur consistent with requirements of the permit and the national Corps decision document referenced above. The cumulative effects analysis is structured consistent with NEPA and 404(b)(1) requirements per Corps regulations. The CEQ (40 C.F.R. § 1508.7) provides the following definition of cumulative effects: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." The CEQ guidance document "Considering Cumulative Effects Under the National Environmental Policy Act" provides the basis for the structure and preparation of the analysis (CEQ 1997).

2. Proposed Action

2.1. Nationwide permit 48

The proposed action is the administration and implementation of the 2017 version NWP 48 in Washington State. The time period for the action is March 19, 2017 until March 18, 2022 which is the time period 2017 NWP 48 will be in effect.

The text of 2017 NWP 48 is as follows:

Commercial Shellfish Aquaculture Activities. Discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States necessary for new and continuing commercial shellfish aquaculture operations in authorized project areas. For the purposes of this NWP, the project area is the area in which the operator is authorized to conduct commercial shellfish aquaculture activities, as identified through a lease or permit issued by an appropriate state or local government agency, a treaty, or any easement, lease, deed, contract, or other legally binding agreement that establishes an enforceable property interest for the operator. A "new commercial shellfish aquaculture operation" is an operation in a project area where commercial shellfish aquaculture activities have not been conducted during the past 100 years.

This NWP authorizes the installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the United States. This NWP also authorizes discharges of dredged or fill material into waters of the United States necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities. Rafts and other floating structures must be securely anchored and clearly marked.

This NWP does not authorize:

(a) The cultivation of a nonindigenous species unless that species has been previously cultivated in the waterbody;

(b) The cultivation of an aquatic nuisance species as defined in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990;

(c) Attendant features such as docks, piers, boat ramps, stockpiles, or staging areas, or the deposition of shell material back into waters of the United States as waste; or

(d) Activities that directly affect more than 1/2-acre of submerged aquatic vegetation beds in project areas that have not been used for commercial shellfish aquaculture activities during the past 100 years.

Notification: The permittee must submit a pre-construction notification to the district engineer if: (1) the activity will include a species that has never been cultivated in the waterbody; or (2) the activity occurs in a project area that has not been used for commercial shellfish aquaculture activities during the past 100 years. If the operator will be conducting commercial shellfish aquaculture activities in multiple contiguous project areas, he or she can either submit one PCN for those contiguous project areas or submit a separate PCN for each project area. (See general condition 32.)

In addition to the information required by paragraph (b) of general condition 32, the preconstruction notification must also include the following information: (1) a map showing the boundaries of the project area(s), with latitude and longitude coordinates for each corner of each project area; (2) the name(s) of the species that will be cultivated during the period this NWP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area(s) (a detailed survey is not required). No more than one pre-construction notification per project area or group of contiguous project areas should be submitted for the commercial shellfish operation during the effective period of this NWP. The pre-construction notification should describe all species and culture activities the operator expects to undertake in the project area or group of contiguous project areas during the effective period of this NWP. If an operator intends to undertake unanticipated changes to the commercial shellfish aquaculture operation during the effective period of this NWP, and those changes require Department of the Army authorization, the operator must contact the district engineer to request a modification of the NWP verification; a new pre-construction notification does not need to be submitted. (Authorities: Sections 10 and 404)

Note 1: The permittee should notify the applicable U.S. Coast Guard office regarding the project.

Note 2: To prevent introduction of aquatic nuisance species, no material that has been taken from a different waterbody may be reused in the current project area, unless it has been treated in accordance with the applicable regional aquatic nuisance species management plan.

Note 3: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines "aquatic nuisance species" as "a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters."

2.2. General Conditions

To qualify for NWP authorization, the prospective permittee must comply with 32 general conditions, as applicable, in addition to any regional or case specific conditions imposed by the division engineer or district engineer.

The general conditions allow for discretion with respect to their applicability (e.g., 'to the maximum extent practicable') in most cases or defer to other agencies for additional requirements. In practice it is uncertain whether any of the general conditions would minimize effects of the action. Historically, these conditions have not been invoked to restrict activities under NWP 48. In all cases but one, the cumulative effects analysis assumes no additional requirements placed on the work beyond that described in the action description above. This results in a worst-case environmental effects analysis.

General condition 11 is the one exception whereby it is assumed that all heavy equipment will be transported to work sites by vessel at high tide so as not to impact aquatic areas through the creation of roads in the mudflat or to otherwise disturb the nearshore habitat beyond the project area.

2.3. Regional Conditions

For the purpose of this analysis, it is assumed no regional conditions will be applied to the work conducted under the 2017 NWP 48.

2.4. Description of Work and Activities

This section describes the range of work and activities that are included within the 2017 NWP 48. The information was gathered from multiple sources including PCSGA (2011; 2013a; 2013b), WDNR (2008; 2013), Corps (2014a) and from knowledge of the professional Corps staff that have been involved in regulating shellfish activities. There is wide variation in the manner in which individual shellfish activities are conducted and the equipment/materials used. The descriptions below are considered generally representative of the individual activities but variability inherent within individual activities is not necessarily captured. The work and activities are summarized in Section 2.4.6. Section 2.5.1 describes the acreage of the work and activities by geographic region. These two components (general description and acreage) together describe the work that would be authorized by the Corps under the proposed action.

2.4.1. Mussel Activities

There are two species of mussels cultured in Washington State marine waters. These include *Mytilus trossulus*, commonly known as the blue mussel and *Mytilus galloprovincialis*, commonly known as the Mediterranean or Gallo mussel. The blue mussel is native to Washington State. The mussel activities described below may be performed at any time of day and at any time of year. They are not dependent on season or tides.

2.4.1.1. Rafts, Floats, other Structures, and Surface Longlines

Mussels are typically grown suspended from rafts or surface longlines anchored in subtidal waters, but they can be grown from any structure (e.g., pier) where there is adequate water depth at low tide. A raft is considered an open-framed floating structure with cross beams. Raft platforms are constructed of lumber, aluminum, galvanized steel, and plywood with some form of flotation. Lines with attached mussels are suspended from the raft. There may be multiple rafts for one activity footprint (Figure 2-1).

A float is a floating platform structure, typically rectangular, that is either anchored or attached to a pier or dock. Floats are used as working platforms, storage or for mooring boats. A float can be towed into place for anchoring.

Other structures the Corps would permit under the proposed action are discharge and intake pipes associated with upland wet-storage tanks. These tanks are placed in upland areas and used for holding shellfish species for some period of time. Water is circulated through the tanks via pipes that extend from the tanks to the nearby marine waters. There would typically be pipes for both intake and discharge. The activity must be compliant with Section 402 of the Clean Water Act (National Pollutant Discharge Elimination System (NPDES)) and have an NPDES permit, if necessary, before the Corps would issue a permit or verification under the proposed action. The upland wet-storage tanks themselves and their associated discharge are not within the regulatory jurisdiction of the Corps so would not be permitted under the proposed action.

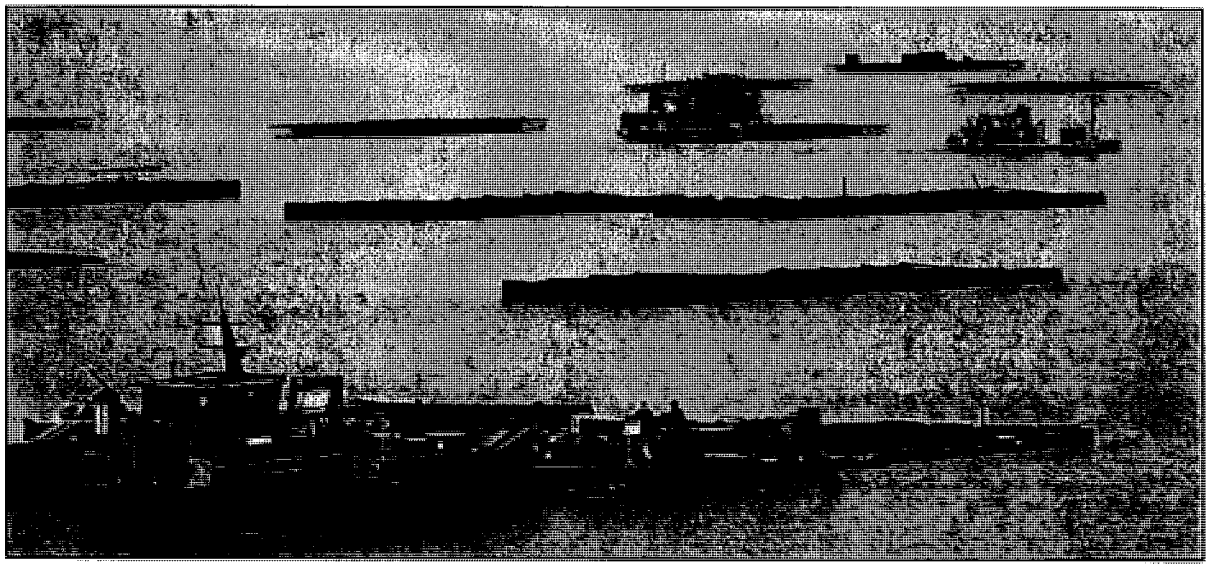

Figure 2-1. Penn Cove Shellfish mussel rafts and harvest barge (Everett Herald 2013)

Surface or floating longlines are typically made of heavy polypropylene or nylon rope suspended by floats or buoys or they could be suspended from a structure such as a pier. They can consist of a single buoy and rope with attached cultured species extending below the buoy and anchored to the substrate. They can consist of multiple buoys connected by rope extending horizontally across the water surface for hundreds of feet. Rope with cultured species would be hung at intervals along this horizontal line. Large anchors to the substrate may also be placed at intervals along the line and at each end.

Seeding and Planting

Naturally-spawned mussel seed are set on lines or metal screen frames in net cages that are suspended in the water during the late spring spawning season. Hatchery seed, when used, is already set on lines or screen frames at the nursery, and then transported to the mussel farm for planting. Once the seed reaches 6 to 12 millimeters long, which can take several months in winter or several weeks in summer, it is scraped from the frames or stripped from the lines and sluiced into polyethylene net sausage-like tubes, called "socks," each with a strand of line threaded down the length of the sock for strength. A mussel disc may be inserted into the socks at intervals to support the weight of the mussels growing above it. Concrete weights with stainless steel wire hooks are hung on the bottom end of each mussel sock for tension. The socks are then attached to the raft or surface longline (Figure 2-2).

Maintenance and Grow-out

When the mussels reach about 1 inch in length, the weights are often removed from the socks and saved for reuse. Predator exclusion nets are hung around the perimeter of the rafts. Nets may be in place all year or may be used seasonally. If the predator exclusion nets become excessively fouled (e.g., with barnacles, algae, other aquatic vegetation or biological growth), they may be cleaned in place by hand or by mechanical methods. They may also be removed and then cleaned. Fouling organisms may also be removed from the raft structure itself.

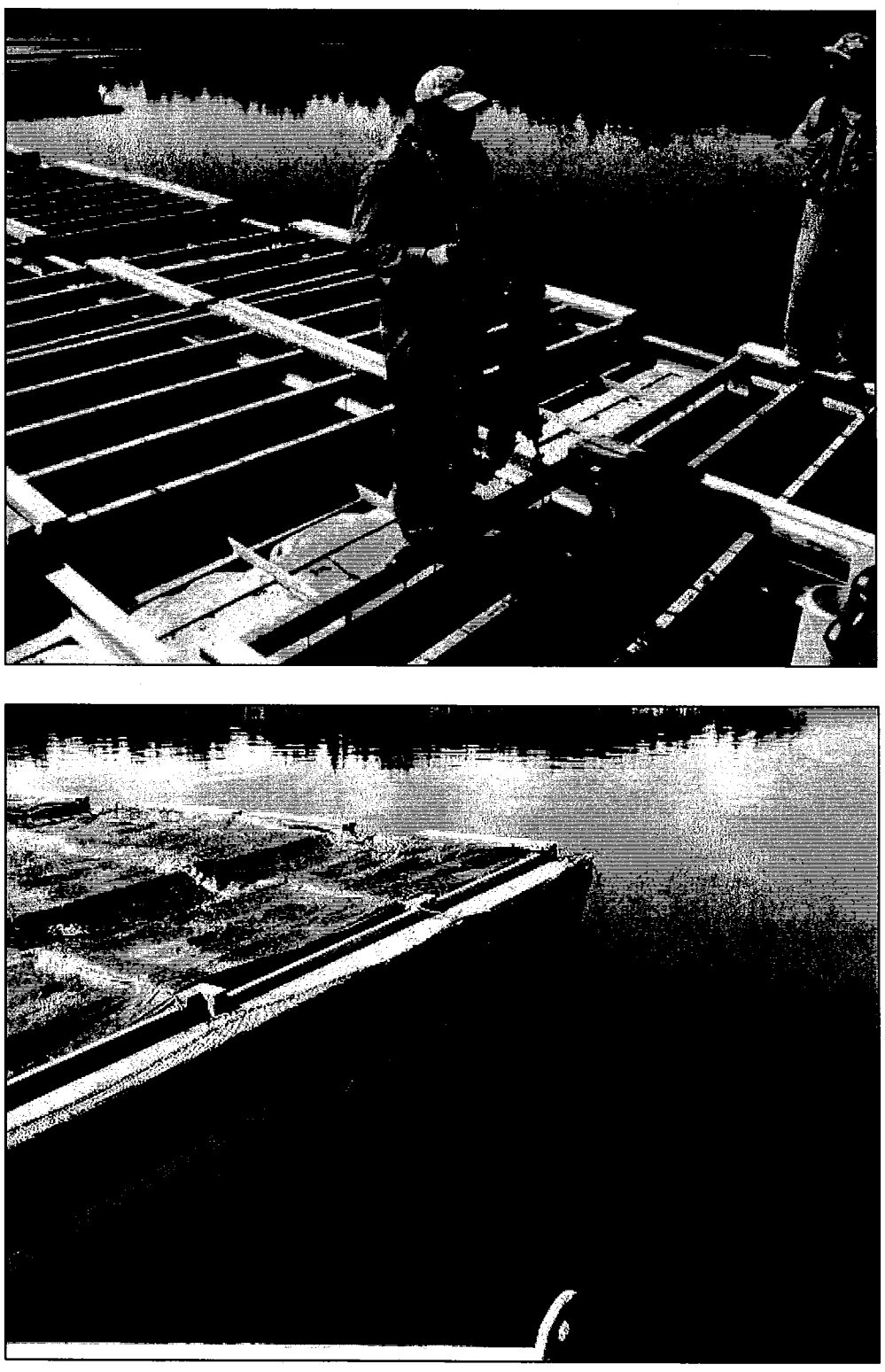

Figure 2-2. Commercial mussel raft in south Puget Sound (Corps site visit 2013)

Harvest

When cultured mussels reach market size, about 12 to14 months of age, socks or lines of mussels are removed from the longline or raft for cleaning and grading. Biofouling is typically removed from mussels during harvest as the mussels are cleaned. The waste material is commonly returned to the water or put into a shell pile on shore. The mussels are stripped from the socks and bulk-bagged and tagged for transport to shore. Mussels that fall from the lines onto the predator nets or the bottom substrate may be harvested by hand or by suction dredge. Weights are reclaimed for re-use, and used socking and lines are recycled or disposed of at an appropriate waste facility. Harvesting occurs year round as mussels mature.

2.4.1.2. Mussel Bottom Culture

Mussel bottom culture entails growing mussels directly on the bottom substrate or in/on a container that is supported on the substrate. This may include growing mussels in bags or on trays supported on the substrate as described in the following sections for oyster and clams. Bottom culture could entail harvesting natural set mussels on stakes placed into the substrate or recruited to the substrate directly. The culture and harvest activities are similar to oyster stake and rack and bag culture methods. The reader is referred to the oyster stake and rack and bag sections for more detail on how this activity would be conducted.

2.4.2. Oyster Activities

Several species of oysters are cultured on the West Coast including the Pacific oyster (*Crassostrea gigas*), Kumamoto oyster (*Crassostrea sikamea*), Eastern oyster (also known as American oyster) (*Crassostrea virginica*), European flat oyster (*Ostrea edulis*), and the Olympia oyster (*Ostrea conchaphila*). Only the Olympia oyster is native to Washington State.

Oyster ground is often classified or referred to by its use, such as seed ground, grow-out ground, or fattening ground. There are four general strategies for oyster culture which depend on target markets, beach characteristics, and environmental conditions. These strategies include stake culture, rack-and-bag culture, bottom culture, and longline culture.

Many oyster activities are performed by workers on foot during low tides that expose the culture bed. The lowest tides occur for a period of several days each lunar month (29 days). During these low tides, workers may be present on the bed for 3 to 6 hours. In this document, work performed during these monthly low tides is described as occurring "during low tide." Work can occur at any time of the year; although, traditionally, December through January has been a strong market for commercially harvested oysters. Oysters are typically harvested between 18 months and 4 years of age (Corps 2014a).

Oyster activities may also be performed at high tides or in the subtidal zone. These work activities would not be dependent on tides and could occur at any time of the year. Harvest activities may occur at any time.

The oyster activities discussed below all generally use oyster cultch as a basis for the culture. Oyster cultch is oyster shell with attached oyster seed (or spat). Cultch is prepared by bundling washed and aged Pacific oyster shells ("mother shells") in plastic mesh bags which are then placed in the intertidal zone prior to spawning season. Up to thousands of cultch bags may be required for a single oyster

operation. Naturalized seed then collects on the bags of shell which creates the oyster cultch. Stakes with attached shell or 'hummocks' of shell placed in intertidal areas may also be used to collect naturalized seed. Alternatively, seeding of the mother shells may occur in an upland hatchery. The cultch bags remain in the intertidal zone, either loose or on pallets, until the seed is large enough or "hard" enough (i.e., firmly cemented onto the mother shell and able to resist predation and desiccation) to withstand being moved onto the culture beds (Figure 2-3).

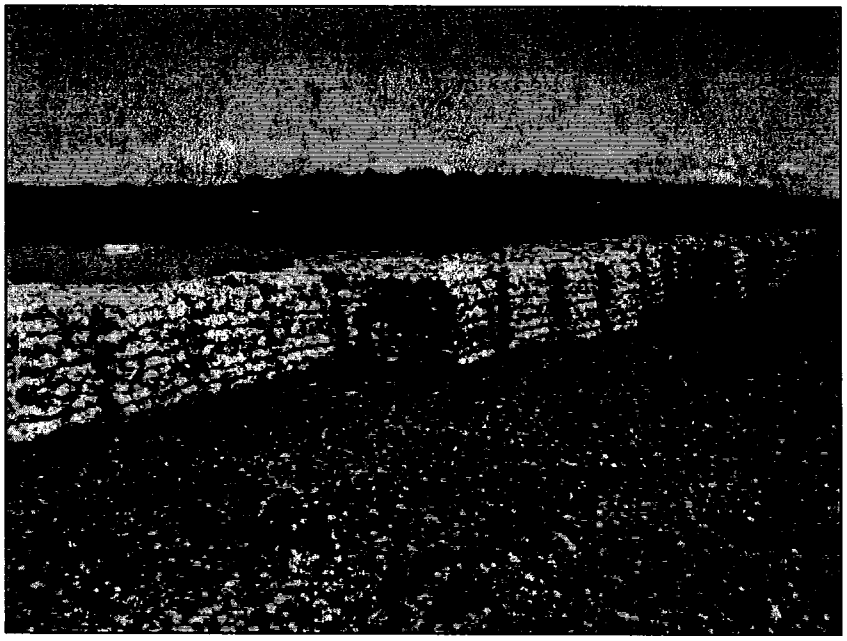

Figure 2-3. Oyster cultch shell with spat stacked on pallets (Corps site visit 2013)

2.4.2.1. Rafts, Floats, FLUPSYs, and other Structures

Oyster activities do not use structures to the same extent as mussel activities. Rafts/floats may be used as work platforms while oyster activities are occurring at a site. These rafts/floats may be anchored to the substrate or attached to a vessel. Rafts and FLUPSY floats may also be used to grow-out seed. A FLUPSY is a type of float structure specifically used for growing out seed to a larger size (Figure 2-4). Because it requires a power connection, FLUPSYs may be placed in the intertidal zone adjacent to power sources, such as attached to a pier. The floating structure continuously draws seawater through the system. Juvenile shellfish, one to two millimeters in length, are transported to a FLUPSY from a shellfish hatchery. The seed is placed in bins with screened bottoms that are lowered into openings in a floating frame and suspended in the seawater. Several bins are placed in a row on either side of a central enclosed channel that ends at a paddlewheel or pump. The wheel or pump draws water out of the central channel creating an inflow of seawater through the bottom of the seed bins, continuously feeding the juvenile shellfish. The outflow from the bins is through a dropped section on one side of the bin facing the central channel. Typically, the FLUPSY platform is equipped with overhead hoists so the bins can be cleaned and moved. Once seed have reached a suitable size, they are removed from the FLUPSY and transplanted to a grow-out site

Trays or bins elevated above the substrate may be used for additional seed grow-out or nursery seed boosting. Trays or bins are affixed to racks set on the substrate. Racks have typically been made of

rebar, angle iron, and in rare cases, wood and or plywood. Trays are typically made of plastic. Racks may be deployed for a few months or longer. There may also be use of what are termed "stackable nester trays" for boosting seed. Tidal depths for elevated trays on racks vary from a +3 feet to -15 feet Mean Lower Low Water. Trays or bins may also be placed directly on the substrate (PCSGA 2013a).

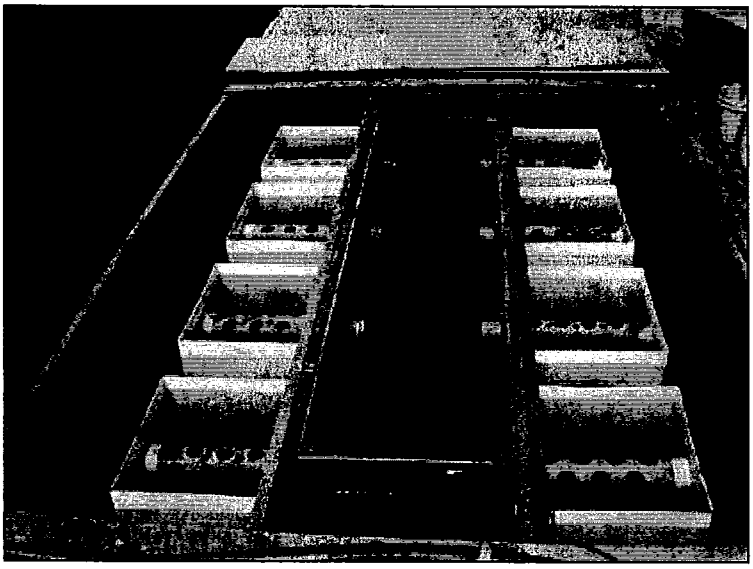

Figure 2-4. A FLUPSY (Fisher Island Oysters 2007 in PCSGA 2011)

Upland wet-storage tanks, as described above for mussel activities, could also be used for oyster activities. The Corps would permit the pipes (for both discharge and intake) associated with these tanks under the proposed action.

2.4.2.2. Oyster Floating Culture

Oyster floating culture occurs using lantern nets, bags, trays, cages, or vertical ropes or wires suspended from surface longlines or rafts similar to that described above for mussels. Floating culture occurs in the subtidal zone. Surface longlines are heavy lines suspended by floats or buoys attached at intervals along the lines, anchored in place at each end. Lantern nets, adopted from Japanese shellfish culture, are stacks of round mesh-covered wire trays enclosed in tough plastic netting. The nets, bags, trays, cages, or vertical ropes or wires are hung from the surface longlines or rafts.

Seeding

Single set oyster seed is placed on the trays or in the bags and suspended in the water. Oyster cultch may be attached directly to the vertical ropes or wires.

Maintenance and Grow-out

Single oysters are regularly sorted and graded throughout the growth cycle. Every three or four months trays are pulled, the stacks taken apart, and oysters are put through a hand or mechanical grading process. The trays are then restocked, stacks rebuilt, de-fouled by removing species such as barnacles, algae and other aquatic vegetation, and returned to the water. Oysters grown directly on vertical lines are in clusters and receive little attention between seeding and harvesting.

Harvest

A vessel equipped with davits and winches works along the lines, and the trays, nets or bags are detached from the line one by one and lifted into the vessel. The gear is typically washed as it is pulled aboard. Oysters are removed and placed into tubs where they may be cleaned and sorted.

Oysters grown using floating culture may be transplanted to an intertidal bed for two to four weeks to "harden". Hardening extends the shelf-life of floating cultured oysters by literally hardening the shell making it less prone to chipping, breakage, and mortality during transport and conditioning them to close their shells tightly when out of the water to retain body fluids. Oysters are re-harvested from the transplanted areas using bottom culture harvest methods. Alternatively, oysters grown by floating culture may be hung from docks at a tidal elevation that results in hardening them.

2.4.2.3. Oyster Bottom Culture

Bottom culture entails growing oysters directly on the substrate in intertidal or shallow subtidal areas (Figure 2-5).

Seeding and Planting

Prior to planting, oyster beds are prepared by removing debris such as driftwood, rocks, and predators (e.g., starfish, oyster drills) by hand or mechanically by dragging a chain or net bag. Any oysters that remain on site from the previous growing cycle may be removed or thinned. In some areas the substrate may occasionally be enhanced with crushed oyster shells often mixed with washed gravel to harden the ground (see discussion of graveling in Section 2.4.3).

Seeding occurs by spraying oyster cultch from the deck of a barge or casting it by hand. In some cases, farms rely solely on the natural set of oyster seed. Oyster hummocks may be created by mounds of oyster shell which provide a substrate more conducive to attracting natural seed (Figure 2-5).

Maintenance and Grow-out

Oysters may be transplanted from one site to another at some point during grow-out. For example, oysters may be moved from an initial growing area to "fattening" grounds with higher levels of nutrients allowing the oysters to grow more rapidly. Oysters may be removed for transplant either by hand or by dredge.

Oysters may sink into the mud in areas where the substrate is soft. When this happens, the oysters are harrowed to pull them up out of the mud. The harrow is a skidder with many tines, towed along the substrate by a boat. The harrow penetrates the substrate by a few inches, breaking up the oyster clusters, and moves the oysters back to the surface. This method is also referred to as "dragging". Dragging is typically performed during the second or third year of growth. Oyster dredge-harvest vessels are used for dragging by substituting the dredge baskets with drag tools which they hang on the outrigger cables. About five acres can typically be harrowed in one day (Corps 2014a).

Harvest

Harvest typically occurs either by hand during low tide or by dredge. During hand harvest, workers use hand tools or hand-pick oysters and place them into various sized containers placed on the bed (Figure 2-6). Larger containers may be equipped with ropes and buoys that can be lifted with a boom crane

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onto the deck of a barge at high tide. Smaller containers are sometimes placed or dumped on decks of scows for retrieval at high tide or are carried off the beach at low tide.

Mechanical or dredge harvest occurs by use of a harvest bag that is lowered from a barge or boat by boom crane or hydraulic winch at high tide and pulled along the bottom to scoop up or 'dredge' the oysters. The dredge bags have a leading edge (blade) consisting of a steel frame with teeth and a steel mesh collection bag attached to the frame. As the dredge bags are towed across the substrate, the oysters are loosened and guided into the bags. The bag is then hoisted onto the boat deck, emptied, and then redeployed. Two dredge bags may be towed simultaneously off each side of the boat. The boats, such as the one shown in Figure 2-7, can haul large volumes that can weigh over twenty tons. Dredge equipment can typically be adjusted so that the correct depth is dredged as tide levels change. A given area may be dredged twice in succession to ensure recovery of the maximum number of oysters (Corps 2014a). Harrowing may occur between the two successive dredge events in order to increase recovery of oysters. Alternatively, the area may be hand harvested at low tide after initial dredging to obtain any remaining oysters.

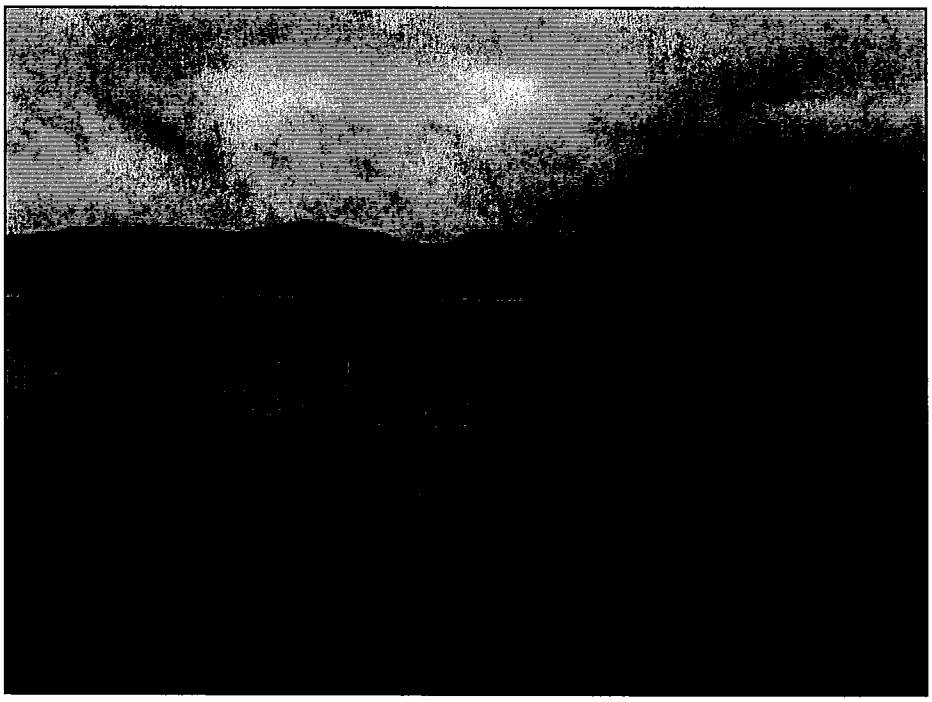

Figure 2-5. Oyster bottom culture (top) and hummocks (bottom), Willapa Bay (UW 2015)

Figure 2-6. Hand harvest of oysters, South Puget Sound (Taylor Shellfish 2013)

One crop of oysters is typically dredged twice before actually being harvested. In some case, oysters may be dredged at about one year and then transplanted to a grow-out bed. In other cases, the oysters may not be transplanted to a finishing (fattening) bed until they are closer to harvest size. Dredging can be accomplished at a rate of one acre harvested every two days depending on the time of year and

density of oysters (Corps 2014a). In summary, an individual oyster bed may commonly be dredged a total of three times over the plant to harvest cycle.

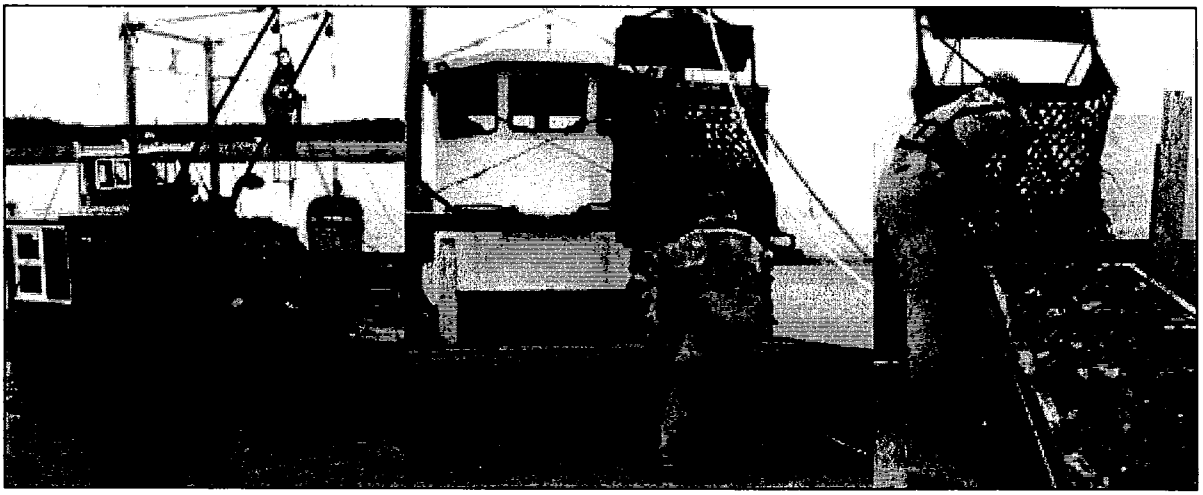

Figure 2-7. Oyster dredge in Willapa Bay (Bay Center Farms 2015)

2.4.2.4. Oyster Longline Culture

In longline culture, oysters are grown in clusters on rope lines suspended off the bottom (typically 3 feet or less) between upright stakes made of PVC or metal pipe. This method keeps the oysters from sinking into soft substrates and minimizes their exposure to predators. Since the activity is supported by structures placed on the substrate, it is considered a ground-based culture method in this document to differentiate it from the floating or surface longlines discussed previously.

Seeding and Planting

Bed preparation activities are similar to those described above under bottom culture with the following additions. Residual oysters ("drop offs") dislodged from the lines during the previous growing cycle are typically harvested using bottom culture methods. The substrate may be leveled either manually or by mechanical means to address accumulations of sediment that have occurred since the previous planting cycle. If the PVC or metal stakes were removed after the previous harvest they are replaced by hand. When bed preparation is complete, long polypropylene or nylon lines with a piece of seeded oyster cultch attached approximately every foot are suspended above the ground between the stakes.

Maintenance and Grow-out

The oysters grow in clusters supported by the longlines over a period of 2 to 4 years (Figure 2-8). The longlines are checked periodically during low tides to ensure that they remain secured to the pipe and that the pipe remains in place. Periodic control of fouling organisms (e.g., mussels, barnacles, algae and other aquatic vegetation) and predator species may take place.

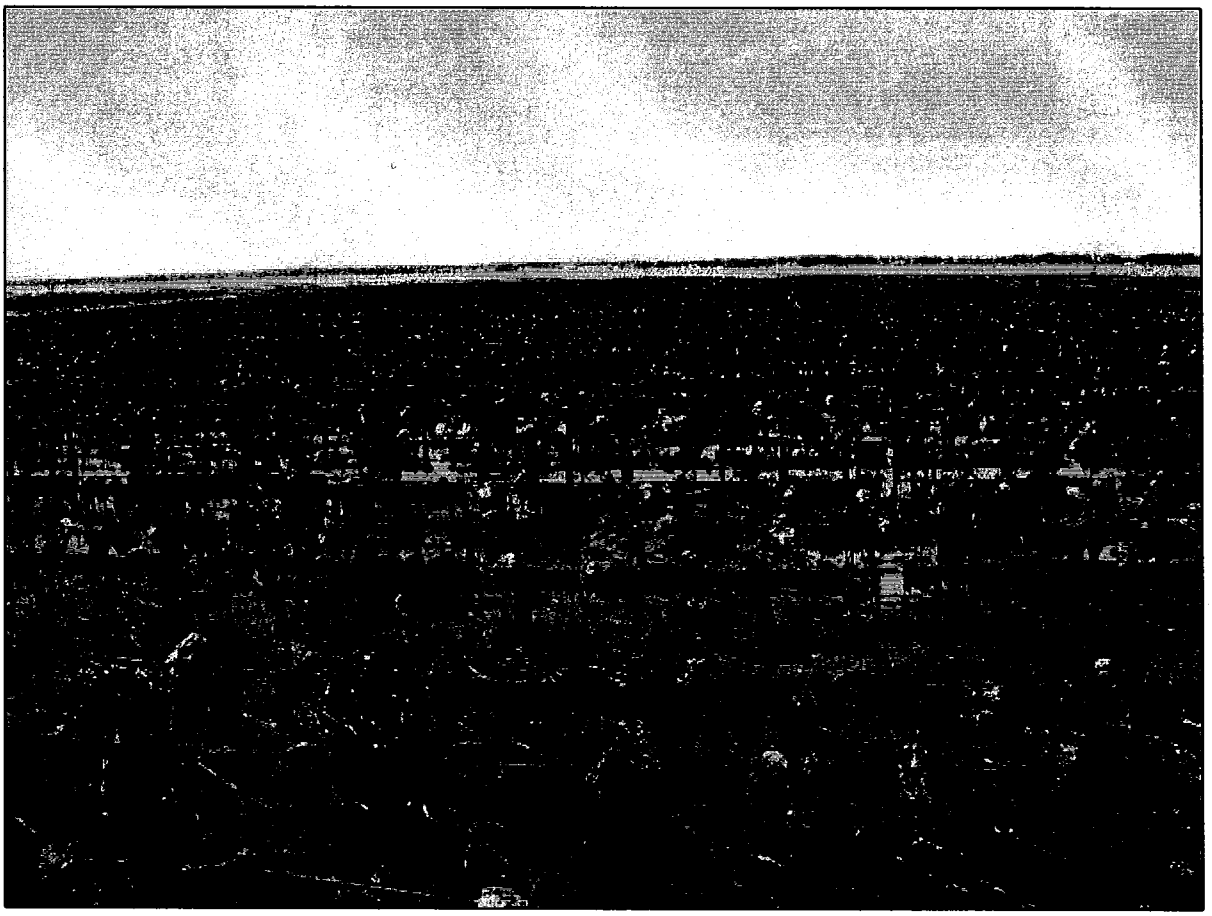

Figure 2-8. Oyster longline culture, Willapa Bay (Corps site visit 2014).

Harvest

Longline oysters may be harvested by hand or by machine. Hand harvest entails cutting oyster clusters off lines by hand at low tide and placing the clusters in harvest tubs equipped with buoys for retrieval by a vessel with a boom crane or hydraulic hoist at a higher tide. The oysters are then barged to shore. Some smaller operations carry the tubs off the beach by hand.

With mechanical harvesting, buoys are attached at intervals along the lines at low tide. During high tide the buoys are attached to a reel mounted on a vessel that pulls the lines off the stakes and reels them onto the boat. The oyster clusters are cut from the lines and then transported to processing plants or market. Some attached biological material (e.g., barnacles, algae) may incidentally fall off the lines during harvest. The oysters are removed from the lines at the processing facility and the line disposed of as waste material. Barnacles and mussels that remain on the lines are removed and may be re-used for their shell material.

About 5,000 to 7,500 sq. ft. (1/8 acre) can be harvested in one day (Corps 2014a). Pipes are often pulled after harvest and the area then harrowed and dredged to collect the remaining oysters. The ground could then be dragged with a chain or net bag to level it and remove debris before replacing stakes for

the next cycle. Alternatively, stakes may remain in place depending on the environmental and substrate conditions.

2.4.2.5. Oyster Stake Culture

Oyster stake culture consists of metal or PVC stakes regularly spaced across the growing site with oysters attached directly to the stakes.

Seeding and Planting

Bed preparation methods are similar to those described above under bottom and longline culture. During low tides, stakes made of hard-surfaced material such as metal or PVC pipe are driven into the ground approximately two feet apart to allow water circulation and easy access at harvest. Stakes are limited to two feet in height to minimize obstruction to boaters.

Stakes can be seeded in upland hatchery setting tanks before being planted in the beds or transported to the site as bare stakes where there is a reliable natural seed set. Bare stakes might be planted during the prior winter to allow barnacles and other organisms to attach to the stakes, increasing the surface area available for setting oyster spat. An alternative method of seeding is to attach one to several pieces of seeded oyster cultch to each stake.

Maintenance and Grow-out

Stakes are left in place throughout a two to four year growing cycle. In areas where natural spawning occurs, multiple year classes of oysters grow on the stakes, with smaller, younger oysters growing on top of older oysters. The area is maintained by periodically checking stakes to ensure they remain upright and by removing fouling organisms (e.g., mussels, barnacles, algae and other aquatic vegetation) and predators. Stakes may be repositioned or replaced as needed. Some oysters may be periodically removed to relieve overcrowding. Oysters that fall from or are knocked off the stakes are harvested periodically by hand. They may be transplanted to firmer ground to improve their condition for harvest at a later time.

Harvest

Oysters are selectively hand harvested during low tide by prying clusters of market-sized oysters from the stakes or removing the stakes entirely. They are placed in containers and either hand carried off the beach or loaded on a boat for transport to shore. Undersized single oysters from the clusters may be transplanted to a special bed for grow-out since they cannot reattach to the stakes. They would then be harvested using bottom culture methods when they reach market size. Market-sized drop-offs that have not settled into the mud are harvested along with those pried from the stakes.

Fouling organisms would typically be dislodged during harvest. Stakes that are removed for reuse would be allowed to dry in an upland location to remove biofouling. Shell material may be stored for reuse.

2.4.2.6. Oyster Rack and/or Bag Culture

Rack and bag or bag culture entails growing oysters within plastic bags or other containers that are placed either directly on the substrate or on racks or lines that suspend the bags above the substrate.

Seeding and Planting

Bed preparation methods are similar to those described above for the other oyster culture methods. During low tide, longlines and PVC/metal stakes may be installed on the bed to secure the bags. Wood or metal racks could also be installed to keep the bags off the ground. Racks with legs may be placed directly on the substrate, or supports may be driven into the substrate. Single-set seed or oyster cultch is placed in reusable plastic net bags closed with plastic ties or galvanized metal rings. Bags are attached to the racks, stakes, or lines using reusable plastic or wire ties.

Figure 2-9. Oyster bag culture, south Puget Sound (NOAA Photo as reported in InsideBainbridge 2015)

In some cases, oysters are cultivated using a tumble bag system (Figure 2-10). Oyster tumbling involves attaching a buoy and securing the bags to a single horizontal stainless steel rod held in place by rebar stakes driven into the substrate. The oyster-seed filled bags pivot on the rod and float with the tide. The ebb and flow of the tide agitates the oysters or "tumbles" them.

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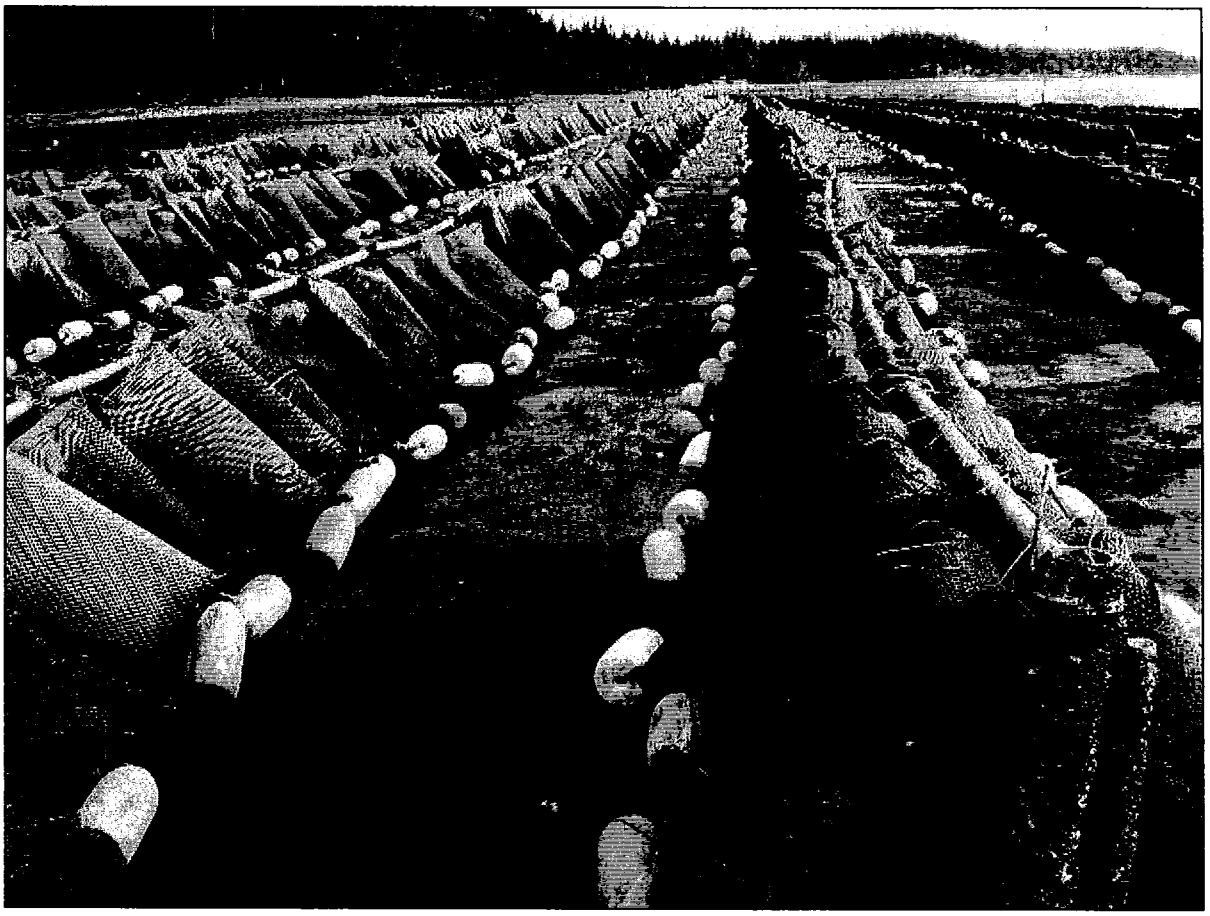

Figure 2-10. Oyster rack and bag tumbling system, South Puget Sound (Corps site visit 2013)

Maintenance and Grow-out

Oysters are left to grow in the bags. The operation is checked periodically during low tides to ensure that the bags remain secure and to remove fouling organisms (e.g., mussels, barnacles, algae and other aquatic vegetation) and predators. Bags may be turned as often as every two weeks to control fouling organisms. Oysters may be periodically redistributed between bags to reduce densities. Oysters may be placed in progressively larger mesh size bags as the oysters grow.

Harvest

Oysters are harvested at low tide by removing the bags from their supports and transferring them to a boat, wheelbarrow, or vehicle for transport to shore. Bags may also be loaded on a boat at higher tides. Biofouling is common on the bags with barnacles and mussels the primary fouling organisms. To removal biofouling, bags are typically placed in upland areas where they are allowed to dry which allows for easier removal of fouling organisms prior to re-use. The activity to 'dry' bags typically occurs during the summer months.

2.4.3. Clam Activities

Several species of clams are cultured or harvested in Washington State including the littleneck clam (*Leukoma staminea*), Manila clam (*Venerupis philippinarum*), butter clam (*Saxidomus gigantea*), Eastern soft shell clam (*Mya arenaria*), horse clam (*Tresus nuttallii* and *Tresus capax*), razor clam (*Siliqua patula*), and the cockle (*Clinocardium nuttallii*). The most commonly cultured clam, the Manila clam, is not native to Washington State.

The following clam activities could occur any time of the year.

2.4.3.1. Rafts, Floats, FLUPSYs, and other Structures

Rafts, floats and FLUPSYs are used less in clam activities than they are in oyster and mussel activities. Their use for clam culture would be similar to that described above in the mussel and oyster sections. Upland wet-storage tanks, as described above for mussel activities, could be used for clam activities. The Corps would permit the pipes (for both discharge and intake) associated with these tanks under the proposed action.

2.4.3.2. Clam Bottom Culture

Bottom culture entails growing clams directly on the substrate of intertidal areas.

Seeding and planting

Prior to planting clam seed on the tidelands, beds are prepared in a number of ways depending on the location. Bed preparation activities are similar to those described above for oyster bottom culture. The substrate may be prepared by removing aquatic vegetation, mussels, and other undesired species. Any shellfish present on site may be harvested to reduce competition. These activities could be conducted by hand or by mechanical means (e.g., water jet, harrowing).

Graveling (also called frosting) is a common activity employed for clam culture. This consists of adding gravel and/or shell when the tide is high enough to float a barge. Graveling by vessel often occurs during about a two hour window at slack tide. Applying at the slack tide allows for a more accurate placement of the graveling material. In a 1-2 hour period, about 1 acre can be graveled to a depth of up to 1 inch (Corps 2014a). Several thin layers of material may be placed over a period of days (Figure 2-12). To place a single 0.5-inch layer requires about 70 cubic yards of washed gravel or shell per acre. An individual site would not be graveled more frequently than once per year. Many sites are graveled annually whereas other may be graveled at a lesser frequency.

Clam seed is typically acquired from hatcheries and planted in the spring and early summer. Intertidal trays or bags may be used as nursery systems until seed is of sufficient size to plant. The trays are typically two-foot by two-foot with ¼ inch diameter openings that permit water to flow through. They are employed in stacks of six or seven, and placed in the lower intertidal areas secured with rebar or anchored with sand bags. Clam bags as described in the section on bag culture can also be used to hold clams in a nursery system. Natural spawning and setting of clams also occurs. Clam seed sizes and methods of seeding vary, depending on site-specific factors such as predation and weather conditions. Planting methods include hand-spreading seed at low tide upon bare, exposed substrate; hand-spreading seed on an incoming tide when the water is approximately four inches deep; hand-spreading

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seed on an outgoing tide when the water is approximately two to three feet deep; or spreading seed at high tide from a boat.

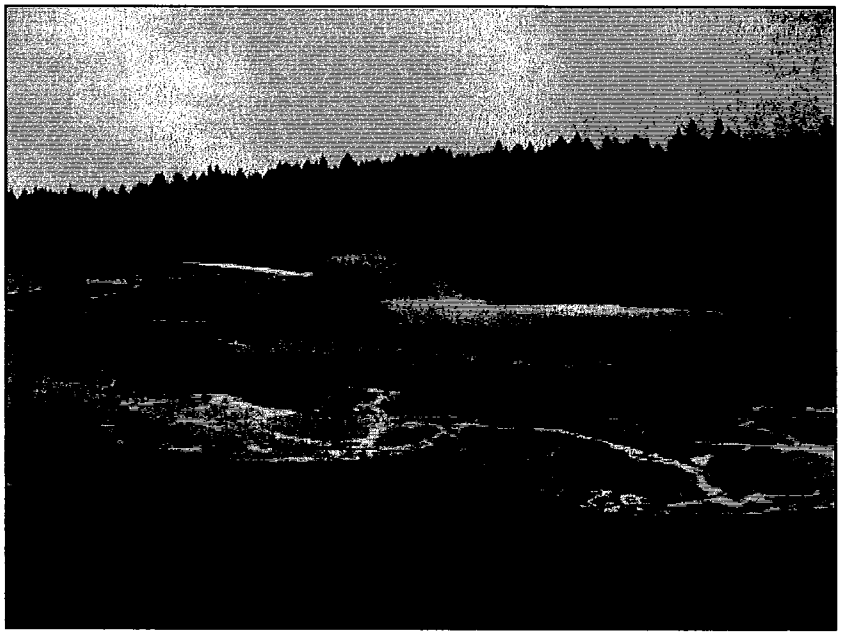

Figure 2-11. Adding gravel to a clam bed (i.e., graveling) (PCSGA 2011)

Immediately after seeding, cover nets may be placed over the seeded areas to protect clams from predators such as crabs and ducks. Cover nets are typically made from plastic such as polypropylene (Figure 2-12). The net edges are typically buried in a trench or weighed with a lead line and secured with rebar stakes. Predator cover netting typically remains on site until harvest.

Maintenance and Grow-out

After each growing season, surveys may be conducted during low tide to assess seed survival and distribution, and to estimate potential yield. Based on survey results, additional seeding activity may occur. Netting used to protect clams from predation can become fouled with barnacles, mussels, aquatic vegetation (e.g., algae, eelgrass) or other organisms. The nets usually remain on site throughout the growing period. Fouling organisms may be removed by hand or by mechanical means while the nets are in place. Depending on local conditions, net cleaning may occur as often as monthly or not at all. Biofouling occurs most frequently during the late spring and summer months.

Harvest

Before harvest begins, bed boundaries may be staked and any predator netting folded back during a low tide. Hand harvesters dig clams during low tides using a clam rake (Figure 2-13). Shovels or other hand operated tools may also be used. Market-size clams (typically about 3 years of age) are selectively harvested, placed in buckets, bagged, tagged, and removed. Undersized clams are returned to beds for future harvests. Since a given clam bed may contain multiple year classes of clams, it may be harvested on a regular schedule (such as annually) to harvest individual year classes of clams. Clams harvested for sale are generally left in net bags in wet storage. Clams are typically maintained in wet storage either directly in marine waters or in upland tanks filled with seawater for at least 24 hours in order to purge

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sand. Upland tanks are connected to the marine waters through intake and outfall structures (pipes) that are compliant with the NPDES.

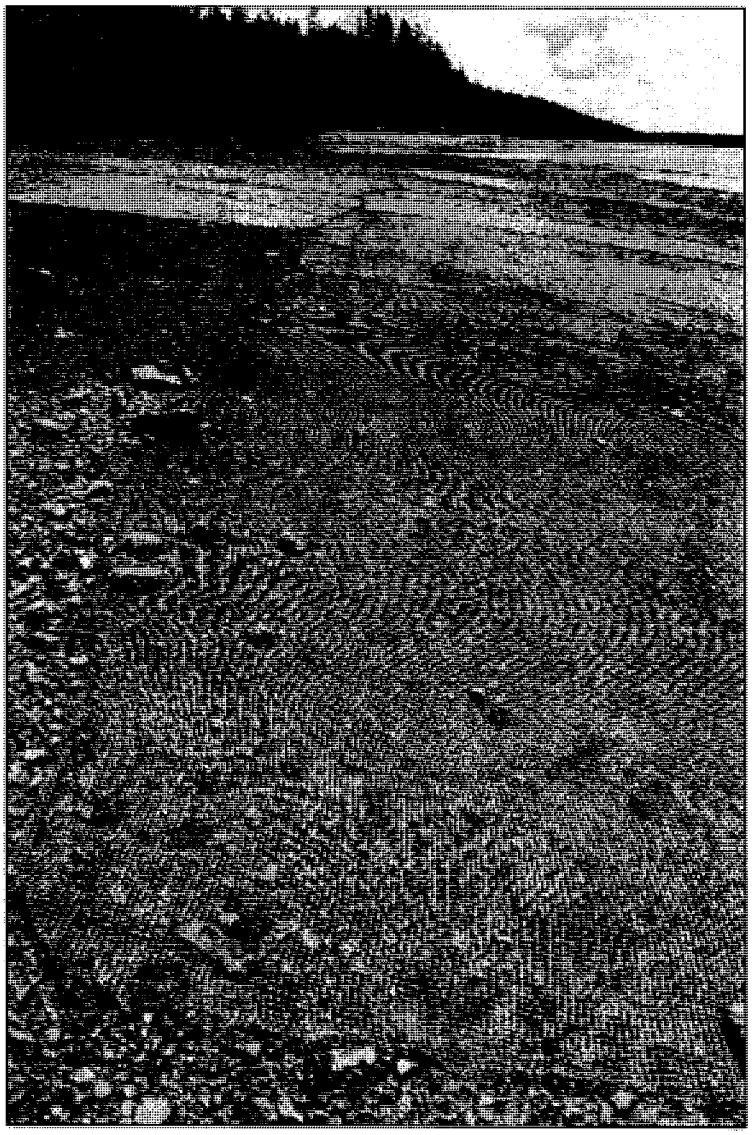

Figure 2-12. Clam cover nets in South Puget Sound (Corps site visit 2014).

Harvesting of clams also occurs with mechanical equipment (Figure 2-14). This equipment is driven on the substrate when the tide is out and excavates the substrate to a depth of about 4-6 inches in order to extract the clams. Clams are harvested after 3 years. About 0.8 acres per day of clams can be mechanically harvested which results in about 12 to 15 days of work for each acre (Corps 2014a). The use of a 'hydraulic escalator harvester' equipment is not included among the proposed action activities.

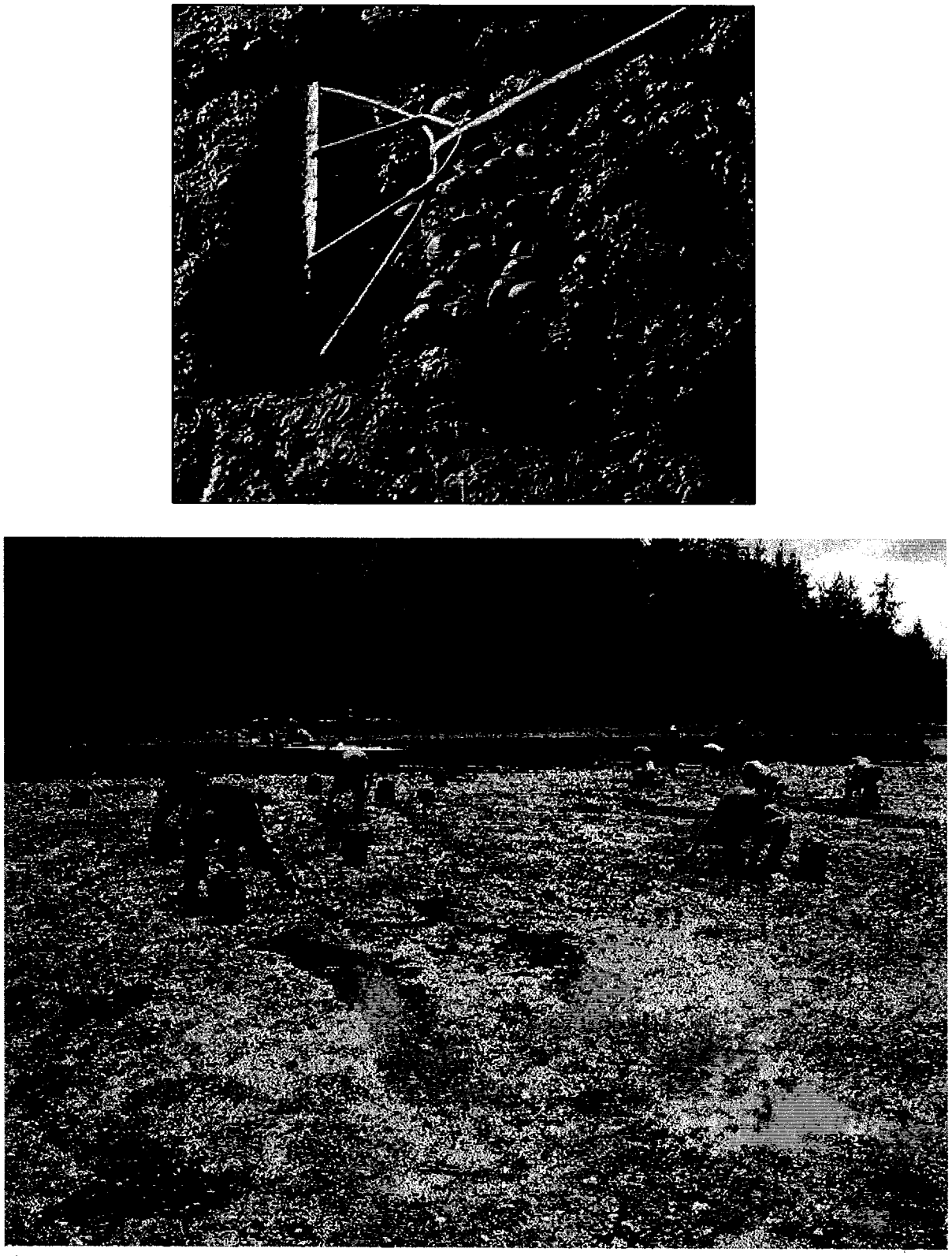

Figure 2-13. Hand harvest of Manila clams (top, Willapa Oysters 2007 in PCSGA 2011; bottom, South Puget Sound, Corps site visit 2013).

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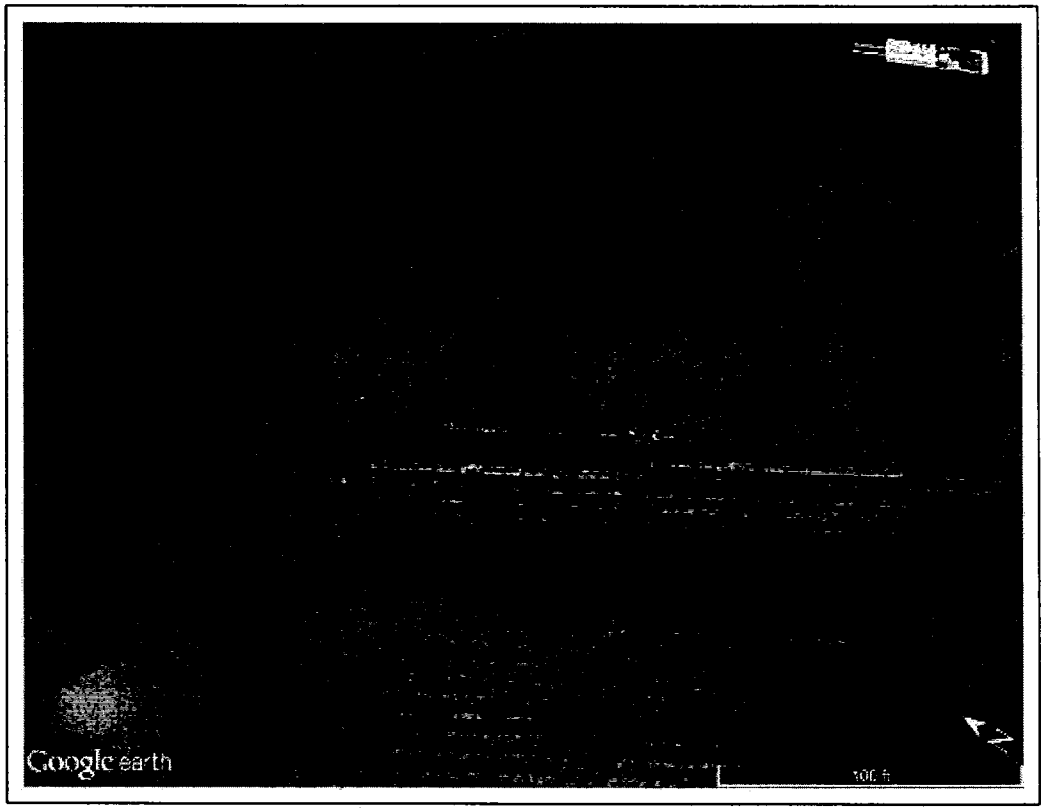

Figure 2-14. Mechanical harvest, low tide in North Puget Sound (GoogleEarth 2015; PSI 2015)

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2.4.3.3. Clam Bag Culture

Clam bag culture is similar to the bag culture described previously for oysters. Clams are typically grown in plastic mesh bags placed directly on the substrate.

Seeding and Planting

Bed preparation activities are similar to those described above. Prior to setting bags on the tidelands, shallow (typically 2 to 4 inches) trenches may be dug during low tide with rakes or hoes to provide a more secure foundation for setting down the clam bags (Figure 2-13).

Clam seed (typically 5-8 millimeters) is placed in reusable plastic net bags closed with plastic ties or galvanized metal rings. Gravel and/or shell fragments may be added to the bags. Bags may be placed in shallow trenches during low tide and allowed to "silt-in" (i.e., become buried in the substrate). In high current or wind areas, bags may be held in place with 4 to 6 inch metal stakes.

Figure 2-15. Manila clam bags set into, on the substrate (Corps site visit 2013)

Maintenance and Grow-out

Bags are monitored during low tide throughout the grow-out cycle to make sure they remain secured. They may be turned occasionally to optimize growth. Fouling organisms (e.g., mussels, barnacles, algae and other aquatic vegetation) and predators may be periodically removed.

Harvest

When the clams reach market size, the bags are removed from the growing area. Harvesting may occur when there is one to two feet of water, so that sand and mud that accumulated in the bags during grow-out can be sieved from the bags in place. Bags are transported to a processing site where any added substrate is separated for later reuse.

COE 125610

2.4.4. Geoduck Activities

Geoduck (*Panopea abrupta*) is native to Washington State and is the largest known burrowing clam. Geoduck is a relatively new species for culture. Washington is the principal state in the United States actively farming geoducks. Cultivation under the proposed action would occur between elevation +7 ft to -4.5 ft MLLW. Naturally seeded or wild geoduck could occur from about +1 ft to deeper than -100 ft MLLW.

2.4.4.1. Rafts, Floats, FLUPSYs, and other Structures

The proposed action includes reauthorization and maintenance of currently serviceable rafts, floats, and FLUPSYs that qualify as continuing activities. New rafts, floats, and FLUPSYs or the relocation or expansion of continuing rafts and floats are also included in the action. All of these types of structures have been described above in the mussel, oyster and clam sections.

2.4.4.2. Geoduck Culture

Seeding and Planting

Bed preparation activities are similar to those described above. Bed preparation can also include a "pre-harvest" to remove all current shellfish on the bed including naturally seeded geoduck already present on the site. Undesired species such as sea stars and sand dollars (*Clypeasterioda*) may be removed by hand. Some growers may attempt to re-locate sand dollars to nearby suitable habitat; other growers remove them permanently from the marine environment.

The most common method of culture currently in use consists of placing a 6-inch diameter, 9-inch long PVC pipe (pipe sizes may vary among growers) by hand into the substrate during low tide, usually leaving the top section of pipe (also called a tube) exposed. Two to four seed clams (usually from hatcheries) are placed in each tube where they burrow into the substrate. Tubes are typically installed into the substrate at a density of about 1 tube per square foot or about 42,000 tubes per acre. The top of each pipe is covered with a plastic mesh net and secured with a rubber band to exclude predators (Figure 2-16). Additional cover netting may be placed over the tube field on beaches with heavy wind and wave action to guard against the tubes becoming dislodged in storms (Figure 2-17). Some growers do not use the individual pipe net covering but use the cover netting to cover the whole field of tubes. Some growers use flexible net tubes (Vexar®) instead of the PVC pipe, which eliminates the need for the additional cover netting. Intertidal geoduck culture typically ranges between the +5.0 and the -4.5 feet tidal elevation (MLLW). Geoduck seed can also be directly set into the substrate without the use of any structure.

Another method being used to exclude predators is net tunnels (Figure 2-18). The tunnels are made from 4-foot wide rolls of polyethylene net placed over a rebar frame to hold the net a couple of inches above the substrate with the net edges buried by the substrate. They are currently being used in the intertidal area. The mesh opening of the net is either 1/4-inch or 3/8-inch. A 24-inch wide net without a rebar frame may also be used.

Maintenance and Grow-out

Fouling organisms including mussels, cockle clams, and sand dollars often accumulate inside the tubes. Aquatic vegetation (e.g., algae and eelgrass) may also accumulate on or over the tubes. When this occurs, which could be throughout the year, these fouling organisms are removed.

Figure 2-16. Geoduck cultivation using individual tube nets for predator control, South Puget Sound (top, OPB 2012) and Discovery Bay (bottom, Kitsap Sun 2015)

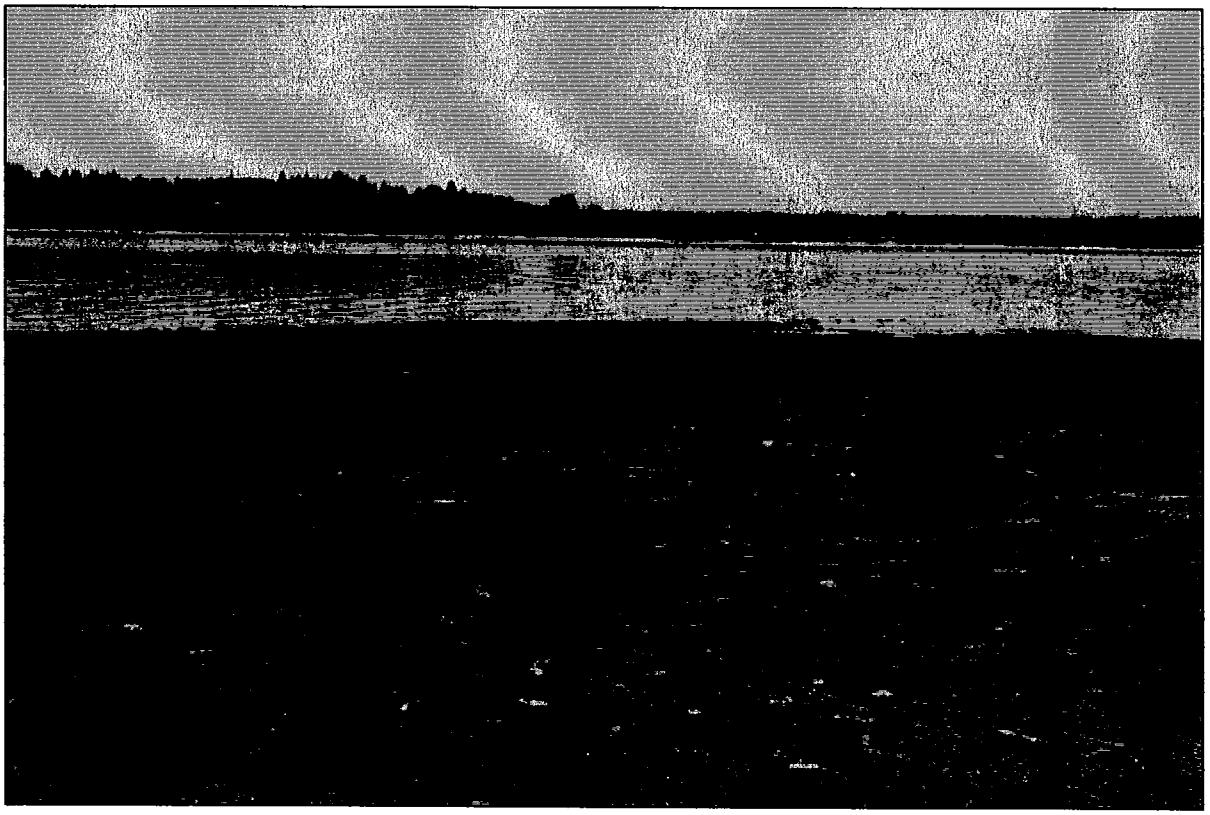

Figure 2-17. Cover netting placed over geoduck tubes, South Puget Sound (Corps site visit 2014)

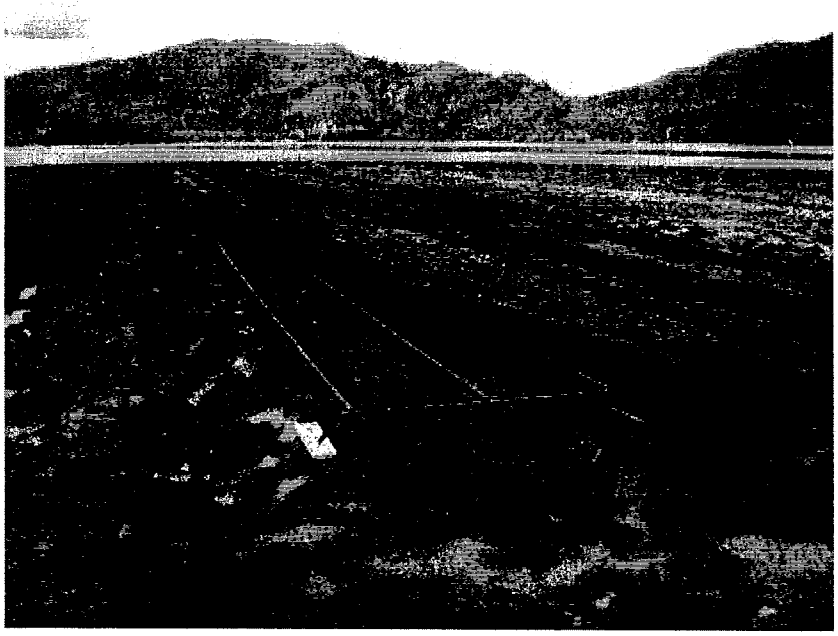

Figure 2-18. Geoduck tunnel net over rebar frame (Dewey 2013)

Tubes and netting are typically removed after 18 months to 2 years when the young clams have buried themselves to a depth sufficient to evade predators (about 14 inches). After tube removal, large area nets may be redeployed over the bed for several months. The tubes and nets are often taken to upland

locations and allowed to dry in order to easily remove fouling organisms. They are then typically reused. As the clams grow, they may gradually dislodge the tubes from the substrate before they can be removed. The dislodged tubes could potentially be swept away from the site by the tides.

Harvest

Naturally produced geoducks can live for more than 100 years and may be harvested at any age or size. Cultivated geoducks are typically harvested 4 to 7 years after planting or when they reach about 2 pounds. A site seeded at 160,000 per acre might be expected to produce 32,000 to 40,000 marketable geoduck per acre. The geoducks are harvested in the intertidal zone at low tide (Figure 2-19) or by divers at high tide in the intertidal or subtidal zone. In either case, the geoducks are typically harvested using hand-operated water jet probes. For water jet harvest, the probe is a pipe about 18 to 24 inches long with a nozzle on the end that releases surface-supplied seawater from a 1-inch internal diameter hose at a pressure of about 40 pounds per square inch (about the same pressure as that from a standard garden hose) and a flow of up to 20 gallons per minute.

This harvest method allows the hand extraction of geoducks, which burrow as deep as 3 feet. The harvester inserts the probe in the substrate next to an exposed geoduck siphon or the hole left when the siphon is retracted. By discharging pressurized water around the geoduck, the sediment is loosened and the clam is removed by hand. For the dive harvester, this entire process takes 5 to 10 seconds (Figure 2-20). Each diver carries a mesh bag to collect the harvested geoducks. Divers periodically surface to unload their bags. One diver can harvest 500 to 1,000 geoducks per day. Multiple divers may work in an area at one time. Dive harvesters work no more than 3 to 4 hours per day.

Geoduck harvesting occurs year-round and is not limited by tidal height. However, dive harvesting tends to be the dominant method during winter months (November through February) due to the prevalence of high daytime tides, the absence of suitable low tides for daytime beach harvest, and generally favorable market conditions during that period. Both low-tide and dive harvests may occur on the same sites. It is estimated that the dive harvest is used about 75% of the time compared to the non-dive harvest method (Cheney 2007 referenced in Anchor 2010). Harvest occurs until all harvestable-sized geoduck are removed from the harvest area. Harvesters make several sweeps of a tract to ensure all harvestable-sized geoduck are removed. Because of differences in geoduck growth rates with a mix of harvest-sized and under-sized clams, only a portion of a project area may be harvested, with the remainder set aside for later dive or beach harvest. Additionally, a dive harvest is typically supplemented with beach harvest when clam densities are reduced in the project area. Harvest may also be constrained by tide and current conditions with slow or slack water conditions reducing or restricting the ability to effectively harvest with divers.

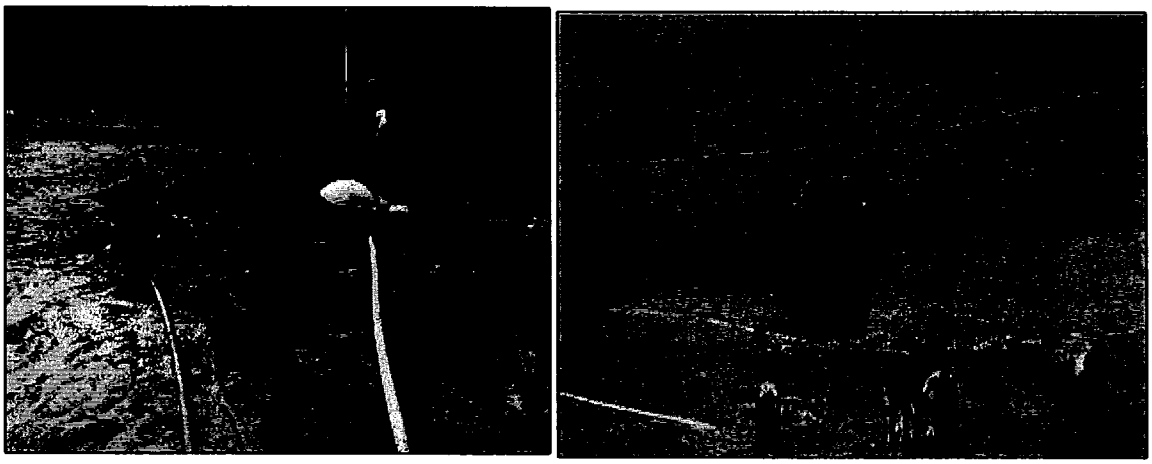

Figure 2-19. Harvesting geoduck at low tide (PCSGA 2011, CPPSH 2015)

Dive harvest is the typical method used for harvesting subtidal geoducks. Dive harvesters work within an approximate 100-foot range from the harvest vessel, or to the maximum lengths of their air and water lines. Intakes for supplying water to the onboard pumps are positioned several feet below the water surface. Intakes will be screened per Conservation Measure.

2.4.5. Vessel and Vehicle Support

Various types of vessels and vehicles could be used to support activities for all shellfish species. Vessels could include offshore rafts, small open crafts with outboard motors, and larger barges (Table 2-1). Land vehicles (e.g., trucks, ATV) could also be used to support the various activities. Use of support vessels would be within the immediate shellfish activity area or the immediate vicinity.

Vessels could be used to mechanically harvest, tow harrow, prepare or maintain the substrate (e.g., graveling). Vehicles may be used on the culture beds as a base of operations and to transport equipment and shellfish. Vehicles can also be used to mechanically harvest or prepare the substrate for harvest (Figure 2-14). This could include tractors harrowing/tilling the substrate.

Geoduck dive harvesters work from small surface vessels or dive platforms that contain machinery for surface-supplied diver air and water jets, diver communication equipment, and on-deck storage for harvested geoducks. Dive boats used to harvest cultivated geoduck may be anchored over the harvest sites and moved to deeper water during low tides. Dive boats used to harvest subtidal geoduck typically move over the harvest area as needed to adjust the divers' position relative to geoduck density.

Information on vessel sizes have has been provided by PCSGA which is expected to be representative of the range of support vessels that would be used for the various types of activities described above.

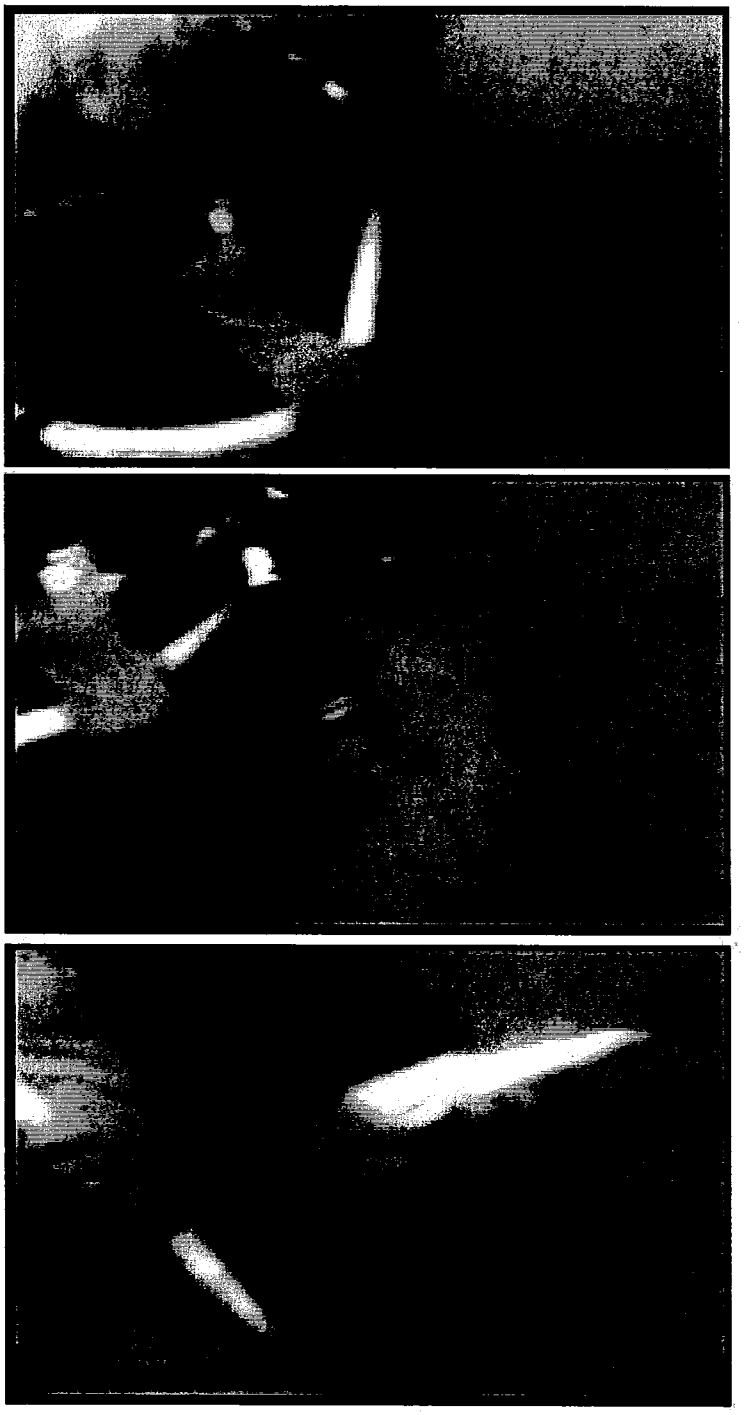

Figure 2-20. Geoduck dive harvest sequence (Anchor 2010)

Table 2-1. Types of support vessels and equipment used while conducting work and activities under NWP 48 and estimated in-air noise (PCSGA 2013b).

Equipment	Purpose	Estimated dBA
5hp motor with propeller	FLUPSY	65@100 yards
10hp engine	skiffs, water pumps, hatchery intake	65 @ 100 yards
40-330hp engine	boat inboard/outboard	65-90 @ 0.5 m
air compressor	diving	77-85 @ 7m
power washer (4000 psi)	nursery raft/FLUPSY	<100 @ operator ear (~3 feet)
electric hoist	lifting nursery raft/FLUPSY	75-85 @ 50 ft
crane	lifting nursery raft/FLUPSY	81 @ 50 ft
harvester (6 cylinder Chevy Vortec engine)	harvesting clams	60-90 @ 15 m

2.4.6. Summary of Activities

The activities are summarized below in Table 2-2. This summary may not necessarily list all the activities described in the previous sections.

Table 2-2. Summary of shellfish activities included within the proposed action.

Species	2017 NWP 48 Work and Activities	
Mussel *Blue, Gallo*	Seeding/ Planting	• Raft, floats, and their associated maintenance • Set lines or metal screen frames in net cages suspended in water to naturally set seed. • Install socks weighted and lashed to rafts, lines, or stakes and suspended in water for hatchery-raised seed. • Place buoys or anchors used to mark and secure structures
	Maintenance / Grow-out	• Placement/maintenance of predator exclusion nets • Replace and maintain stakes and lines • Remove biofouling and weights • Monitor growth
	Harvest/ Processing	• Strip mussels from the lines or socks • Bag mussels for transport • Intake or outfall structures (pipes) (discharge compliant with NPDES) to connect upland wet storage holding tanks
Oyster	Seeding/ Planting	• Raft, floats, and FLUPSYs and associated maintenance • Prepare substrate by removal of debris (rocks/large wood)

Species	2017 NWP 48 Work and Activities	
Pacific, Olympia, Kumamoto, Eastern, European flat		• Remove/relocate undesired aquatic species • Application of gravel/shell to firm substrate (sprayed from vessel, or delivered with land vehicle and mechanically or hand deposited). • Mechanically level substrate • Use of 'continuing' seed floats • Use of work floats • Use of racks/elevated trays or bins • Create oyster hummocks (oyster shell mounds) • Install bags of cultch material onto stakes, lines, racks, trays or secured directly onto substrate • Suspend lantern nets, bags, cages, vertical ropes or wires from surface longlines, or 'continuing' rafts
	Maintenance / Grow-out	• Continued removal of debris/aquatic species, as necessary • Flip/turn bags • Re-position stakes • Remove excess biofouling • Harrow to lift excess mud or sand/re-level substrate • Pull and restack trays
	Harvest/ Processing	• Hand harvest into containers for transport • Mechanical shallow depth dredging from barges • Collection and transport of oysters to 'fattening' beds to harden (2nd harvest then occurs) • Wet storage (in-water) • Use of work platforms • Intake or outfall structures (pipes) (discharge compliant with NPDES) to connect upland wet storage holding tanks
Clam *Manila, littleneck, butter, eastern soft shell, horse, razor, cockle*	Seeding/ Planting	• Raft, floats, and FLUPSYs and associated maintenance • Use of seed grow-out trays and bins • Prepare substrate by removal of debris (rocks/large wood) • Remove/re-locate other aquatic species (starfish, vegetation) • Application of gravel/shell to firm substrate (sprayed from vessel, or delivered with land vehicle and mechanically or hand deposited). • Placing secured nets on the substrate • Applying seed from vessel/vehicle or from foot • Place secured or trenched-in net bags

Species	2017 NWP 48 Work and Activities	
	Maintenance / Grow-out	• Continued removal of debris/aquatic species, as necessary • Repositioning/cleaning nets to remove debris/biofouling • Turning bags
	Harvest/ Processing	• Hand digging/bag removal • Mechanical harvest
Geoduck	Seeding/ Planting	• Raft, floats, and FLUPSYs and associated maintenance • Use of seed grow-out trays and bins • Prepare substrate by removal of debris (rocks/large wood) • Remove/re-locate undesired aquatic species • Install PVC tubes with individual net covers or flexible net tubes • Install secured area net covers • Install secured net tunnels
	Maintenance / Grow-out	• Clean tubes to remove debris/biofouling • Remove tubes/nets (area nets may be reset after tubes removed)
	Harvest/ Processing	• Harvest by hand (low tide, high tide, and subtidal by divers) • Use of pressured water to liquefy substrate
All species		• Use of work platforms • Vessel support (grounding/anchoring) • Land vehicle/foot support to and from uplands to transport equipment, material, shellfish, and people

2.4.7. Activities Specifically Excluded

Certain shellfish activities (Table 2-3) are excluded from the proposed action for various reasons including:

- Activity extends sufficiently beyond the jurisdiction of the Corps regulatory program and/or is regulated by another Federal agency (e.g., upland hatcheries, NPDES discharge, pesticide use).
- Any unauthorized activity (e.g., not permitted) is not included in the action.

Table 2-3. List of NWP 48 excluded work and activities

Excluded Work and Activities
Vertical fencing/vertical nets or drift fences (includes oyster corrals; does not apply to raft nets)

New berms or dikes or the expansion or maintenance of current, authorized berms or dikes
Pile driving
Installation and maintenance of mooring buoys
Construction, maintenance, and operation of upland hatcheries
Cultivation of invasive species
Construction, maintenance, and operation of attendant features, such as docks, piers, boat ramps, stockpiles, or staging areas
Deposition of shell material back into waters of the United States as waste
Dredging or creating channels (e.g., placing sand bags) so as to redirect fresh water flow
Any form of chemical application to control undesired species (e.g., non-native eelgrass *Zostera japonica*, burrowing shrimp)
The use of materials that lack structural integrity in the marine environment (e.g. plastic children's wading pools, unencapsulated Styrofoam®).
Unauthorized activities

2.5. Geographic area

The geographic area of the action is the nearshore coastal and inland marine waters of Washington State. This includes Washington coastal beaches, coastal embayments (e.g. Willapa Bay and Grays Harbor), the Strait of Juan de Fuca, and the Puget Sound/Salish Sea (see Figure 1). Work is only expected to occur in the shallow nearshore marine and brackish waters. No work is anticipated in freshwater. Negligible use of NWP 48 is expected in the Columbia River and along the Washington coastal beaches due to the lack of historical shellfish aquaculture in these locations, and the anticipated continued lack of aquaculture in the future. Since work under NWP 48 is not anticipated in the Columbia River estuary, coastal beaches, or in freshwater or upland areas, these geographic areas are not analyzed or discussed in the context of cumulative effects.

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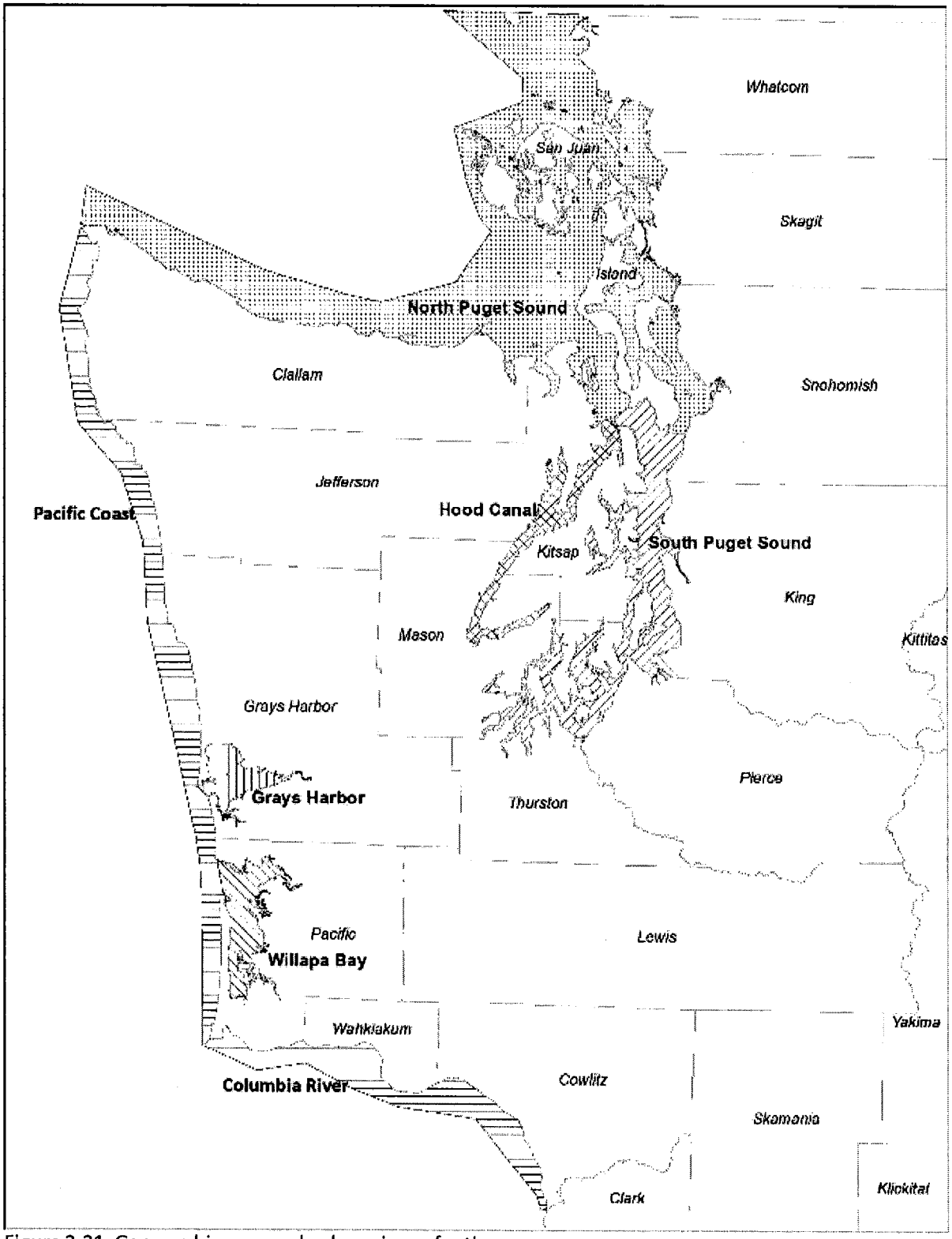

Figure 2-21. Geographic area and sub-regions of action

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2.5.1. Acreage

The 2017 NWP 48 authorizes project areas for shellfish aquaculture. In the state of Washington project areas can be privately owned real estate parcels with the area delineated by a deed or a leased area that is delineated by the lease. A project area need not necessarily be entirely engaged in aquaculture but may include active culture areas, fallow areas, or areas that have never or will never be engaged in aquaculture. Project areas can be either continuing/ongoing if there has been aquaculture somewhere within the project area during the last 100 years or a project area can be new to aquaculture. Table 2-5 summarizes the anticipated total acreage that will be permitted under 2017 NWP 48 for continuing and new project areas by geographic area. This includes all project area acreage that was permitted under 2012 NWP 48 which is expected to be reauthorized under 2017 NWP 48 and anticipated new project area acreage. Continuing acreage includes all acreage that has been permitted to date under the 2012 NWP 48 and all known pending acreage. Since not all permit applications for 2012 NWP 48 have been received and some pending applications have not identified acreage, not all continuing acreage is known. The continuing acreage in Table 2-5 was therefore rounded up to account for this unknown acreage.

In order to determine the scale of shellfish activity conducted under the proposed action, the Corps developed an estimate for the total project area acreage that is expected to be authorized by 2017 NWP 48. Estimates for the amount of acreage that could be authorized under the proposed action are provided by geographic region.

The acreage estimates are based on many factors including historical Corps permit applications, estimates provided by commercial shellfish growers for future aquaculture production, coordination with the Washington Department of Natural Resources (WDNR) and their potential shellfish activities, and the general knowledge and expertise of the Corps professional staff that have processed shellfish related permit applications.

For the purpose of categorizing acreages, the activities have been subdivided into floating culture (i.e., with floating lines or rafts) and ground-based culture which includes all other activities including oyster longline culture. Based on analysis of permit applications, there are a total of 934 ongoing/existing project areas. Of these, a total of 927 include ground-based activities conducted in the intertidal or adjacent shallow subtidal areas. The remaining seven activity footprints are for floating culture with rafts exclusively. Five of the continuing activities include both raft and ground-based culture.

Floating aquaculture

Analysis of historical permit applications indicates that floating aquaculture activities occur in Willapa Bay, Hood Canal, South Puget Sound and North Puget Sound. There are a total of twelve continuing active footprints with rafts that cover 87 acres. It is estimated that an additional 100 acres of new floating acreage could be authorized under the 2017 NWP 48. New surface or floating longlines would be authorized under the proposed action. There are a total of 22 continuing active and 32 continuing fallow acres with surface longlines. New floating acres are estimates based on coordination with the shellfish industry and Corps professional judgment.

COE 125624

Ground-based aquaculture

Ground-based commercial aquaculture encompasses all of the activities discussed in Section 2 except for the floating activities using rafts. The anticipated acreage for these activities includes both continuing and new activities (**Error! Reference source not found.**). The acreage for the continuing activities was collected from permit applications that are maintained by the Corps. The geographic locations for each of the continuing activity footprints are illustrated in Appendix D.

The total acreage for new activities is estimated based on projections provided to the Corps by the aquaculture industry, the historical rate of permit applications, and the experience of Corps professional staff.

The vast majority of the ground-based commercial aquaculture and all new activities would occur at tidal elevations between - 4.5 ft and +7 ft MLLW. It is probable that some percentage of this total acreage would be authorized (or reauthorized) at subtidal elevations (i.e., deeper than - 4.5 ft MLLW). This would typically be shallow subtidal lands immediately adjacent to intertidal shellfish activity areas. Based on an analysis of historical permit applications, 22 acres of subtidal lands were previously authorized as continuing shellfish activities. Because permit applicants have not historically been required to delineate their project footprints by tidal elevation, this total likely underestimates the subtidal acreage of continuing shellfish activity. This conclusion is supported by Corps professional staff knowledge of many of the continuing shellfish activity areas. Analysis of aquatic parcel maps and the Corps geographic database also indicates that greater than 22 acres of subtidal lands have likely been previously authorized. WDNR has indicated all but 1,085 acres of marine bedlands (i.e., deeper than extreme low tide) in the State of Washington are owned by WDNR, and WDNR does not lease these lands for ground-based aquaculture currently (WDNR 2013a). WDNR does lease subtidal lands for floating raft aquaculture activities. Because public subtidal lands would not be used for ground-based aquaculture, these 1,085 acres would be considered the maximum amount of subtidal acreage available for ground-based commercial aquaculture. This would constitute less than 3% of the total continuing commercial acreage. These unknown subtidal acres are included in the totals for ground-based activities.

The vast majority of acreage for commercial aquaculture is for activities that are ongoing. Since these activities represent the majority of all shellfish activity potentially authorized under the proposed action, an evaluation of this information is useful for understanding the action and its effects. It is anticipated that all of the ongoing activities would be reauthorized by the Corps under the 2017 NWP 48. A detailed summary of the shellfish activities proposed by historical permit applicants can be found in Appendix B. A summary of the species cultivated by ground based methods can be found in Table 2-4. The table does not include a small amount of mussel bottom culture. The predominant species cultured varies by geographic region. On an acreage basis, the most commonly cultured species appears to be oyster followed by non-geoduck clams.

COE 125625

Table 2-4. Distribution of ground-based commercial aquaculture continuing footprints and acreage by species cultivated

Grays Harbor							
Total	Oyster Only	Clam Only	Geoduck Only	Oyster, Clam, & Geoduck	Oyster & Clam	Oyster & Geoduck	Clam & Geoduck
Continuing footprints	23	0	0	0	5	0	0
Continuing acres active	801	0	0	0	343	0	0
Continuing acres fallow	1,813	0	0	0	7	0	0
Total acres	2,614	0	0	0	350	0	0
Willapa Bay							
Total	Oyster Only	Clam Only	Geoduck Only	Oyster, Clam, & Geoduck	Oyster & Clam	Oyster & Geoduck	Clam & Geoduck
Continuing footprints	117	30	0	2	102	0	0
Continuing acres active	4,493	404	0	680	10,818	0	0
Continuing acres fallow	2,047	379	0	67	6,949	0	0
Total acres	6,540	782	0	747	17,767	0	0
Hood Canal							
Total	Oyster Only	Clam Only	Geoduck Only	Oyster, Clam, & Geoduck	Oyster & Clam	Oyster & Geoduck	Clam & Geoduck
Continuing footprints	14	0	3	9	179	1	0
Continuing acres active	24	0	8	444	440	1	0
Continuing acres fallow	8	0	2	108	279	0	0
Total acres	33	0	10	552	719	1	0
South Puget Sound							
Total	Oyster Only	Clam Only	Geoduck Only	Oyster, Clam, & Geoduck	Oyster & Clam	Oyster & Geoduck	Clam & Geoduck
Continuing footprints	3	18	142	56	89	15	34
Continuing acres active	46	36	121	635	1,310	34	140
Continuing acres fallow	2	8	45	454	222	5	14
Total acres	48	44	166	1,089	1,532	39	154
North Puget Sound							
Total	Oyster Only	Clam Only	Geoduck Only	Oyster, Clam, & Geoduck	Oyster & Clam	Oyster & Geoduck	Clam & Geoduck
Continuing footprints	12	7	0	7	40	2	2
Continuing acres active	51	43	0	323	834	16	30
Continuing acres fallow	74	29	0	2,107	122	1	0
Total acres	125	72	0	2,430	956	17	30

COE 125626

Summary of NWP 48 acreage

The total potential commercial aquaculture acreage that would be authorized by geographic region is illustrated in Table 2-5.

Table 2-5. Total acreage by project area authorized under 2017 NWP 48 (2017 to 2022)

Project area acreage	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound	Total
Continuing/ongoing	3,846	36,315	1,820	3,648	3,946	49,576
New	24	19	105	106	78	332
Total (estimated)	4,000	40,000	2,000	4,000	5,000	55,000

Many project areas include fallow acreage or acreage that has never been engaged in aquaculture. This acreage is summarized in Table 2-6. For the purpose of this analysis it is assumed this acreage will be put into aquaculture because it will be authorized for that purpose. In this respect it is similar to a new project area but is not encumbered by the restrictions that come with a new project area (e.g., maximum of ½ acre aquatic vegetation impact).

Table 2-6. Existing project area acreage that is known to be fallow (as of 2012) or was never engaged in aquaculture.

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound	Total
Fallow	1,820	9,441	410	787	2,333	14,792
Never in culture	333	272	53	326	280	1,265

Oyster culture methods vary by region. The ground culture method is by far the dominant method used for clams in all regions. A summary of primary culture methods and an estimate for the relative distribution of species cultured by region is illustrated in Table 2-7. The estimate is based on the information in Appendix B and Table 2-4.

This estimate is consistent with the PCSGA estimate of 300 acres currently used for geoduck culture in the Puget Sound and Hood Canal regions (PCSGA 2013a).

In order to evaluate effects of the action, the acreage for specific categories of activities and their geographic locations are described. This includes discussion of the prevalence of the various culture methods.

COE 125627

Table 2-7. Distribution of species cultivated and primary cultivation methods

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound
continuing acres - cultured species distribution and methods					
oyster	95%	80-95%	40-60%	30-50%	50-60%
clam	1-5%	5-15%	20-40%	30-50%	30-40%
geoduck	0%	1%	10-20%	15-30%	1-10%
mussel	0%	1%	1%	1%	1%
oyster culture methods	bottom culture primary; longlines common	bottom culture primary; some longlines; limited rack & bag	bottom culture primary; some longlines; limited rack & bag	bottom culture dominant; limited rack & bag, longlines	bottom culture primary; longlines common; some rack & bag
clam culture methods	bottom	bottom	bottom	bottom	bottom
mussel culture methods	NA	surface longlines	rafts & surface longlines	rafts & surface longlines	rafts & surface longlines
new acres – anticipated cultured species distribution					
oyster & clam	95%	25%	78%	62%	79%
geoduck	0%	50%	18%	33%	19%
mussel	5%	25%	4%	5%	2%

2.6. Indirect Activities

2.6.1. Vessel and Vehicle Traffic

Vessel (boat/barge), vehicle (e.g., trucks, ATV), or foot traffic related to the transportation of people and materials to and from activity areas occurs in many, if not all, cases. Vessels could land on the shoreline and load or unload items to waiting vehicles or to individual persons who could then carry these items to an upland destination. Vehicle traffic could occur to and from shellfish activity areas directly along shorelines without any dock or pier. Vehicles could be traveling directly on the substrate (i.e., mudflats) to a proximate upland destination. The distinction between the interdependent vessel and vehicle traffic and the support activity described in Section 2.4.5 is the proximity to the shellfish activity area. In most cases, vessel traffic is anticipated to occur from the shellfish activity areas to a local pier, dock, or to the shoreline directly such as to a local beach. In some cases vessel traffic could occur from activity areas to a more distant destination (e.g., to deliver product to market).

COE 125628

2.6.2. Upland Storage Sites

Upland locations used for storing equipment, materials (e.g., shell), or maintaining live product in tanks (e.g., wet storage) could occur in close proximity to shellfish activity areas. These upland locations are in many cases interdependent with the shellfish activity area. The use and management of upland storage locations in close proximity to shellfish activity areas are considered to be interdependent with the proposed action. Disturbance (e.g., of native riparian vegetation) in such upland areas shall be minimized consistent with the Conservation Measures.

2.6.3. Shore Facilities

Shore facilities such as hatcheries and processing plants are typically used in coordination shellfish activities but are not regulated by the Corps.

2.6.4. Pesticide Application

The application of the pesticide carbaryl to aquatic lands in Willapa Bay and Grays Harbor has occurred since the 1960s to control burrowing shrimp species (ghost shrimp *Neotrypaea californiensis* and mud shrimp *Upogebia pugettensis*). Pesticide use is not universal to all applicants. It is dependent on environmental conditions and other factors associated with individual project areas and applicants. Pesticides are regulated under section 402 of the CWA which is administered by the Washington State Department of Ecology with EPA oversight. In recent years this activity has received significant scrutiny due to its environmental effects. In 2015 WDOE approved the application of Imidacloprid on 2000 acres in Willapa Bay and Grays Harbor. The applicants subsequently requested WDOE cancel the permit in response to public concerns. A new permit application was received by WDOE in 2016 to apply imidacloprid, a neonicotinoid pesticide, on 485 acres in Willapa Bay and 15 acres in Grays Harbor. The earliest this work could occur is 2018. No pesticides would be applied in 2017. WDOE has preliminarily determined that the proposal will have significant adverse environmental impacts under the State Environmental Policy Act. At this time it is uncertain whether the application will be approved (Rockett 2017 pers comm).

3. Effects of the Action

Aquaculture consists of a collection of individual activities that each have their own effects. These effects may be relatively short-term or longer lasting. The effects of these individual activities are discussed below. Of equal or more relevance to ESA listed species are the effects of the collective activities, their frequency, duration, timing, geographic location, and general scale across the landscape. The frequency and geographic scale of the activities are discussed Section 3.2.

3.1. Effects of Individual Activities

The effects described below are written from the perspective of a worst-case effects scenario relative to issues such as work timing and husbandry practices. The purpose of this approach is to ensure the full range of possible effects is discussed. A brief summary of these effects is provided in Table 3-1 for the culture methods and many of the individual activities.

3.1.1. Water Quality

Bivalves themselves remove phytoplankton and suspended particles from the water column. High densities of bivalves that occur with aquaculture can locally decrease phytoplankton, nutrients, and suspended material increasing water clarity (WDNR 2014b; Straus et al. 2013; Heffernan 1999; Newel 2004). Wastes from the cultured species are excreted into the water column and ultimately settle to nearby sediments.

Many of the shellfish activities (e.g., dredging, dive harvest) physically disturb the substrate which results in localized turbidity, increases in suspended sediment, and potentially changes in other water quality parameters such as lower dissolved oxygen (Mercaldo-Allen and Goldberg 2011, Heffernan 1999). These water quality effects may be delayed for activities conducted at low tide 'in the dry' until the tide floods the area. There may be a turbidity plume emanating from the actively worked area at low tide for some activities such as intertidal geoduck harvest. In-water activities such as dredging and dive harvest may affect water quality during the period of activity and a short period afterwards. These effects on water quality are temporary and not expected to persist longer than a period of hours or days (Mercaldo-Allen and Goldberg 2011).

3.1.2. Substrate and Sediments

Physical disturbance of the substrate can occur as a result of anchors placed for rafts or surface longlines, from bed preparation activities (e.g., tilling, harrowing, substrate leveling), planting activities (e.g., installation of nets), harvest (e.g., raking, dredge, hydraulic harvest), the grounding of vessels and support structures, and the general traffic of personnel and equipment. Sediment compaction can occur from vessel grounding, vehicle and personnel traffic. Topographic variation and natural debris such as large wood and boulders are often removed. In some cases this can result in filling of tidal channels in order to level a bed. Bed preparation techniques vary widely as do their effects depending on the specific cultured species and individual grower practices. Bed preparation and harvest activities such as dredging, tilling, raking, and hydraulic harvest result in turning over the sediments may temporarily alter the physical composition and chemistry of the sediment (Mercaldo-Allen and Goldberg

COE 125630

2011, Bendell-Young 2006, WDNR 2014b). Hydraulic harvest in geoduck culture areas results in liquefaction of the substrate.

Subtidal geoduck harvest temporarily leaves behind a series of depressions, or holes where the clams are extracted. The number of depressions created across a harvested area in a tract depends on the density of geoducks. The fate of these depressions, in terms of the time to refill, depends on the substrate composition and tidal currents. The time for them to refill can range from several days up to 7 months (Goodwin 1978).

Many activities result in a change to the composition of the native substrate which is often mud or sandflats. Graveling results in a generally firmer substrate with a larger grain size. Oyster bottom culture results in a substrate that is predominantly or entirely oysters that are periodically removed during harvest. Longline and stake culture result in an altered substrate that is partially shaded/occupied by oysters and stakes. Culture techniques that use racks, bags, nets, and PVC tubes result in an altered substrate that is intermittently or more broadly surfaced with plastic. There can be wide variability in the coverage of the plastic structure across the substrate depending on the practices of individual growers. Bag culture could be sufficiently dense to completely cover an existing substrate over a relatively broad area (Figure 2-9). Similarly plastic nets placed for clam or geoduck culture could extend over multiple acres (Figure 2-17). Alternatively, structures may be placed in rows that result in alternating plastic versus native substrate (Figure 2-10, Figure 2-18). Where the profile of the artificial structure is low, for example with bags resting on the substrate or area nets, sediment may gradually accumulate on top of the structure resulting in a return, at least in part, to a substrate similar to what existed before the activities were initiated. Periodic maintenance of the nets may remove this accumulated sediment. The artificial structure can be present for multiple years in a particular location (e.g., geoduck tubes) or can remain almost continuously over time as new crops are quickly planted after harvest (e.g., clam bags, area nets for clam culture).

Activities that involve placement of structure such as rafts, floating longlines, oyster longline, and rack and bag culture can affect water currents and circulation patterns, can lead to changes in rates of erosion and sedimentation, and altered tidal channels (WDNR 2014b, Wisehart 2007). An evaluation of aerial photographs indicates that tidal channels are generally less prevalent in aquaculture areas which may be due to gradual filling and/or grading that occurs as part of the work. Sedimentation and nutrient enrichment may occur from the settling of wastes to the substrate from the cultured species (Heffernan 1999, WDNR 2013a). Culture using rafts and longlines in particular often experience nutrient enrichment of the local sediments due to accumulation of biological waste and shell material from the cultured species. Anoxic sediments from nutrient enrichment have been documented below rafts (Hargrave et al. 2008; Heffernan 1999). Man-made debris such as metal and plastic can also accumulate beneath rafts.

3.1.3. Vegetation

Aquaculture activities classified as continuing active and fallow would occur in areas containing eelgrass. New project areas could disturb as much as ½ acre of submerged vegetation.

Effects on aquatic vegetation can occur where shellfish activities are co-located with aquatic vegetation including eelgrass and kelp. Rafts shade the underlying substrate limiting the growth of aquatic

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vegetation. They are typically sited in waters too deep for eelgrass. Macroalgae such as kelp could be negatively affected or excluded from areas beneath rafts (WDNR 2014b). Floating culture using lines suspended from buoys would typically have a smaller footprint than a raft so substrate shading may be limited depending on spacing of the lines.

Ground-based culture activities are often conducted in the same tidal zone occupied by eelgrass. In Puget Sound, WDNR inventoried eelgrass (*Z. marina*) at a minimum elevation of -41 ft MLLW at a site in central Puget Sound and a maximum elevation of +7.5 ft MLLW at a site in Hood Canal (WDNR 2011). The average minimum and maximum elevations throughout Puget Sound were +0.3 to +3.0 ft MLLW. This range encompasses the elevations where ground-based shellfish activities would occur. When shellfish activities are co-located in areas with eelgrass, a net loss in eelgrass is typically the result either as a result of bed preparation activities, competition for space with the culture species or equipment, or harvest (Tallis et al. 2009, Wagner et al. 2012, Wisehart 2007; Dumbauld et al. 2009, Ruisink et al. 2012, NMFS 2009, NMFS 2005, Rumrill and Poulton 2004). This is the case for all forms of ground-based culture. Eelgrass is replaced by oysters, culture bags, and geoduck tubes. Eelgrass often coexists within the culture area albeit at a reduced density. Bed preparation and harvest activities physically remove eelgrass (Ruesink and Rowell 2012; Tallis et al. 2009; Boese 2002, Simenstad and Fresh 1995). Use of vessels and floats can smother and cause physical disturbance to eelgrass due to grounding of the vessels (NMFS 2005). Longline and suspended bag culture may shade eelgrass and preclude it underneath the structure (Skinner et al. 2014; WDNR 2014b). Biofouling on cover nets can reduce light availability for eelgrass (WDNR 2013a). The magnitude and duration of effect may vary depending on culture method and individual grower practices. For example, dense, mature bottom oyster culture may totally preclude eelgrass during certain parts of the aquaculture cycle while lesser densities of oyster may allow eelgrass to coexist within the culture area.

Eelgrass recovery times after disturbance vary depending on the type of disturbance, environmental conditions, and the availability of local seed sources. Timeframes can range from less than two to greater than five years (Dumbauld et al. 2009; Tallis et al. 2009; Wisehart; 2007, Boese 2002).

3.1.4. Benthic Community

Most shellfish activities affect the existing benthic community to some degree due to the physical disturbance of the substrate. Each phase of the aquaculture cycle of activity which is characterized by bed preparation (e.g., tilling), planting (e.g., net installation), maintenance (e.g., cleaning area nets), and harvest results in physical disturbance of the benthic community and often a temporary decrease in abundance of many infaunal and epifaunal species (Vanblaricom et al. 2015; Mercaldo-Allen and Goldberg 2011; WDNR 2014b; Straus et al. 2013; Dumbauld 2008; Heffernan 1999; Bendell-Young 2006; Simenstad and Fresh 1995). Bed preparation activities often directly remove many species including bivalve predator species, bivalve competitor species, and commercial species such as bivalves/burrowing shrimp. Bag culture techniques result in bags with bivalves placed directly on the substrate smothering the existing benthic community. The magnitude and duration of the effect is variable depending on the activity, individual husbandry practices, and environmental conditions. The benthic community typically recovers in a period of weeks or months depending on the activity (Vanblaricom et al. 2015; WDNR 2014b; Mercaldo-Allen and Goldberg 2011; WDNR 2008).

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Benthic community diversity and/or composition may be altered as a result of physical changes to the substrate depending on the specific culture method and activity. Oyster bottom culture results in a shift in the composition of the benthic community to an oyster dominated community. This may have positive, negative or neutral effects on individual species. Areas with mature oyster bottom culture may have a comparable level of species diversity and abundance to an eelgrass based habitat (Ferraro and Cole 2007). Once oysters are harvested, the benthic community may begin transition back to the pre-oyster based community that existed previously. Regular graveling can result in shifts in the composition of the benthic community due to the change in substrate composition over time (Simenstad and Fresh 1995, Simenstad et al. 1991). When activities result in removal of eelgrass, a corresponding change in the benthic community occurs (Carvalho et al. 2006, Simenstad and Fresh 1995). Changes in sediment chemistry from nutrient enrichment can result in decreased benthic community abundance and diversity for some culture methods (Heffernan 1999; Stenton-Dozey 2001). Shifts in benthic community composition diversity are less clear for other culture methods and the subject of active study. Chemical changes to the benthic habitat can also occur as a result of aquaculture, particularly under floating rafts, where nutrients and aquaculture debris can accumulate.

Activities that include installation of artificial structure such as geoduck tubes, nets, bags, or longlines may result in shifts in benthic macrofauna. In a study of geoduck tubes, increased numbers of transient fish and macro invertebrate species were found when the structure was in place (McDonald et al. 2015). Effects ended when the structure was removed. Tubes and nets are typically in place for 2 to 3 years before harvest at 4 to 7 years. A study of rack and bag culture also suggested habitat benefits of the structure to certain fish and invertebrate species (Dealteris et al. 2004). Studies with area nets have been variable with no changes in species composition and diversity in some cases (Vanblaricom et al. 2015; Simenstad et al. 1993) and altered species diversity and composition measured in others (Bendell-Young 2006).

3.1.5. Fish and Birds

In-water activity, noise, and increases in suspended sediment would displace many fish species and birds from localized work areas. Temporary decreases in benthic community abundance would locally decrease available prey for fish. Eelgrass provides important habitat and prey for many fish and bird species including juvenile salmon. In areas where eelgrass is removed, the fish community may be negatively affected (NMFS 2005).

Forage fish are an important prey resource for many species including Chinook salmon, steelhead, bull trout and marbled murrelet. Several forage fish including Pacific herring, surf smelt, and Pacific sand lance spawn throughout the action area. Spawning and egg incubation could potentially be affected by shellfish activities. In the Puget Sound region, herring spawn in the lower half of the intertidal or shallow subtidal zone down to a depth of -10 ft MLLW depending on water clarity (Penttila 2007). Native eelgrass, *Z. marina*, is of primary importance as a herring spawning substrate. Spawning also occurs on other aquatic vegetation and rocks. The removal of vegetation, which may occur as a result of some of the shellfish activities could decrease available spawning habitat for herring. Spawning has occurred on shellfish gear such as racks or tubes (Pentilla 2007). Work in areas with spawn may kill the eggs.

Sand lance deposit their eggs in substrate that is predominantly sand in the high intertidal above +5 ft MLLW. Surf smelt tend to spawn in substrates with a mix of sand and gravel above +7 ft MLLW (Penttila 2007). Shellfish activities conducted when spawning is occurring or after eggs have been deposited could potentially disturb these species or destroy eggs. Culture and harvest activities would not typically occur above +7 ft MLLW but would occur below that elevation in the zone where sand lance may deposit eggs. Above +7 ft, shellfish activities would still occur including general travel to and from shellfish activity areas, temporary storage/staging of equipment, and grounding of floats which all could result in trampling, smothering, or loss of eggs.

Area nets used for clam and geoduck culture could potentially entrap fish, birds, or other aquatic species if they become loose or dislodged (Bendell 2015, Corps 2014b, Smith et al. 2006). This could occur due to variable husbandry practices with respect to net installation and maintenance, the high energy of the marine environment which makes securing nets difficult, and large wood debris strikes that create holes in the nets. Rack and/or bag culture could also entrap fish species by creating a physical barrier across the tidelands (Figure 2-10). This barrier could temporarily impound water and/or prevent fish from returning to deeper water during a receding tide which would result in stranding fish on the tidelands. The density and orientation of the structure relative to water drainage patterns would be particularly important in determining the risk of this occurring. Finally, nets associated with floating rafts would exclude fish from habitat under the rafts. Net deployment may occasionally capture fish depending on the depth of the nets.

3.1.6. Contaminants

The use of vessels and vehicles could result in accidental discharges of fuel, lubricants, and hydraulic fluids. The effect on water quality depends on the type of contaminant spilled, time of year, spill volume, and success of containment efforts.

Plastic debris such as nets and tubes may break free from project sites and be released to the environment. These materials eventually breakdown in the environment into small plastic particles called microplastics which can be ingested by organisms and accumulate up the food web (Wright et al 2013). Microplastics have been found in numerous species including fish and shellfish species and documented to have adverse effects (Lönnstedt and Eklöv 2016). Microplastics have been found in Puget Sound (Davis and Murphy 2015). It is uncertain to what degree aquaculture contributes to this debris.

3.1.7. Noise

Noise from equipment operation could temporarily disturb and displace both aquatic and upland species from the local area. The types of vessels commonly used for shellfish activities are listed in Table 2-1. To estimate noise produced by shellfish activities, an analysis was conducted using data from Wyatt (2008) for a commonly used vessel, a 21-foot Boston Whaler with a 250 horsepower Johnson 2-cycle outboard motor. Operating this vessel at full speed produced a sound measured at 147.2 decibels (dB) root mean square (RMS) re 1 microPascal at 1 meter[1]. Assuming a background underwater sound level

[1] In this document, underwater sound pressure levels given in units of dB RMS and dB peak are referenced to a pressure of 1 microPascal and sound pressure levels given in dB SEL (sound exposure level) are referenced to 1 microPascal^2 second unless otherwise noted.

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of 120 dB RMS, which is the threshold established by NMFS for behavioral effects to marine mammals, and using the practical spreading loss model preferred by NMFS and USFWS, sound produced by this vessel would attenuate to 120 dB RMS within 65 meters (213 feet). Larger vessels could also be used on occasion which could potentially generate greater underwater sound levels.

The intermittent use of power equipment is likely to produce in air noise of up to 81 dBA for dive harvesting and 82 dBA for shoreline work. Over marine water, the 81 dBA value would attenuate to the background level (57 dBA) within 792 feet and over a terrestrial habitat the 82 dBA would attenuate to the background noise level of a rural environment (35 dBA) within 3793 feet (0.71 mile). Maximum surface noise levels from boat operations and dive support equipment for subtidal geoduck harvest was measured at 61 to 58 dBA at a distance of 100 feet where auxiliary equipment was housed on deck and 55 to 53 dBA where equipment was housed below deck (WDNR 2008).

3.1.8. Summary

Effects of the various shellfish activities on habitat are summarized in Table 3-1. It is a summary of worst-case effects that would not necessarily occur in all locations where the activity is occurring. Substantial local variability would be expected due to individual grower practices (e.g., densities, scale, techniques) and environmental conditions.

Table 3-1. Summary of shellfish activity effects on habitat

Shellfish Activity	Cultured/ Harvested Species	Primary Effects on Habitat
floating culture and harvest methods		
floating culture with rafts, anti-predator nets	mussel	• altered benthic substrate dominated by shell/barnacle debris • nutrient enrichment of sediments; potential anoxia • decreased benthic species diversity and abundance • shaded substrate limiting or preventing aquatic vegetation • potentially trap fish, bird species within nets • contributes plastic debris to the aquatic environment (e.g., disks, nets)
surface longlines	mussel, oyster, clam	• limited shading of substrate, minor effects on aquatic vegetation
FLUPSYs	oyster, clam, geoduck	• shades substrate preventing or limiting growth of aquatic vegetation
ground-based culture and harvest methods		
oyster bottom culture	oyster	• altered benthic habitat and species composition • aquatic vegetation replaced by oyster habitat
longline, stake culture	oyster	• altered benthic habitat, nutrient enrichment; potential effect on benthic community composition • reduction of aquatic vegetation • increased sedimentation • potential disruption of fish travel patterns, foraging

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Shellfish Activity	Cultured/ Harvested Species	Primary Effects on Habitat
rack and bag culture	oyster	• altered benthic habitat; potential effect on benthic community composition • aquatic vegetation removed • creates barriers to tidal flow; altered sedimentation/erosion patterns • contributes plastic debris to the aquatic environment • potential migration barrier and stranding of fish and other species • loss of forage fish spawning habitat (e.g., sand lance)
clam ground culture	clam	• altered substrate due to graveling, artificial structure (e.g., nets); shift in benthic community composition over time due to regular graveling • aquatic vegetation removed, reduced due to artificial structure, activities • loss of forage fish spawning habitat (e.g., sand lance)
bag culture (bags directly on substrate)	clam, oyster	• altered benthic habitat; potential effect on benthic community composition • aquatic vegetation removed, reduced due to artificial structure, activities • contributes plastic debris to the aquatic environment • loss of forage fish spawning habitat (e.g., sand lance)
geoduck culture	geoduck	• altered benthic habitat; potential effect on benthic community composition • aquatic vegetation removed, reduced due to artificial structure, activities • contributes plastic debris (e.g., PVC tubes, nets) to the aquatic environment
low tide activities		
install and maintenance of area nets	clam, geoduck	• altered benthic habitat; temporary decrease in benthic community abundance • lost and unsecured nets lead to fish and wildlife entanglement
'hand' harvest (rakes, shovels, containers)	clam, oyster	• substrate disturbance, temporary decrease in benthic community abundance, aquatic vegetation (e.g., eelgrass) • short-term increase in suspended sediments • potential loss of forage fish eggs (e.g., sand lance)
bed preparation (mechanized tilling, leveling substrate, hydraulic pre-harvest)	oyster, clam, geoduck	• substrate disturbance, temporary decrease in benthic community abundance, • aquatic vegetation removed, reduced • short-term increase in suspended sediments • altered, filled tidal channels
low tide hydraulic harvest	geoduck	• substrate disturbance, temporary decreases in benthic community abundance, • aquatic vegetation removed, reduced • short-term increase in suspended sediments
longline harvest	oyster	• substrate disturbance, temporary decreases in benthic community abundance, • aquatic vegetation removed, reduced
vehicle and vessel traffic on tidelands	oyster, clam, geoduck, mussel	• localized compaction of substrate , smothering of benthic community, aquatic vegetation • compaction, smothering of incubating surf smelt and sand lance eggs
temporary equipment storage on tidelands; use	oyster, clam, geoduck, mussel	• localized compaction of substrate , smothering of benthic community, aquatic vegetation • compaction, smothering of incubating surf smelt and sand lance eggs • shades substrate limiting or precluding vegetation

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Shellfish Activity	Cultured/ Harvested Species	Primary Effects on Habitat
of floats, work platforms		
in-water activities		
dredging, harrowing, longline harvest	oyster, clam	• in-water disturbance, noise, increased suspended sediments • substrate disturbance, temporary decreases in benthic community abundance • aquatic vegetation (e.g., eelgrass) removed • potential loss of forage fish eggs (e.g., herring)
graveling	oyster, clam	• gradually alters substrate from mud/sand to firmer, gravelly substrate; altered benthic community over time • in-water disturbance, noise, increased suspended sediments
hydraulic dive harvest	geoduck	• in-water disturbance, noise, increased suspended sediments • substrate disturbance, temporary decreases in benthic community abundance • aquatic vegetation (e.g., eelgrass) removed • potential loss of forage fish eggs (e.g., herring) • disruption of fish travel patterns, foraging

3.2. Spatial Extent and Frequency of Effects

The following section discusses the scale and frequency of activities and effects resulting from the proposed action.

3.2.1. Extent of Floating Activities

Floating aquaculture occurs in all of the geographic regions except for Grays Harbor. In all cases the acreages involved are negligible in the context of each region. Activities are concentrated in a few embayments (e.g., Quilcene Bay, Penn Cove) where the acreage covers a larger percent of the embayment area (see figures in Appendix D). Effects would be limited to the immediate proximity of the work areas and would continue for the duration of the permit authorization and likely beyond.

3.2.2. Extent of Tideland Activities

The vast majority of the ground-based continuing active and fallow/new activities would occur in the intertidal zone as would all of the new aquaculture, restoration, and recreation activities. An unknown but likely insignificant percentage of the ground-based continuing aquaculture activities (both active and fallow) would occur in the shallow subtidal zone. For these reasons and to simplify the analysis, the entire ground-based acreage is considered intertidal. The percentage of the total intertidal acreage that would be devoted to shellfish activities within each geographic region is summarized in Table 3-2. The total tideland acres are based on the area classified as marine tideland in the Washington State aquatic parcel GIS database (WDNR 2014a). Marine tidelands extend from ordinary high tide down to extreme

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low tide (WDNR 2013a). This analysis indicates proportionally how much of the intertidal habitat would be affected by the proposed action.

Table 3-2. Project area acreage relative to total tideland acreage

	Grays Harbor		Willapa Bay		Hood Canal		South Puget Sound		North Puget Sound		Total	
	acres	% of tidelands	acres	% of tidelands	acres	% of tidelands	acres	% of tidelands	acres	% of tidelands	acres	% of tidelands
Total marine tideland acres	41,115		49,194		11,378		30,075		84,283		216,045	
Total continuing	4,000	10%	40,000	81%	2,000	18%	4,000	13%	5,000	6%	55,000	25%
continuing fallow	1,820	4%	9,468	19%	402	4%	780	3%	2,333	3%	14,803	7%
new	24	0.1%	19	0.0%	105	0.9%	106	0.4%	78	0.1%	332	0.2%
cumulative total (continuing + new)	4,024	10%	40,019	81%	2,105	19%	4,106	14%	5,078	6%	55,332	26%

For all regions combined, the continuing fallow and new shellfish activity would occur on 8% of the combined tidelands. This varies between a low of 3% in South Puget Sound to a high of 19% in Willapa Bay. Continuing active aquaculture activities occur on 10% of the combined tidelands across all the regions although there is quite a bit of variability ranging from a low of 2% in North Puget Sound to a high of 33% in Willapa Bay. The cumulative total percentage of tidelands with some form of shellfish activity is 18% across all the regions. This coarse scale analysis illustrates the geographic magnitude of the action. Comparatively higher percentages of tidelands may be affected in individual embayments within each region. For example, in South Puget Sound, shellfish activities are concentrated in the far south and west corner of the region (see Appendix D). In north Puget Sound, shellfish activities are concentrated in several smaller embayments including Samish Bay, Discovery Bay, and Kilisut Harbor.

The acreages classified as fallow and new contain relatively undisturbed habitat currently. The action would result in a change from this undisturbed habitat to an aquaculture farm. Activities with effects similar to those described in Section 3.1 would occur on this acreage over the period of the permit authorization.

3.2.3. Frequency of Disturbance

Some of the proposed shellfish activities may only be conducted once in that footprint over the anticipated 5 year period of the permit authorization and thus would have a very limited period of effects. In other cases, multiple activities may occur on a given footprint annually or potentially more

frequently. For example active maintenance of cover nets for clams could occur monthly. Active oyster bottom culture on a given footprint could include two successive dredges, harrowing, and graveling each year. The frequency of activities on most acreage would fall somewhere in between these extremes. The variability in activity frequency among shellfish growers is also high. Table 3-3 lists frequencies of occurrence for a number of the activities. The information was gathered from individuals engaged in aquaculture in the State of Washington (Corps 2014a, Corps 2011).

Table 3-3. Shellfish activity frequency of occurrence and acres completed per day

Activity	Acres completed per day	Frequency of occurrence
mussel harvest	--	12-14 months
graveling	1	1 year
harrowing/tilling	5	1 - 4 years
dredge harvest (includes for transplanting)	0.5	1 - 4 years
longline mechanical harvest	0.125	3 years
geoduck harvest (in cultured areas)	.01 - .06	4 - 7 years
clam raking	0.05 - 0.1	3 yrs
clam mechanical harvest	0.8	3 years
net install, removal (clam, geoduck)	--	2 - 3 yrs

Note: This information does not necessarily encompass the full range of activity rates and frequencies for the activities. There is wide variability. The information is considered representative but is based on a limited sampling of aquaculture growers (sources Corps 2014a, Corps 2011).

For some areas, particularly larger aquaculture acreages, there is a progression of activity from one end of the acreage to the other that may occur over a series of days, weeks, or longer. Certain effects, such as increases in suspended sediment, from one part of the acreage may drift over locations where the activity had previously been completed thereby extending the duration of effects in that location. This is most applicable to those activities that take comparatively longer to conduct (see Table 3-3). For example, harvest of cultured geoduck is a comparatively time consuming activity that could occur for months at a particular location as it slowly progresses across the acreage.

Most of the activities occur at a frequency of only once every year, or once every few years on given acreage. In the context of the temporary impacts that occur with the activities, the relevance of this frequency is dependent on recovery from the impact. Effects that diminish quickly such as increases in suspended sediment are minor in the context of a once per year frequency. The collective activities conducted on a particular acreage may increase this to 3 or 4 times per year. Collectively the total period of effects is still minor and on the order of days. For impacts that require a slightly longer period for recovery such as the benthic community (weeks to months) following bed preparation or harvest activities, the period for effects would be comparatively longer. For impacts where recovery times are on the order of years, such as disturbance to eelgrass, an annual or every few year repeat disturbance

may never allow a full recovery of the eelgrass from the impact or the impact would be repeated shortly after recovery is achieved.

In-water Disturbance

Activities conducted in-water include graveling, harrowing, dredging, mechanical longline harvest, and geoduck dive harvest where there is potential to directly affect fish species. To determine the frequency and extent of these in-water activities at a regional scale, estimates were made for the total acres per day worked and total activity days for each region. 'Acres worked per day' is an estimate of the number of acres that would be worked every day for one year to complete the tasks in one year. The analysis assumes the activity effort is equally spread across the entire year which may be unrealistic but does provide some indication of the relative scale of the collective activity level. 'Activity days per year' is an estimate of the number of days that are required to be worked in order to complete the task on the activity acres during one year. It is analogous to 'man-days'. More detail including the methodology used to develop the estimates can be found in Appendix C. The locations of the specific in-water activities can be found in Appendix F. This analysis is for work that occurs in the intertidal zone, so it does not include subtidal geoduck dive harvest.

The analysis suggests work is regularly occurring, perhaps on a daily basis, at the regional scale. This is consistent with the idea that shellfish product must be delivered to market on a regular and perhaps daily basis. Willapa Bay is by far the region with the most work occurring. There are an estimated 139 acres that would be worked each work day to accomplish all the tasks in one year. Relative to the total tideland acreage per region, the acres worked per day estimate is negligible (0.3% in Willapa Bay). If assume work only occurs once per month, this increases to 6% of the tidelands worked in Willapa Bay on that one day per month. In some small embayments where shellfish activities are more concentrated, this percentage of activity relative to the total tidelands in that one embayment would be higher.

Table 3-4. Estimated frequency in-water activities would be conducted in the intertidal zone (see Appendix C for details)

		acres engaged in in-water activities	in-water activity acres worked/day	in-water activity days/year
Grays Harbor	Continuing active	2,018	5.9	4,003
	Cont. fallow & new	2,885	9.5	5,579
	Subtotal	4,903	15.4	9,582
Willapa Bay	Continuing active	25,113	86.0	42,542
	Cont. fallow & new	15,164	53.2	25,340
	Subtotal	40,277	139.1	67,882
Hood Canal	Continuing active	645	1.6	1,408
	Cont. fallow & new	1,609	4.9	2,719
	Subtotal	2,254	6.6	4,127
South Puget Sound	Continuing active	2,283	7.9	3,959
	Cont. fallow & new	1,939	6.1	3,551

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	Subtotal	4,222	14.0	7,510
North Puget Sound	Continuing active	1,649	6.0	2,531
	Cont. fallow & new	3,162	11.3	3,912
	Subtotal	4,811	17.3	6,443
Total	Continuing active	31,708	107.4	54,442
	Cont. fallow & new	24,759	85.0	41,101
	Grand Total	56,467	192.4	95,543

Note: acres worked/day assumes work occurs each work day throughout the year (260 work days/yr)

3.2.4. Cover Nets and Artificial Structure

Culture methods that result in a change to the substrate (e.g., bag culture, cover nets) would result in impacts that may be more or less continuous for the period of the permit authorization because there is no recovery or return to the prior substrate and habitat conditions. A new crop of bags would be placed shortly after the previous crop is harvested. Geoduck culture would result in periods with and without structure. Depending on individual grower practices, structure to support geoduck culture is expected to occur between 30 and 100% of the time.

The placement of artificial structure for growing shellfish occurs in all the geographic regions. The number of acres potentially with artificial structure is summarized by region in Table 3-5. These acreages are best interpreted as a maximum for each culture method which, if implemented, would result in a less than equivalent decrease in acreage for another activity in the region (see discussion in Appendix B). The geographic locations where cover nets would occur for the continuing active and fallow acres are illustrated in Appendix G. It is assumed that all new aquaculture activities will also employ methods using artificial structure. Restoration and recreation related activities are generally not expected to employ artificial structure although there may some exceptions.

Table 3-5. Artificial structure by region

		Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget
oyster longline/stake	active	732	4,377	268	171	719
	fallow	533	1,913	77	51	2,081
rack and/or bags (clam and oyster)	active	29	829	115	189	328
	fallow	6	72	23	51	2,050
geoduck tubes	active	0	1	453	931	369
	fallow	0	67	110	518	2,108
cover nets	active	0	3,380	538	2,011	637
	fallow	0	2,637	337	724	2,204
new aquaculture		100	100	438	448	315
total	active	861	8,687	1,812	3,750	2,368

	fallow & new	639	4,789	985	1,792	8,758
total (plastic structure only)	active	129	4,310	1,544	3,579	1,649
	fallow & new	106	2,876	908	1,741	6,677

Notes:

1. Acreages are likely overstated by some unknown amount due to double or triple counting associated with limited detail on permit applications (See App. B). Acreages are best interpreted as a maximum for each activity which, if implemented, would result in a less than equivalent decrease in acreage for another activity in the region.
2. All new acres assumed to potentially contain plastic structure or longline/stake.

3.2.5. Eelgrass

The continuing active and fallow aquaculture acres could potentially occur in areas with eelgrass. A geographic analysis was conducted to estimate the aquaculture acreage potentially co-located with eelgrass. A description of the analysis, detailed results, and figures illustrating geographic locations where aquaculture and eelgrass are co-located can be found in Appendix D. The results provide a conservative estimate of aquaculture co-located with eelgrass appropriate for this analysis. The results are summarized in Table 3-6. They suggest there is substantial overlap between eelgrass and much of the continuing active and fallow aquaculture acreage. This pattern occurs in all the geographic regions. An estimated 14,803 acres of continuing active aquaculture is potentially co-located with eelgrass across all the geographic regions. This results in reduced productivity and habitat function for this eelgrass as discussed in Section 7.1. This is an ongoing effect under the environmental baseline that will continue under the proposed action. An estimated 11,227 acres of continuing fallow acreage would be co-located with eelgrass under the proposed action. Effects to eelgrass in the fallow areas would be considered new effects relative to the environmental baseline. The magnitude of effect would be dependent on the type of culture method employed and the activities conducted as described in Section 7.1.

Willapa Bay has by far the most overlap between eelgrass and the continuing active and fallow acres. This is followed by the North Puget Sound and Grays Harbor regions where over 1,000 acres of eelgrass are estimated to overlap with the fallow acreage. Aquaculture activities (active and fallow) are more often than not co-located with eelgrass in Willapa Bay, Grays Harbor, and the North Puget Sound Region. In the Hood Canal region, aquaculture acreage is equally split between areas with and without eelgrass. The South Puget Sound region appears to be the notable exception where a minority of the acreage is co-located with eelgrass. Continuing aquaculture activities would occur in 49% of the total mapped eelgrass acreage in Willapa Bay and 21% of the mapped eelgrass in Hood Canal. These percentages are less in the other regions.

Table 3-6. Summary of shellfish activities potentially co-located with eelgrass

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound	Total
# continuing active footprints	17	161	34	2	21	235
continuing active acres	766	12,170	392	180	1,131	14,803

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# continuing fallow footprints	13	81	42	1	13	150
continuing fallow acres	1,152	7,448	294	95	2,239	11,227
Total acres (active & fallow):	1,918	19,618	685	275	3,370	25,866
% of continuing active acreage potentially co-located with eelgrass	67%	74%	41%	8%	84%	66%
% of continuing fallow acreage potentially co-located with eelgrass	63%	79%	73%	12%	96%	76%
% of eelgrass in region potentially co-located with aquaculture (active & fallow)	5%	49%	21%	9%	7%	20%

Note: See Appendix D for more detail, summary of methodology, and geographic locations

3.2.6. Forage Fish

The continuing active and fallow acreages could be co-located with forage fish spawning areas and thus affect spawning success as discussed previously in Section 7.1. A geographic analysis was conducted to estimate the aquaculture acreage potentially co-located with forage fish spawning areas. A description of the analysis, detailed results, and figures illustrating geographic locations where aquaculture and forage fish spawning are co-located can be found in Appendix E. The analysis is summarized in Table 3-7 and suggests there is substantial overlap between forage fish spawning locations and aquaculture activities. There are an estimated total of 3,297 fallow acres across all regions co-located with forage fish spawning areas. In the two Puget Sound regions and in Hood Canal, active and fallow acreage is co-located with mapped spawning habitat for all three forage fish species analyzed. In Grays Harbor and Willapa Bay, aquaculture acreage appears co-located only with herring spawning areas.

Table 3-7. Summary of continuing active and fallow acreage potentially co-located with WDFW mapped forage fish spawning areas

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound	Total
Herring						
continuing active acres	73	2,200	211	79	486	3,049
continuing fallow acres	0	510	58	14	2,184	2,766
Surf smelt						
continuing active acres	0	0	130	532	59	721
continuing fallow acres	0	0	67	359	15	441
Sand lance						
continuing active acres	0	0	169	78	79	326
continuing fallow acres	0	0	28	20	42	90
total *active* acres co-located with spawning areas	73	2,200	510	688	623	4,094

COE 125643

% of total active acres co-located with spawning areas	6%	13%	54%	29%	46%	18%
total *fallow* acres co-located with spawning areas	0	510	153	394	2,241	3,297
% of total fallow acres co-located with spawning areas	0%	5%	37%	50%	96%	22%
cumulative total (active + fallow):	73	2,710	663	1082	2,864	7,391
% of cumulative total co-located with spawning areas	2%	10%	49%	34%	78%	20%

Note: See Appendix E for more detail, summary of methodology, and maps.

The analysis suggests that Willapa Bay and North Puget Sound are the regions where the most overlap may occur on an acreage basis. Relative to the total mapped herring spawning area in each region, activities in Willapa Bay tend to occur in well over half of the mapped spawning area, by far the largest proportion of any of the regions. Most of this overlap is with ongoing aquaculture activities. The North Puget Sound region contains the most fallow acres (2,241 acres) potentially co-located with forage fish spawning areas. Much of this is overlap with the herring spawning area in Samish Bay. The South Puget Sound region active and fallow acres are co-located more with surf smelt spawning areas relative to the other two species.

Table 3-8. Percent of total mapped herring spawning area potentially affected by continuing activities in active and fallow areas

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget [illegible]
Total WDFW mapped herring spawning acres	462	4,691	5,179	4,740	33,730
% of total mapped herring acres that potentially overlap with continuing active acres	16%	47%	4%	2%	1%
% of total mapped herring acres that potentially overlap with continuing fallow acres	0%	11%	1%	0.3%	6%

3.3. Summary of Primary Effects by Region

This section summarizes the future expected activities and habitat effects for each of the geographic regions.

3.3.1. Grays Harbor

Oyster bottom culture and its related activities predominate in Grays Harbor with longline culture also common. In-water activities common to the region include dredging, harrowing, and longline harvest.

COE 125644

This is expected to continue in the future. Fallow and new acreage is also anticipated to be predominantly for oyster culture using the same methods. The mechanical clam harvester and cover nets are being introduced to Grays Harbor on 363 acres of existing project area. It is assumed that all anticipated new activities could contain cover nets or bags for clam culture.

A total of 5% of the total tidelands in the region would be altered from the current relatively undisturbed condition to an aquaculture farm with corresponding effects on the habitat and species. Effects from activities conducted on this acreage would persist for the duration of the permit authorization and likely longer assuming the farm remains in business. Cumulatively, effects from all shellfish activities including on acreage classified as continuing active would occur on 7.5% of the tidelands in Grays Harbor. Effects would be concentrated in the North and South lobes of the embayment on the extensive tidelands in these areas (see Figure D-1).

There are an estimated 1,152 fallow acres co-located with eelgrass in Grays Harbor. The action assumes oyster bottom and longline culture methods would occur in these areas in the future. This would substantially reduce or eliminate the eelgrass in these areas at least during significant portions of the culture and harvest cycle. It does not appear that any fallow acreage is co-located with forage fish spawning areas so no impact to these species is anticipated.

Temporary habitat effects of the activities include short-term degradation of water quality, noise and general activity disturbance, and temporary decreases in benthic community abundance. These activities would be expected to displace fish and other species in the immediate vicinity of the activity. The frequency of in-water work is conservatively estimated to be 10 acres worked per day averaged over one year for activities on fallow and new acres and 15 acres per day for all shellfish activities, which is 0.04% of the total tideland area in the Grays Harbor region.

3.3.2. Willapa Bay

Oyster bottom culture is the primary culture method in Willapa Bay with a lesser amount of longline culture, limited oyster rack and bag culture and some clam culture. There does appear to be substantial acreage with cover nets. In-water activities common to the region include dredging, harrowing, graveling, and longline harvest. This relative distribution of culture methods and individual activities is expected to continue in the future on both continuing active and fallow acres. New activities are expected to be focused on geoduck culture with lesser amounts of clam, oyster, and mussel culture. No restoration, recreation, or subtidal geoduck activities are expected to occur in Grays Harbor.

A total of 19% of the total tidelands in the region would be altered from the current relatively undisturbed condition to an aquaculture farm with corresponding effects on the habitat and species. Effects from activities conducted on this acreage would persist for as long as the permit authorization or the work occurs/farm remains in business. Cumulatively, effects from all shellfish activities including on acreage classified as continuing active would occur on 53% of the tidelands in Willapa Bay. Effects would occur throughout the region on the extensive tidelands that characterize the embayment.

There are an estimated 7,448 fallow acres co-located with eelgrass in Willapa Bay. The action assumes oyster bottom and the other activities listed above would occur in these areas in the future. This would substantially reduce or eliminate the eelgrass in these areas at least during significant portions of the culture and harvest cycle. There are an estimated 510 fallow acres co-located with herring spawning

areas. Spawning in these areas would be negatively affected primarily by the loss of eelgrass spawning substrate.

Temporary habitat effects of the activities include short-term degradation of water quality, noise and general activity disturbance, and temporary decreases in benthic community abundance. These activities would be expected to displace fish and other species in the immediate vicinity of the activity. The frequency of in-water work is conservatively estimated to be 53 acres worked per day averaged over one year for activities on fallow and new acres and 139 acres per day for all shellfish activities, which is 0.3% of the total tideland area in the Willapa Bay region.

3.3.3. Hood Canal

Oyster and clam culture are both common in Hood Canal with a smaller amount of geoduck. Bottom culture is the primary method for growing all species. There are lesser amounts of longline and rack and/or bag culture. An estimated 538 active and 337 fallow acres are estimated to use cover nets which is about 10% of the total acreage in Hood Canal. In-water activities that occur include graveling, dive harvest, and longline harvest. This relative distribution of culture methods and individual activities is expected to continue in the future on both continuing active, fallow, and new aquaculture acres.

A total of 8% of the total tidelands in the region would be altered from the current relatively undisturbed condition to an aquaculture farm with corresponding effects on the habitat and species. Effects from activities conducted on this acreage would persist for as long as the permit authorization or the work occurs/farm remains in business. Cumulatively, effects from all shellfish activities including on acreage classified as continuing active would occur on 16% of the tidelands. Hood Canal is a deep fiord like embayment characterized by narrow ribbons of tidelands along the shoreline interrupted by small estuaries at river mouths that have a somewhat greater tideland area depending on the size of the river. Activities and their effects would be focused along these shoreline areas and estuaries throughout the region.

There are an estimated 257 fallow acres co-located with eelgrass in Hood Canal. The action assumes oyster and clam bottom and the other activities listed above would occur in these areas in the future. This would substantially reduce or eliminate the eelgrass in these areas at least during significant portions of the culture and harvest cycle. There are an estimated 153 fallow acres co-located with forage fish spawning areas. Spawning in these areas would be negatively affected primarily by the loss of aquatic vegetation spawning substrate and smothering of eggs.

Temporary habitat effects of the activities include short-term degradation of water quality, noise and general activity disturbance, and temporary decreases in benthic community abundance. These activities would be expected to displace fish and other species in the immediate vicinity of the activity. The frequency of in-water work is conservatively estimated to be 5 acres worked per day averaged over one year for activities on fallow and new acres and 7 acres per day for all shellfish activities, which is 0.05% of the total tideland area in the Hood Canal region.

3.3.4. South Puget Sound

Oyster and clam culture are both common in South Puget Sound followed closely by geoduck. Bottom culture is the primary method for growing all species with some longline and rack and/or bag culture.

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Cover nets are common and occur on about 75% of the continuing footprints. An estimated 2,011 active and 724 fallow acres are estimated to use cover nets. In-water activities that occur include dredging, graveling, dive harvest, and longline harvest. This relative distribution of culture methods and individual activities is expected to continue in the future on both continuing active, fallow, and new aquaculture acres.

A total of 5% of the total tidelands in the region would be altered from the current relatively undisturbed condition to an aquaculture farm with corresponding effects on the habitat and species. Effects from activities conducted on this acreage would persist for as long as the permit authorization or the work occurs/farm remains in business. Cumulatively, effects from all shellfish activities including on acreage classified as continuing active would occur on 12% of the tidelands. Activities and effects in the South Puget Sound region would be focused in the south and east part of the region along shoreline areas and in small embayments although new activities could occur throughout the region. Most of the acreage in some of these smaller estuaries may be engaged aquaculture.

There are an estimated 115 fallow acres co-located with eelgrass in South Puget Sound. The action assumes the shellfish activities listed above would occur in these areas in the future. This would substantially reduce or eliminate the eelgrass in these areas at least during significant portions of the culture and harvest cycle. There are an estimated 394 fallow acres co-located with forage fish spawning areas, primarily for surf smelt. Spawning in these areas would be negatively affected primarily by the smothering of eggs.

Temporary habitat effects of the activities include short-term degradation of water quality, noise and general activity disturbance, and temporary decreases in benthic community abundance. These activities would be expected to displace fish and other species in the immediate vicinity of the activity. The frequency of in-water work is conservatively estimated to be 6 acres worked per day averaged over one year for activities on fallow and new acres and 14 acres per day for all shellfish activities, which is 0.05% of the total tideland area in the South Puget Sound region. Given the concentration of activity acreage in the south and east corner of the region, the frequency of activity in this area would be quite a bit higher than this average.

3.3.5. North Puget Sound

Oyster and clam culture are both common in North Puget Sound with a very small amount of geoduck. Bottom culture is the primary method for growing all species with some longline, stake, and rack and bag culture. Cover nets are common and occur on about 46% of the continuing footprints. An estimated 637 active and 2,204 fallow acres are estimated to use cover nets. In-water activities that occur include graveling, harrowing, dive harvest, and longline harvest. This relative distribution of culture methods and individual activities is expected to continue in the future on both continuing active, fallow, and new aquaculture acres.

A total of 3% of the total tidelands in the region would be altered from the current relatively undisturbed condition to an aquaculture farm with corresponding effects on the habitat and species. Effects from activities conducted on this acreage would persist for as long as the permit authorization or the work occurs/farm remains in business. Cumulatively, effects from all shellfish activities including on acreage classified as continuing active would occur on 5% of the tidelands. Activities and effects in the

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North Puget Sound region would be focused in a handful of embayments including Samish Bay, Discovery Bay, Sequim Bay, Kilisut Harbor and in the vicinity of Skagit Bay. The percent of tidelands engaged in shellfish activities in these embayments would be significantly higher than this regional average. For example, 50% of the tidelands in Samish Bay contain continuing active or fallow acreage. New activities could occur throughout the region.

There are an estimated 2,194 fallow acres co-located with eelgrass in North Puget Sound. The action assumes the shellfish activities listed above would occur in these areas in the future. This would substantially reduce or eliminate the eelgrass in these areas at least during significant portions of the culture and harvest cycle. There are an estimated 2,241 fallow acres co-located with forage fish spawning areas, primarily for herring. Spawning in these areas would be negatively affected by the loss of eelgrass spawning substrate.

Temporary habitat effects of the activities include short-term degradation of water quality, noise and general activity disturbance, and temporary decreases in benthic community abundance. These activities would be expected to displace fish and other species in the immediate vicinity of the activity. The frequency of in-water work is conservatively estimated to be 11 acres worked per day averaged over one year for activities on fallow and new acres and 18 acres per day for all shellfish activities, which is 0.02% of the total tideland area in the region. The frequency of activity in the embayments where activities are concentrated would be significantly higher than this regional average.

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4. Cumulative Impacts

This analysis assesses cumulative impacts of the proposed action as defined under the National Environmental Policy Act (NEPA) and the CWA Section 404(b)(1) regulations. Under NEPA, a cumulative impact as defined as follows:

> *Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time* (40 CFR 1508.7).

A determination of significance under NEPA requires considerations of both context and intensity. Context "means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 CFR 1508.27(a)). Intensity "refers to the severity of impact" (40 CFR 1508.27(b)). According to the CFR, the following should be considered when evaluating intensity:

> (1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
>
> (2) The degree to which the proposed action affects public health or safety.
>
> (3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
>
> (4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> (5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
>
> (6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
>
> (7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
>
> (8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The CEQ guidance document "Considering Cumulative Effects under the National Environmental Policy Act" (1997) and the 2005 memo from CEQ (CEQ 2005) provides guidance on how to structure cumulative effects analysis. The steps are summarized in Table 4-1.

Table 4-1. Steps in cumulative effects analysis to be addressed in each component of environmental impact assessment (from CEQ 1997).

Table 1-5. Steps in cumulative effects analysis (CEA) to be addressed in each component of environmental impact assessment (EIA)

EIA Components	CEA Steps
Scoping	1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. 2. Establish the geographic scope for the analysis. 3. Establish the time frame for the analysis. 4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
Describing the Affected Environment	5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses. 6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds. 7. Define a baseline condition for the resources, ecosystems, and human communities.
Determining the Environmental Consequences	8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities. 9. Determine the magnitude and significance of cumulative effects. 10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects. 11. Monitor the cumulative effects of the selected alternative and adapt management.

Under CWA Section 404(b)(1) cumulative impacts are defined as follows:

Determination of cumulative effects on the aquatic ecosystem (40 CFR 230.11(g)).

(1) Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the

impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.

(2) Cumulative effects attributable to the discharge of dredged or fill material in waters of the United States should be predicted to the extent reasonable and practical. The permitting authority shall collect information and solicit information from other sources about the cumulative impacts on the aquatic ecosystem. This information shall be documented and considered during the decision-making process concerning the evaluation of individual permit applications, the issuance of a General permit, and monitoring and enforcement of existing permits.

The 404(b)(1) guidelines further state:

To predict cumulative effects, the evaluation shall include the number of individual discharge activities likely to be regulated under a General permit until its expiration, including repetitions of individual discharge activities at a single location (40 CFR 230.7b3).

The 404(b)(1) guidelines outlined in 40 CFR 230 guide how the analysis is conducted. This analysis only evaluates the proposal against 230.10 (c), determination of significant degradation, which is only one of the compliance requirements. Evaluation of the proposal against Subparts C thru F for cumulative effects are discussed below.

4.1. Scope of Analysis

CEQ guidance recommends that cumulative effects analysis focus on effects to the resources affected by the proposed action as opposed to the traditional focus on effects based on the perspective of the action (CEQ 2005, CEQ 1997). A focus on the resource helps ensure all effects to the resource itself are discussed in the context of the action. This approach has been adopted for the 2017 NWP 48 cumulative effects analysis. An important component of the analysis is identifying other unrelated actions, past, present, and reasonably foreseeable in the future, that have or could potentially affect the resources affected by the proposed action.

The 404(b)(1) guidelines require cumulative effects analysis evaluate effects of all potential activity conducted under the General permit (e.g., each permit verification). Effects to resources from other activities or a reissuance of the permit are beyond the scope. The CEQ guidelines for the NEPA analysis thus are broader in identifying and evaluating effects to resources. The analysis below is thus focused on this broader evaluation under NEPA. Cumulative effects under CWA would fall within the effects envelope described for NEPA.

4.1.1. Resources Affected

For practical purposes, the geographic footprint of the proposed action is Willapa Bay, Grays Harbor, and the greater Puget Sound or Salish Sea. This is where all of the historical NWP 48 authorized work has occurred in the past and where it is expected to occur for the 2017 version of the NWP 48. Effects

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to resources could thus occur in these regions. Due to the broad geographic area encompassed by the proposed action, the resources affected vary depending on the region.

In addition to being potentially affected by the proposed action, the following screening criteria were used to identify important affected resources for the analysis:

1. listed under the ESA, MSA or designated critical habitat in area;
2. provides a key ecological role (e.g., important component of the food web);
3. important to commercial or recreational fisheries;
4. is the focus of significant regional or national restoration or planning initiatives;
5. managed with some degree of regional or national protected status;

Resources that meet the above criteria have been categorized according to the three primary geographic areas in Table 4-2.

Table 4-2. Important resources affected by the proposed action

Grays Harbor	Willapa Bay	Puget Sound
Eelgrass (*Z. marina*)	Eelgrass (*Z. marina*)	Eelgrass (*Z. marina*)
Benthic invertebrate community	Benthic invertebrate community	Benthic invertebrate community
Salmon species (Chinook, coho, chum)	Salmon species (Chinook, coho, chum)	Salmon species (Chinook, coho, chum)
Pacific herring	Pacific herring	Pacific herring, sand lance, surf smelt
Dungeness crab	Dungeness crab	Dungeness crab
Green sturgeon	Green sturgeon	Canary rockfish, bocaccio
Pacific groundfishes (E. sole)	Ground fish (E. sole)	
Bull trout		Bull trout
Snowy plover	Snowy plover	

Consistent with CEQ guidance the cumulative effects analysis is not an exhaustive analysis on all species and resources affected. Rather the analysis is focused on those resources that are measurably affected by the action in an important way and that could be further impacted by other actions past, present, or reasonably foreseeable so that a more comprehensive review can be conducted on a smaller number of resources.

The effects analysis is focused on eelgrass, sand lance/surf smelt and the benthic community. The other species listed in Table 4-2 are not discussed.

The effects on some species, such as Dungeness crab and eelgrass, are directly related to effects on eelgrass. Other species such as salmon, rockfish and bull trout, while affected by the proposed action and other cumulative actions, can be evaluated through a surrogate species such as surf smelt. While not a perfect surrogate, this approach allows for a more comprehensive analysis as discussed above.

While snowy plover may be affected by the placement of new aquaculture in breeding areas or designated critical habitat for this species, activities currently do not occur within these areas and it is expected that they will be precluded in the future.

4.1.2. Geographic Scope of Cumulative Effects Analysis

The geographic area for the proposed action includes the Puget Sound/Salish Sea, Willapa Bay, and Grays Harbor. The Columbia River and coastal beaches are also included but no work is expected to be authorized here under NWP 48. Within this broad area, activities expected to be authorized by NWP 48 are concentrated geographically in Willapa Bay, certain areas of Grays Harbor, southeast Puget Sound, Hood Canal, and several embayments in north Puget Sound including.

The resources identified above extend broadly across the landscape. The geographic focus of the analysis is the State of Washington. Analysis is generally conducted at the watershed scale although effects to some species may extend beyond this scale due to the migratory range of the species. This is discussed in more detail in the sections discussing the individual resources.

The broad geographic area necessarily means that there are potentially many past, present, and future actions that could have some effect on the resources. Consistent with CEQ guidance for conducting cumulative effects analysis, the analysis is focused only on those actions with the greatest potential for meaningfully affecting the identified resources.

4.1.3. Temporal Scope of Cumulative Effects Analysis

The timeframe for cumulative effects analysis typically first considers the timeframe for the proposed action, which in this case is five years (CEQ 1997). Under the 404(b)(1) guidelines, the period of analysis is specifically defined as the expiration date of the General permit (40 CFR 230.7b3). This permit will expire in 2022. Effects of the action would then begin to dissipate after 2022. However, while the timeframe of the permit itself is five years, the work itself and more importantly its effects are expected to continue well beyond 2022. As was the case with the 2012 NWP 48 that preceded it, the 2017 NWP 48 is likely to be reissued in 2022 which means most if not all of the activities authorized under the previous permit along with additional new project area will be reauthorized in the future. Thus while the activities authorized under the 2017 NWP 48 permit will cease to be authorized in 2022, the activities themselves will most assuredly continue and be subsequently authorized by the next version of NWP 48 in 2022. Prior permittees typically have a one year grace period to apply for and be authorized under the reissued permit. It would be the unusual case for aquaculture acreage to decrease in this currently expanding industry.

As discussed above, the focus of cumulative effects analysis is on the resource itself. Effects to resources would continue with the reissuance of the NWP 48 in 2022. An analysis of cumulative effects under NEPA must therefore consider this additional work because it results in continued if not expanded impacts on the resource. The reissuance of NWP 48 in 2022 represents a set of potential future cumulative impacts, much the way climate change could result in cumulative impacts.

Whether a 2022 version of the NWP 48 is considered part of the proposed action or a separate action unto itself, its cumulative effects must still be evaluated according to eth CEQ guidelines (CEQ 1997). While there may be modifications to the reissued permit in 2022, these are anticipated to be minor and

all activities permitted in 2017 would also likely be eligible for the 2022 NWP 48, and subsequent versions of NWP 48. Selecting an appropriate timeframe for the analysis is somewhat arbitrary given that the aquaculture work is not expected to end but is instead expected to continue and become a more or less permanent feature of the environment. Aquaculture has been occurring on the landscape for over 100 years. The analysis therefore assumes that the work will continue and not end in 2022 upon the expiration of the 2017 NWP 48.

4.2. Eelgrass

The following summary of eelgrass and its ecosystem value is from WDNR 2015:

Eelgrass (*Zostera marina*) is an aquatic flowering plant found in fine grained intertidal and subtidal habitats. It provides numerous high-value regional ecosystem services within the coastal ecosystem. It creates structural complexity and supports high levels of biodiversity. Eelgrass serves as a focal habitat for perhaps hundreds of species in the Sound (Thom et al. 2011). It provides nursery habitat for economically important Dungeness crab and Pacific salmon (Fernandez et al. 1993, Phillips 1984, Simenstad 1994); spawning substrate for Pacific herring (Penttila 2007); and foraging habitat for numerous water birds including black brant. Eelgrass improves water quality by trapping and storing particulates and nutrients (Short and Short 1984, Gacia et al. 1999, Asmus & Asmus 2000); enhance productivity and alter nutrient cycling (Hemminga and Duarte 2000); mitigate wave energy and increase shoreline stabilization (Koch et al. 2006); and serve as a globally significant carbon sink (Fourqurean et al. 2012). Given the significance and diversity of the ecosystem functions and services provided by seagrass, Costanza et al. (1997) determined seagrass ecosystems to be one of Earth's most valuable.

Natural conditions (especially water quality) play a significant role in controlling the distribution of eelgrass. Eelgrass meadows in Puget Sound are characterized by substantial interannual variability that appear to be related to the occurrence of El Niño climate events (Shafer 2015). Eelgrass areas on the Pacific coast can expand by as much as 5 meters (m) and contract by as much as 4 m annually (WDNR 2012).

4.2.1. Eelgrass status

Eelgrass (Z. marina) is protected by a number of Federal and State regulations as discussed below.

- Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), seagrasses, specifically native eelgrass, are designated as an essential fish habitat (EFH) habitat area of particular concern (HAPC) for Pacific Coast groundfishes and Pacific salmon (Chinook, coho, and pink) in Willapa Bay, Grays Harbor, and Puget Sound. HAPC designations are used to provide additional focus for conservation efforts. This indicates NOAA may have conservation recommendations to ensure projects do not harm bottom-dwelling fish if seagrasses are adversely affected by proposed actions.

- Aquatic vegetation, which includes eelgrass, is a primary constituent element for designated critical habitat for several species listed under the Endangered Species Act including Puget Sound Chinook salmon (70 FR 52630), Hood Canal summer run chum salmon (70 FR 52630), and Puget Sound steelhead (78 FR 2726). A programmatic ESA consultation for shellfish activities

including aquaculture concluded that terms and conditions restricting aquaculture in fallow areas were required to protect eelgrass (NOAA 2016).

- Eelgrass is considered a "special aquatic site" under the Clean Water Act (40 CFR 230.43). Special aquatic sites are "geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region" (40 CFR 230.3 (q-1)). "From a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources." (40 CFR 230.1(d))

- According to EPA (2016): The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Toward achievement of this goal, the CWA prohibits the discharge of dredged or fill material into waters of the United States unless a permit issued by the Army Corps of Engineers or approved State under CWA Section 404 authorizes such a discharge. For every authorized discharge, the adverse impacts to wetlands, streams and other aquatic resources must be avoided and minimized to the extent practicable. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland and aquatic resource functions in the watershed. Compensatory mitigation refers to the restoration, establishment, enhancement, or in certain circumstances preservation of wetlands, streams or other aquatic resources for the purpose of offsetting unavoidable adverse impacts. Zostera marina is listed on the 2016 Wetland Plant List for the State of Washington (Lichvar et al. 2016).

- Native eelgrass is considered a 'saltwater habitat of special concern' by the State of Washington (WAC 220-660-320). In administering the Hydraulic Project Approval (HPA) process, the Washington Department of Fish and Wildlife (WDFW) requires applicants to: 1) avoid impacting eelgrass, 2) minimize unavoidable impacts, and 3) mitigate for any impacts (WAC 220-660-350) (WDFW 2008, WDNR 2015).

- WDNR's aquatic leasing program recognizes the regional ecosystem services provided by eelgrass beds and emphasizes impact avoidance during authorization of uses of state-owned aquatic lands to protect the sensitive aquatic habitat from disturbance (WDNR 2015).

Under the Washington State Shoreline Management Act, which implements the Coastal Zone Management Act on 1972, the state is requiring updates of all local Shoreline Master Programs (SMPs). They developed guidelines for the development of the SMPs the local jurisdictions must follow in order for their SMP to be approved by the State. These guidelines have specific protections for eelgrass as described below.

- WAC 172-32-186(8) directs SMPs to "include policies and regulations designed to achieve no net loss of those ecological functions". WDOE (2010) indicates that "the no net loss standard is designed to halt the introduction of new impacts to shoreline ecological functions resulting from new development. Both protection and restoration are needed to achieve no net loss."

- Protecting critical saltwater habitats is important to achieving no net loss of ecological functions. The SMP Guidelines state, "Critical saltwater habitats require a higher level of protection due to the important ecological functions they provide" [WAC 173-26-221(2)(c)(iii)(A)]. Critical saltwater habitats include "...all kelp beds, eelgrass beds, spawning and holding areas for forage fish, such as herring, smelt and sandlance; subsistence, commercial and recreational shellfish beds; mudflats, intertidal habitats with vascular plants, and areas with which priority species have a primary association" (WAC 173-26-221(2)(c)(iii)(A)).

The SMP guidelines include specific provisions for aquaculture including:

- The SMP Guidelines state that aquaculture "should not be permitted where it would adversely impact eelgrass ... Impacts to ecological functions shall be mitigated according to the mitigation sequence described in WAC 173-26-201 (2)(e)".(WAC 173-26-241(3)(b)(i)(C)).
- Local governments should require buffers in order to avoid impacts to eelgrass and require monitoring to ensure the buffers are adequate (WDOE 2015).
- WDNR will establish eelgrass buffers on state managed aquatic lands based on individual site assessments in order to ensure environmental protection of state-owned aquatic resources (WDOE 2015).

The Puget Sound Partnership (PSP), a state agency leading the region's collective effort to restore and protect Puget Sound, identified eelgrass as an indicator of the health of Puget Sound in recognition of the regional ecosystem services it provides and its sensitivity to changes in environmental conditions. PSP established a goal to increase eelgrass area by 20 percent relative to the 2000-2008 baseline of approximately 53,300 acres by 2020.

4.2.2. Historical context and past effects

The historical distribution of eelgrass in Puget Sound, Willapa Bay, and Grays Harbor is unknown. Available information on past effects is discussed below for each region.

The global literature strongly points to the overriding influence of human population driven land use changes and management practices in causing the loss of seagrasses (Thom et al. 2011). Surveys of local stakeholders identified dredging/filling, shoreline development, water quality, and commercial aquaculture as the most significant stressors on eelgrass (Thom et al. 2014). In Puget Sound, substantial losses are believed to be due to physical changes in shorelines, periodic physical disturbances, and degradation in water quality (Thom and Hallum 1990; Thom 1995; Dowty et al. 2010; Thom et al. 2011).

Eelgrass requires certain environmental conditions including appropriate tidal elevation, light, temperature, salinity, substrata, nutrients, waves, and current velocities (Philips 1984, Thom 2003, Koch 2001).

The WDNR contracted with Pacific Northwest National Laboratory to summarize and rank known stressors to eelgrass in Puget Sound. The summary of stressors on native eelgrass in Figure 4-1 is reproduced from the final report (Thom et al. 2011). The focus of the review was Puget Sound but the analysis is relevant to Willapa Bay and Grays Harbor to the extent the identified stressors occur. The results have been used to develop an eelgrass recovery strategy in Puget Sound (WDNR 2015).

COE 125656

	Characteristics of Stressor								
Stressor	Controlling Factor	Magnitude	Spatial Extent	Temporal Extent	Reversibility	Trend	Case Study Evidence	Global Studies	Threat Score	Knowledge Score
Invasive species	Competition	Low **	Med **	Med **	Med *	Increase **	Direct *	O	2.00	1.20
Nutrient-driven harmful algal blooms	Competition, light	Med **	Med *	Med *	Med **	Increase *	Direct *	SW, W, D, O	2.20	1.40
Suspended sediment	Light	Med ***	Med *	High *	Med **	Increase *	Direct *	SW, D, O	2.40	1.60
Sea level rise	Light	Med **	High *	High *	Low ***	Increase *	None	SN, D, O	[redacted]	1.60
Overwater structures	Light	High ***	Low ***	High ***	Low ***	Increase **	Direct ***		2.40	[redacted]
Aquaculture	Light, substrate	Med **	Low **	Med *	Med *	Increase **	Direct ***		2.00	1.60
Bioturbation	Substrate	Low *	Low *	Low *	Med *	Same *	Direct, spec. **		[redacted]	[redacted]
Storms	Energy	High *	Med *	Low *	High **	Increase *	None		2.00	1.20
Construction	Substrate, direct	High ***	Med ***	Med *	Med **	Increase *	Direct ***		2.40	2.00
Boat grounding /anchoring	Direct	High **	Low *	Low *	High *	Increase *	Direct *	W	1.80	1.20
Shoreline armoring	Substrate, energy	Low *	High ***	High *	Med *	Increase *	Ambiguous *		2.40	1.40
Dredging/ filling	Substrate, direct	High ***	Med **	High ***	Med **	Increase *	Direct **		2.40	2.20
Propeller wash/ boat wake	Energy	Med **	Low *	Med *	High *	Increase *	Direct/Ambiguous *		1.80	1.20
Anthropogenic contaminants	Direct	Low *	High **	Low *	Low *	Increase **	None	SW	2.20	1.40
Disease	Direct	Low *	High *	Med *	Med **	Increase *	None *		2.20	1.20
Organic matter discharge/sulfides	Direct	High **	Low *	Med *	Med *	Same *	Direct *		2.00	1.20
Sea temperature rise	Temperature	Med *	High *	Med *	Low **	Increase *	None	SN, O	2.00	1.20
Freshwater input	Salinity	Med **	High **	Med *	Med *	Same *	None *		2.20	1.40
Overfishing	Herbivory	Low *	Med *	Med *	Med *	Same *	None *		1.80	[redacted]

Figure 4-1. Eelgrass stressor ranking table (from Thom et al. 2011). The stressor score is determined by assigned point values to stressor characteristic values. For most categories, High = 3, Medium = 2, and Low = 1, with the exception of the Reversibility category, in which High = 1 and Low = 3 (because high reversibility reduces the threat presented by a stressor). The final stressor score is the mean of all of the points for each stressor, with a value of 3 (red) indicating the highest possible threat to eelgrass and 1 (green) the lowest. All columns included are currently weighted equally in the calculations. The knowledge score is the mean number of asterisks assigned to each stressor (not including case studies). A high knowledge score (3, green) indicates the most information is available about the stressor, while a low score (1, red) indicates very little information is available.

Puget Sound

The following impacts to eelgrass have occurred in Puget Sound:

- Over the last 150 years river deltas have experienced a large loss in area and shoreline, tidal wetlands decreased by 56%, several small embayments have been eliminated and many beaches and bluffs have been modified as a result of shoreline armoring (Simenstad et al. 2011, Fresh et al. 2011). These have all contributed to losses of eelgrass. Eelgrass meadows have been lost due to diking, filling and dredging, but overall changes in Puget Sound have not been assessed due to a lack of comprehensive early records (Thom and Hallum 1990, WDNR 2015, Shelton et al. 2016).

COE 125657

- Historical information that does exists indicates that there have been eelgrass losses in Bellingham Bay (34 ha or 30% of the original mapped total) and the Snohomish River delta (70 ha, minimum of 15% lost) due primarily to filling and dredging (Thom and Hallum 1990). Padilla Bay eelgrass increased from 598 to 1541 ha possibly due to the diversion of the Skagit River away from the Bay (Thom and Hallum 1990). A survey of local stakeholders resulted in Figure 4-2 which illustrates areas with historical eelgrass but that were now absent of eelgrass (Thom et al. 2014).

- Though Olympia oysters currently are found throughout their historic distribution, less than 4 percent of historic core populations remain in Puget Sound. Approximately 155 acres remain, compared to 4,000-5,000 acres that historically supported dense assemblages of oysters (NOAA 2011). It is uncertain if the loss of oyster reefs provided an opportunity for eelgrass to expand as has been suggested in Willapa Bay (Blake and Ermgassen 2015), but this is certainly possible.

- Anecdotal accounts indicate widespread declines in eelgrass in certain areas over the last 30-40 years (Thom and Hallum 1990). In these cases, changes in water quality are suggested as the reason for the decreases.

- The invasion of Z. japonica has probably affected the native Zostera at the upper limits of its distribution. These species co-occur at the +0.3 to 1.0 m MLLW elevation on flats, and competition for space has been demonstrated (Harrison 1976). In addition, Z.japonica can invade newly created bare patches within native Zostera meadows, and hold this space for a considerable amount of time (Michele Nielsen, University of British Columbia, conversation, 5 May 1990, in Thom and Hallum 1990). The WDNR sampling program has sampled 378 sites in the greater Puget Sound and Z. japonica has been identified at 68 of those sites (Mach et al. 2010). The author indicates this likely underestimates the presence of Japonica because the sampling is not comprehensive.

- There has been a decadal decline in eelgrass at the Skagit River delta, which has been identified as a priority for future restoration. Research has shown that most of the fluvial sediment delivered to the delta is currently exported offshore by channelized dike complexes. This has led to fragmentation of the eelgrass beds and degradation of other valued nearshore components (Grossman 2013, in WDNR 2015).

- Aquaculture has occurred in Puget Sound for many years. The effects of oyster culture on eelgrass have been discussed previously. In addition to these effects, West (1997) indicated that eelgrass was considered a nuisance species and was routinely removed by oyster growers in Puget Sound.

- In the more recent past Shelton (et al. 2016) indicates that over the past 40 years, eelgrass in Puget Sound has proven resilient to large-scale climatic and anthropogenic change. They indicate that substantial changes to eelgrass populations occur at the site and subsite level with no large scale trends and emphasize the role of local site specific drivers on eelgrass changes.

- Notable increases in eelgrass area occurred at two river deltas following major restoration projects: the Skokomish River delta (200 acres) in southern Hood Canal and the Nisqually River

COE 125658

delta in southern Puget Sound. Eelgrass gains at these deltas contrast sharply with nearby sites (WDNR 2015).

WDNR has conducted annual surveys of eelgrass in Puget Sound. These data indicate that Puget Sound native eelgrass area has been stable over the 2002-2013 monitoring record (WDNR 2015). There are no significant 11 year trends although there is some evidence of a general increase in eelgrass area between 2010 and 2013. Localized areas have seen both increases and decreases in eelgrass area. WDNR estimates the long term average (2000-2013) eelgrass acreage is 22,000 ha (54,000 acres) (WDNR 2015). In 2013, WDNR estimated 22,610 ha (55,870 acres).

COE 125659

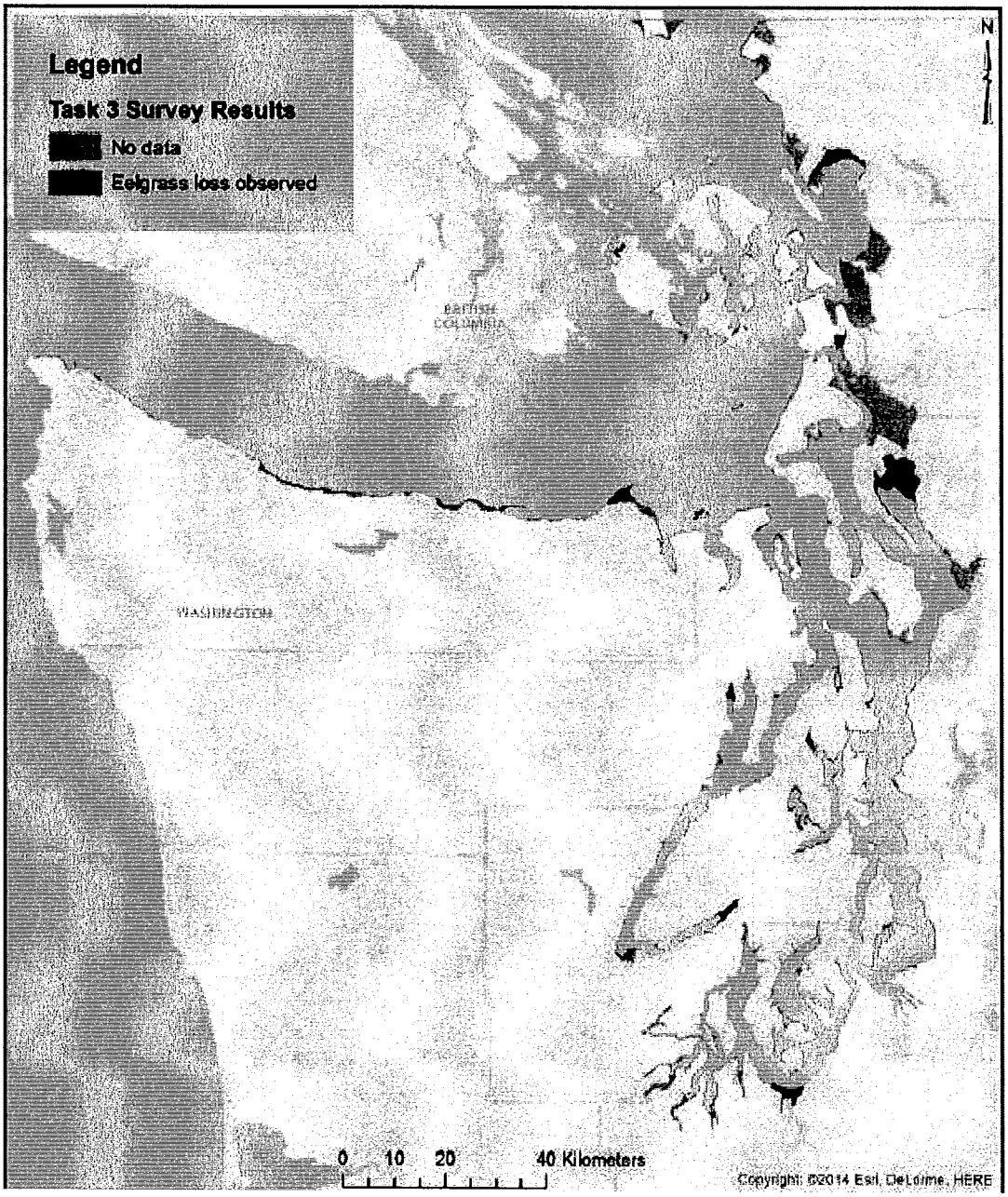


Figure 4-2. Areas identified as having previously contained eelgrass but currently is absent (from Thom et al 2014).

Willapa Bay

The historical coverage of eelgrass in Willapa Bay is unknown. However, the nearshore habitat in all three areas has been substantially altered since the mid-1800s.

Historical impacts to eelgrass include:

COE 125660

- Willapa's shoreline has been modified by filling and diking (Fish and Wildlife Service (1970, cited in Philips 1984, Ruisink et al. 2006). An estimated 64% of estuarine wetlands have been lost from Willapa Bay (CRA 2007). Borde (2003) estimates that Willapa Bay tidal marsh decreased 36% between 1905 and 1974. It is unknown how much former eelgrass habitat has been lost. Fish and Wildlife Service (1970, cited in Philips 1984) indicate that deteriorating water quality from draining of fresh water marshes and construction of lagoon housing also impacted eelgrass.

- The impacts of diking and sediment loading from logging peaked by the mid-20th century and have since been constant or declined (Fish and Wildlife Service 1970, cited in Philips 1984, Ruisink et al. 2006)

- Historically, the Corps maintained dredged channels at the mouth of Willapa Bay, from the Bay entrance to Raymond, to Bay Center, and mooring areas in Tokeland and Nahcotta. Dikes and breakwaters were constructed. Channel deepening likely resulted in erosion of tidelflats/shallow subtidal areas along the margins of the dredged channel making them less habitable for eelgrass. This was observed in Grays Harbor (Borde et al 2003).

- Historical dredging has impacted eelgrass (Fish and Wildlife Service 1970, cited in Philips 1984). Prior to 1977, the Corps dredged 300,000 cy per year in Willapa Bay (Philips and Watson 1984). Historically, dredged spoils were disposed upland and in open water. The cumulative volume discharged to all the Willapa Bay open water disposal sites from 1996 to 2015 was 539,572 cy (Corps-DMMP 2016).

- construction of bulkhead, pier, and shoreline facilities., (Fish and Wildlife Service (1970, cited in Philips 1984)

- pollution from domestic waters, agricultural runoff, debris from log storage, wood chips (Fish and Wildlife Service (1970, cited in Philips 1984)

- invasion of non-native eelgrass (*Z. Japonica*) in the 1930s (Borde 2003). It generally occurs at higher tidal elevations but competes for space with *Z. marina* at the upper end of the *Z. marina* tidal range (refs). This species is currently the subject of control efforts that are discussed below. Harrison and Bigley (1982) estimated 17,000 ha of Z. japonica on intertidal flats in Willapa Bay. Ruesink et al. (2010) reported that, as of 1997, Z. marina occupied 9.6% of Willapa Bay and Z. japonica occupied 7.7%. Ten years later, in a 2006/2007 survey of Willapa Bay, Dr. Dumbauld with the U.S. Department of Agriculture (USDA) estimated that there were approximately 13,762 acres of Z. marina (15.6% of Willapa Bay) and 12,183 acres of Z. japonica (13.8% of Willapa Bay) (Dumbauld and McCoy 2006/2007). This did not include any acres with thinly populated Z. japonica. To illustrate that Z. japonica distribution in Willapa Bay is thought by some to be expanding, an estimation of Z. japonica distribution was conducted in 2012 using anecdotal data to estimate that 18,000 acres of Z. japonica occurred in Willapa Bay (WDOE 2014).

- Invasion of non-native cordgrass (*Spartina alterniflora*) which traps sediment and converts mudflat to salt grass.

COE 125661

- Damming and regulation of the Columbia River has greatly decreased sediment and freshwater inputs to the estuary (Borde et al 2003). Land use changes including forestry and agriculture increased siltation.

- Oyster culture began in the late 1800s in Willapa Bay to replace the overharvested native Olympia oyster population and continues to the present time. The effects of oyster culture on eelgrass have been discussed previously.

- In Willapa Bay, significant intertidal and shallow subtidal habitat was covered by Olympia oysters which likely competed with eelgrass for space although they also were reported to grow together (Blake and Zu Ermgassen 2015). Historical estimates for the area covered by oyster reef range up to 6,225 ha (15,382 acres) (ermgassen 2012 in Blake) and 9,774 ha (24,152 acres) or 27% of the bay bottom, to 3,141 ha (7,762 acres) (Dumbauld 2011) and 2,600 ha (6,425 acres) or 10% of bay bottom (Ruisink 2006). It is estimated that as much as 27% of the bay bottom could have been oyster bed (Blake and Zu Ermgassen 2015). These oyster beds were subsequently harvested creating an opportunity for eelgrass to expand its range (Dumbauld 2011, Blake). Areas historically set aside as oyster reserves, that historically contained native oysters, now contain extensive areas of eelgrass (Dumbauld 2011). Dumbauld indicates of the 3995 ha of area historically set aside as oyster reserves, 1393 ha currently contain eelgrass (77% is native eelgrass) (Dumbauld 2015).

Willapa Bay and Grays Harbor are not annually monitored for eelgrass like Puget Sound. Recent trends in eelgrass coverage are not known. Current estimates of eelgrass (*Z. marina*) in Willapa Bay range from 39,861 acres for *Z. marina* and *Z. japonica* combined by WDNR (2001) to 17,000 acres for *Z. marina* and 9,000 acres for *Z. japonica* (Dumbauld and McCoy 2015) and 8,461 acres of *Z. marina* with a similar coverage area for *Z. japonica* (Ruesick et al. 2006). Borde et al. 2003 indicates that potential eelgrass habitat has increased by 1706 ha based on changes in bathymetry of Willapa Bay.

Grays Harbor

Similar to Willapa Bay and Puget Sound, historical eelgrass area is unknown but Grays Harbor has experienced extensive changes in the nearshore habitat due to diking, filling, and dredging (Borde et al, 2003). Anecdotal observations (Thom) indicated that some flats in the outer (South Bay) area of Grays Harbor were eroded shortly after the navigation channel was deepened in the early 1990s (Borde et al. 2003). Many of the other factors affecting eelgrass including invasion of Z. japonica, declines in water quality, and shoreline construction have also occurred in Grays Harbor. Miller (1977, in Mach et al. 2010) measured a 518% increase in Z. japonica in Grays Harbor from 680 to 4210 acres, though there is little information about its density and abundance across this area.

In recent years WDNR (2001) estimated 36,415 acres of *Z. marina* and *Z. japonica* combined in Grays Harbor. Estimates for *Z. marina* alone in Grays Harbor ranged from 11,700 acres (Wyllie-Echeverria and Ackerman 2003), and 10,990 acres (Gatto 1978). Borde et al. 2003 indicates that potential eelgrass habitat increased by 1793 ha to 3099 ha based on changes in bathymetry of Grays Harbor between 1883 and 1956 (e.g., from a general deepening of the bay). It is unknown whether this translated to an actual increase in eelgrass. It is suggested that the change in bathymetry may be due to decreases in sediment supply from the Columbia River and dredging within the Bay.

COE 125662

4.2.3. Effects of the proposed action

The effects of the proposed action are discussed above in Section 3. In general the action will result in continued degradation/loss of eelgrass in areas that have been engaged in ongoing aquaculture, and new eelgrass degradation/loss in areas currently classified as fallow or project are that is not currently engaged in aquaculture but is expected to be put into aquaculture during the next five years. These project areas have no conditions or restrictions on conducting work in eelgrass. New project area, area that has never had historical aquaculture or is not part of holdings by an existing aquaculture farm, can impact up to a half acre of eelgrass. It is uncertain what degree this condition would affect shellfish activities in Washington State because of the many areas have been engaged in some form of aquaculture historically (including tribes) and the many existing growers/farms would likely not be restricted by this because any new areas they obtained could be absorbed into their larger project area. For purposes of this analysis it is assumed the half acre eelgrass impact restriction would have negligible relevance and offer negligible protection to eelgrass resources for the reasons stated above.

The current known distribution of eelgrass within the geographic area is illustrated in Appendix A.

Table 4-3. Estimated acres of eelgrass affected by the proposed action

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound	Total
continuing active acres	766	12,170	392	180	1,131	14,803
continuing fallow acres	1,152	7,448	294	95	2,239	11,227
Total acres (active & fallow):	1,918	19,618	685	275	3,370	25,866
% of continuing active acreage potentially co-located with eelgrass	67%	74%	41%	8%	84%	66%
% of continuing fallow acreage potentially co-located with eelgrass	63%	79%	73%	12%	96%	76%
% of eelgrass in region potentially co-located with aquaculture (active & fallow)	5%	49%	21%	9%	7%	20%

Note: Eelgrass coverage estimates for Willapa Bay and Grays Harbor are likely high by a factor of 3 due to dated WDNR surveys using less accurate methods and that include *Z. japonica*.

4.2.4. Effects of other present day actions

Development and urbanization

Commercial and residential development produce a number of stressors to eelgrass including construction such as dredging and filling that physically removes eelgrass, overwater structures that shade eelgrass, and water quality impacts that negatively affected eelgrass. Current population density (Figure 4-3) identifies where many of these stressors are concentrated currently. Visual analysis of Figure 4-3 illustrates the impact of urbanization of eelgrass. While eelgrass generally exists throughout the geographic area, there are noticeably less areas in along the urbanized east side of Puget Sound and

Kitsap County. Eelgrass is noticeably deficient in the southern reaches of Puget Sound. This is likely due to the low tides that occur during mid-day during the summer which desiccates eelgrass decreasing its productivity and survival (ref).

COE 125664

Figure 4-3. 2010 population density in western Washington State and mapped eelgrass

COE 125665

Outfalls and Nutrients

In Puget Sound, it is estimated the average annual dissolved inorganic nitrogen (DIN) loading from anthropogenic sources is 2.7 times the natural loading conditions (Mohamedali et al. 2011). Annual DIN loads were greatest in the main basin of Puget Sound and almost entirely a result of discharge from residential wastewater treatment facilities (Mohamedali et al. 2011). The DIN loads between Edmonds and the Tacoma Narrows bridge, an area with the greatest concentration of outfalls (Carmichael et al. 2009), were 3.6 times the average for greater Puget Sound, an area not including the Straits (Mohamedali et al. 2011). The continued addition of DIN in excess of natural conditions will likely shift the carbon and nutrient balance in Puget Sound and develop conditions (e.g., eutrophication) less suitable for eelgrass (Gaeckle 2012). It has been shown that the construction of outfalls and the discharged effluent affect marine organisms and processes, and specifically eelgrass. The impacts to eelgrass range from physical effects on the environment where it grows to physiological effects on the plants. But little is known about these impacts in Puget Sound (Gaeckle 2012).

The areas within Puget Sound where eelgrass is most at risk include locations along the eastern side of the Sound where population density is highest (e.g., urban growth areas), near outfall discharge points, and at the mouths of major rivers. However, the major outfall discharge points that would be a direct source of contamination for eelgrass typically discharge deeper than the extent of existing eelgrass beds in Puget Sound (e.g., West Point Wastewater Treatment Plant, Brightwater Treatment Plant). Most other treatment facilities in Puget Sound discharge at or beyond the deepest extent of eelgrass (Gaeckel et al. 2015).

Other discharge points of concern include CSO and stormwater outlets. These sources typically discharge near eelgrass beds and tend to contain high concentrations of nutrients, metals, and contaminants. CSOs are mostly contained in areas of high population density near major cities most of which have eelgrass growing along the waterfront.

Another area of concern where eelgrass may be affected includes major river deltas that have high flow and sediment discharge and contain inputs from sewage treatment facilities among other upland sources. Eelgrass is currently growing at most of the major river deltas but restoring historical flow volumes, drainage patterns and filtration potential may enhance eelgrass across deltaic fronts (Grossman 2013, Grossman et al. 2011). In addition, improvements in sewage treatment will only enhance riverine water quality and provide a range of benefits downstream and into the Sound.

The potential effect on eelgrass from the quantity of outfalls (and associated loading) in the Central Puget Sound and Saratoga-Whidbey basins could be detrimental to eelgrass considering the anticipated population growth over the next decade (Gaeckel et al. 2015).

Outfall impacts to eelgrass range from physical effects on the environment where it grows, such as the installation of an outfall pipe, to physiological effects on the plants caused by shading due to nutrient triggered plankton blooms or compromised photosynthetic potential because of metal or contaminant toxicity (Lewis and Devereux 2009). Effects of anthropogenic containments in general are uncertain as limited study has occurred to date (Gaeckle 2016).

COE 125666

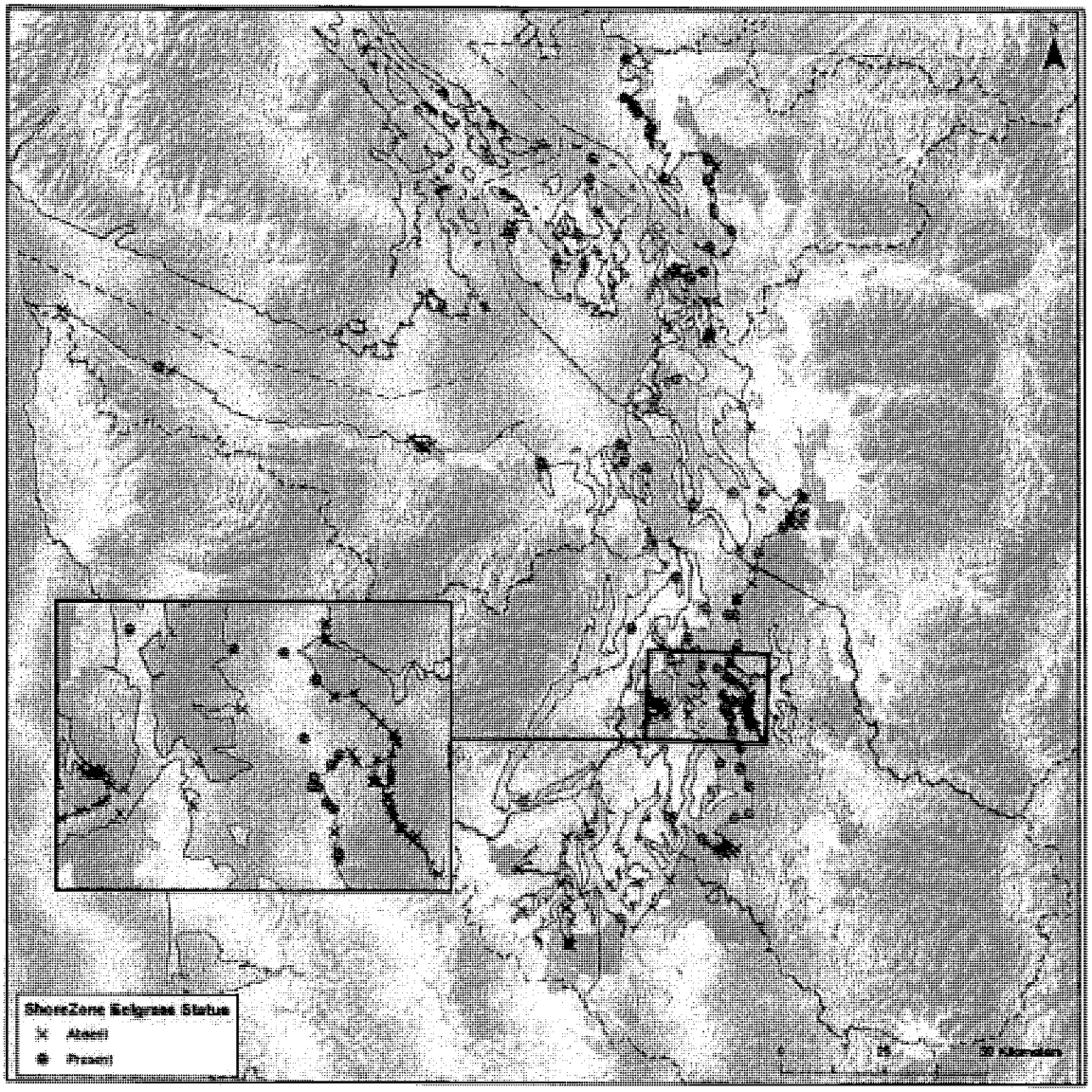
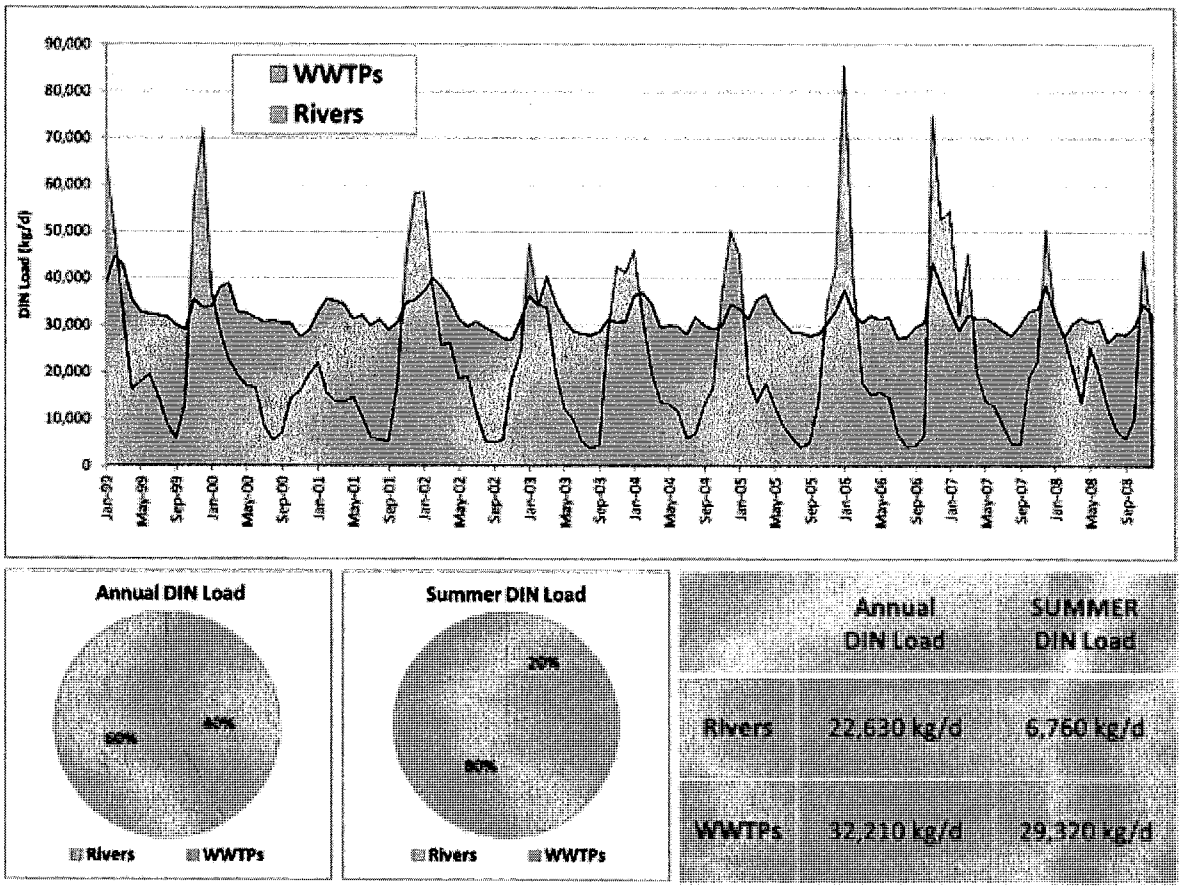


Figure 4-4. NPDES permitted outfalls in Puget Sound and eelgrass presence in adjacent shoreline segment from WDNR Shoreline inventory (2001). Figure reproduced from Geackel et al. 2015.

Nutrient (nitrogen and phosphate) concentrations have been increasing in Puget Sound. The reasons for this are uncertain but WDOE hypothesizes that human derived nutrients due to summer inputs by waste water treatment plants increases nitrogen in the summer when natural inputs from rivers typically decrease (Figure 4-5). This affects the nutrient balance of the food web and may be causing algal blooms (Roberts et al 2013). The presence of macroalgal blooms in particular is identified as a stressor for eelgrass due to deposition of masses of macrolgae directly on eelgrass. The role of phytoplankton blooms is less certain but could increase turbidity and reduce eelgrass health and growth (Thom et al. 2011). The quantitative effect on eelgrass is not known.

COE 125667



	Annual DIN Load	SUMMER DIN Load
Rivers	22,630 kg/d	6,760 kg/d
WWTPs	32,210 kg/d	29,320 kg/d

Figure 4-5. Dissolved inorganic nitrogen (DIN) input to Puget Sound from local rivers and water water treatment plants (WWTPs).

Herrera (2011) found that during storm events, median total nitrogen concentrations were higher in residential and agricultural subbasins (1.3 and 1.8 mg/L, respectively) relative to commercial/industrial and forested basins (0.3 and 0.4 mg/L, respectively). Increased development relative to forested basins is likely to increase nitrogen loads.

The deposition of organic matter in the nearshore if thick enough can result in sediment porewater becoming anaerobic. This produces hydrogen sulfide which is toxic to eelgrass (Thom et al. 2011). This can from storm water, log rafting, tree debris, and macroalgae piles. The extent of this in Puget Sound is expected to be low (Thom et al, 2011).

Disease

Wasting disease has been observed in eelgrass populations throughout most of Puget Sound (Thom et al 2011). It appears to not have a detrimental effect on survival of these populations, but there is limited information. Thom et al. 2011 suggests the disease may increase with expected changes in sea temperature and salinity.

COE 125668

Overwater structures

Overwater structures such as docks and piers cause loss of eelgrass by shading, altered wave energy pattern, altered substrate characteristics (Jones and Stokes 2006, Nightingale and Simenstad 2001). An inventory of overwater structures was conducted by WDNR (WDNR 2007). While the inventory is dated, it provides an indication of the magnitude of the impact. The number of overwater structures and total acres affected are illustrated in Table 4-4.

Table 4-4. Overwater structure inventoried by WDNR from 2002-2006 orthophotos.

	Grays Harbor	Willapa Bay	Hood Canal	South Puget Sound	North Puget Sound
Number of structures	133	111	1156	4350	2481
Total acres	53	22	174	975	560

Simenstad et al. (2011) estimated that overwater structures cover approximately 6.5 km2 of the Puget Sound intertidal. Thom e al. 2011 estimated an average of 4 ft2 of overwater structure per linear foot of shoreline across Puget Sound, with over 1,400 acres of overwater structures. Central Puget Sound contains the largest area covered by overwater structures and the greatest ratio of overwater structure to linear feet shoreline present. The San Juan region has the lowest density of overwater structures. It was estimated that 40% of the overwater structure area (560 acres) was collocated with eelgrass and thus would be affected (Thom et al. 2011).

Nightingale and Simenstad (2001) concluded that their empirical findings indicate that the cumulative impacts of overwater structures can have significant impacts on ambient wave energy patterns and substrate types. While this conclusion is not specific to eelgrass, these impacts directly affect eelgrass present at these locations.

Effects may be reduced due to increased knowledge of effects leading to care in placement location so as not to disturb eelgrass and/or installation of grating to allow light penetration which reduces the impact (Jones and Stokes 2006). Eelgrasses losses are minimized by WDFW hydraulic code rules that require overwater structures be designed or located to avoid shading or other impacts that could result in the loss of eelgrass (WAC 220-110-300(3) and (4)).

Corps permitting of overwater structures between 2007 and 2016 is illustrated in Figure 4-6 and includes both new structures and maintenance/repair of existing structures.

COE 125669

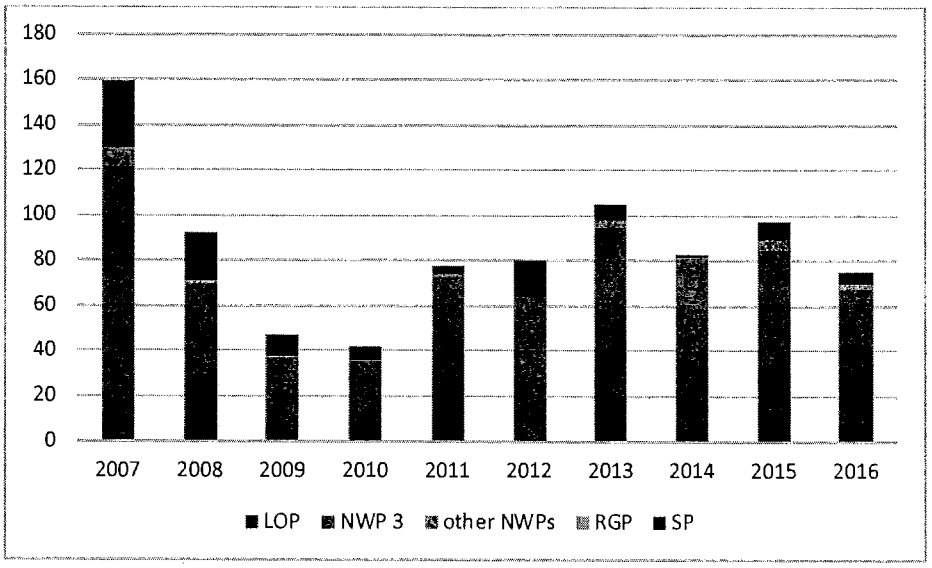


Figure 4-6. Overwater structure permitting 2007-2016

Mooring buoys, anchors, and barge grounding

Improperly sited or designed mooring buoys and vessel anchoring can scour, shade, fragment, and increase eelgrass bed vulnerability to disturbances. Localized impacts are frequently concentrated within embayments with high densities of moored vessels (WDNR 2015). Barge groundings have damaged eelgrass at the Clinton ferry terminal and at Hood Canal Bridge, as well as smaller scale impacts near marinas (Thom et al 2011). These effects are generally small in scale, but there spatial extent is unknown. Effects are likely to increase as boat traffic increases (Thom et al. 2011). Recent Corps permitting of mooring buoys is illustrated in Figure 4-7.

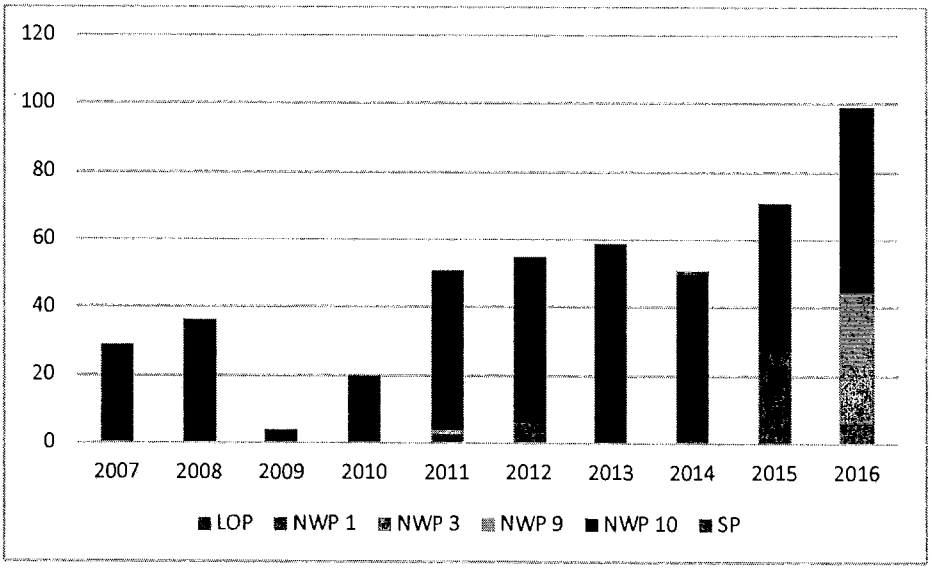


Figure 4-7. Recent Corps permits issued for mooring buoys in Washington State

COE 125670

Dredging projects

Construction projects that affect the substrate or that result in dredging or filling can adversely affect eelgrass. In most cases, project effects to eelgrass are mitigated. A summary of permits issued for non-Corps dredging and maintenance dredging activities conducted under NWPs are summarized in Figure 4-8. Corps maintenance dredging occurs regularly at many locations throughout Puget Sound and in Grays Harbor. Annual dredging in Puget Sound is 100,000 – 200,000 cy which is typically maintenance dredging of the Snohomish or Duwamish Rivers. An average of 1.7 million cubic yards is dredged annually from the Grays Harbor deep draft channel. The dredged material is disposed of at various approved disposal sites, including open-water disposal at the Point Chehalis, South Beach, South Jetty, and Southwest disposal sites, as well as beneficial use for beach nourishment at Half Moon Bay. The Westport Marina and the entrance channel require infrequent maintenance dredging. Annual maintenance dredging by the Corps is likely to continue for the foreseeable future. In addition, the Port of Grays Harbor (Port) conducts maintenance dredging of its marine terminal facilities adjacent to the Federal Navigation Channel (Corps 2012 – GH EA). The Corps is currently deepening the federal navigation deep-draft channel in Grays Harbor from the currently maintained depth of -36 feet MLLW to the fully authorized depth of -38 feet MLLW. The project is deepening approximately 14.5 miles of the 27.5-mile channel. The Port of Grays Harbor requested deepening the channel the additional two feet to better accommodate current vessel traffic for existing Port tenants and commodities. Maintenance dredging in Willapa Bay is currently managed by the Port of Willapa Bay. Maintenance dredging would be expected to have only negligible impacts to eelgrass associated with turbidity during dredging. The primary eelgrass impact would have occurred during the initial dredging of the project. The Port plans to dredge six locations at varying frequencies ranging from annually to every 20 years. The average annualized dredge volume they estimate is 14,000 cy (Shepsis and Chaffee 2012).

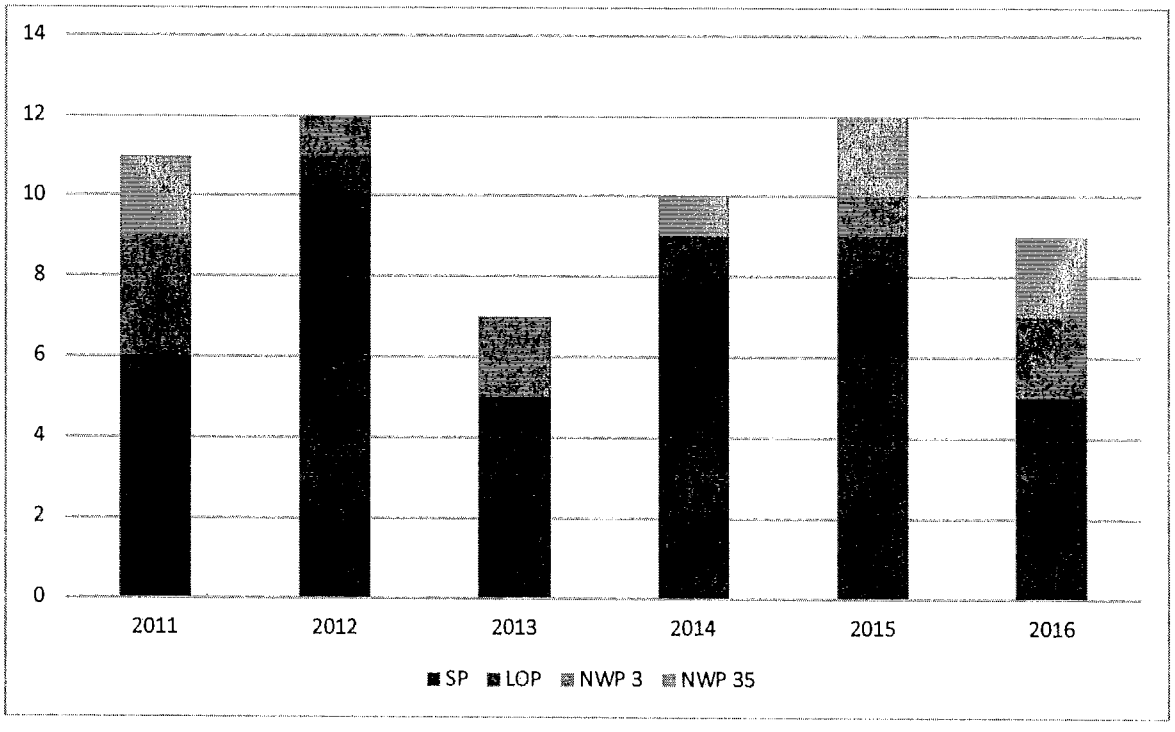


Figure 4-8. Dredge related Corps permitting 2011-2016

COE 125671

Invasive species and control efforts

As described two invasive species, *Z. japonica* and *S. alterniflora*, may adversely affect native eelgrass. *Z. japonica* occurs throughout Puget Sound, Willapa Bay, and Grays Harbor and competes for space with the native eelgrass (*Z. marina*). Spartina can also displace eelgrass (Zostera spp.) on mudflats although it typically occurs at higher elevations than the native eelgrass (DOI et al. 1997). Efforts to control both species with herbicides and mechanical methods are ongoing. Herbicides in particular can adversely affect the native eelgrass. These non-target effects are minimized to the degree possible.

The herbicide imazapyr and glyphosate have been used to control *S. alterniflora*. In Puget Sound, approximately 11.3 solid acres of *S. alterniflora*, including over 30,000 occurrence points, was treated in Puget Sound. This represents a seven percent increase from the 10.5 solid acres treated in 2014. It is anticipated that treatment efforts will increase in coming years (WSDA 2015). In Willapa Bay over 8,000 solid acres have been eradicated as of 2015. Affected acres in Pacific County have declined to 1,075 representing a 96 percent reduction from the peak of 25,430 affected acres recorded in 2009 (WSDA 2015). The reported amount of imazapyr discharged for Spartina control in Willapa Bay for 2012 was approximately 0.75 pound of active ingredient. In Grays Harbor *S. alterniflora* has been reduced to 0.0032 solid acre from a high of over ten solid acres in 2005. WSDA projects that less than 0.006 solid acre of *S. alterniflora* will be present in Grays Harbor County during the 2016 treatment season WSDA 2015).

In 2014, WDOE issued an NPDES permit for shellfish growers to apply imazamox to *Z. japonica* on clam culture beds only (not authorized for geoduck or oysters) in Willapa Bay. WDOE indicates that mixed beds of *Z. marina* and *Z. japonica* will be removed (WDOE 2014). Ecology expected that *Z. marina* growing off of the treatment site will not be significantly impacted if effective mitigation was employed. Follow-up monitoring indicated that effects to off-site non-target *Z. marina* were within the acceptable limits (WDOE 2016).

Eelgrass restoration

The Puget Sound Partnership (PSP), a state agency leading the region's collective effort to restore and protect Puget Sound, identified eelgrass as an indicator of the health of Puget Sound in recognition of the regional ecosystem services it provides and its sensitivity to changes in environmental conditions. PSP established a goal to increase eelgrass area in Puget Sound by 20 percent relative to the 2000-2008 baseline of approximately 53,300 acres by 2020. The WDNR was subsequently tasked, in collaboration with the PSP, to develop a comprehensive recovery strategy for eelgrass. An interdisciplinary workgroup of local, state, and federal government, tribes, non-governmental organizations, and business groups defined overarching goals and prioritized implementation measures to address critical stressors and support conservation and recovery. The eelgrass recovery strategy including the following goals:

- Conserve existing eelgrass habitats and enforce the "no net loss" standard established by the SMP guidelines;

COE 125672

- Reduce environmental stressors to support natural expansion, key stressors identified included overwater structures & in-water construction, vessel mooring & anchoring, anthropogenic nitrogen and sediment loading;

- Restore and enhance degraded or declining eelgrass beds;

Successful eelgrass restoration has been difficult to achieve in Puget Sound (WDFW 2010, Thom et al. 2001, Thom et al 2014). New eelgrass beds can be established where conditions that prevent eelgrass from growing (e.g., shade, depth, substrate, or current velocity) are remedied (Thom et al. 2001, Thom et al 2014). An analysis of candidate areas for restoration was produced to support the PSP goal of increasing eelgrass area by 20%. These areas are identified in Figure 4-9.

COE 125673

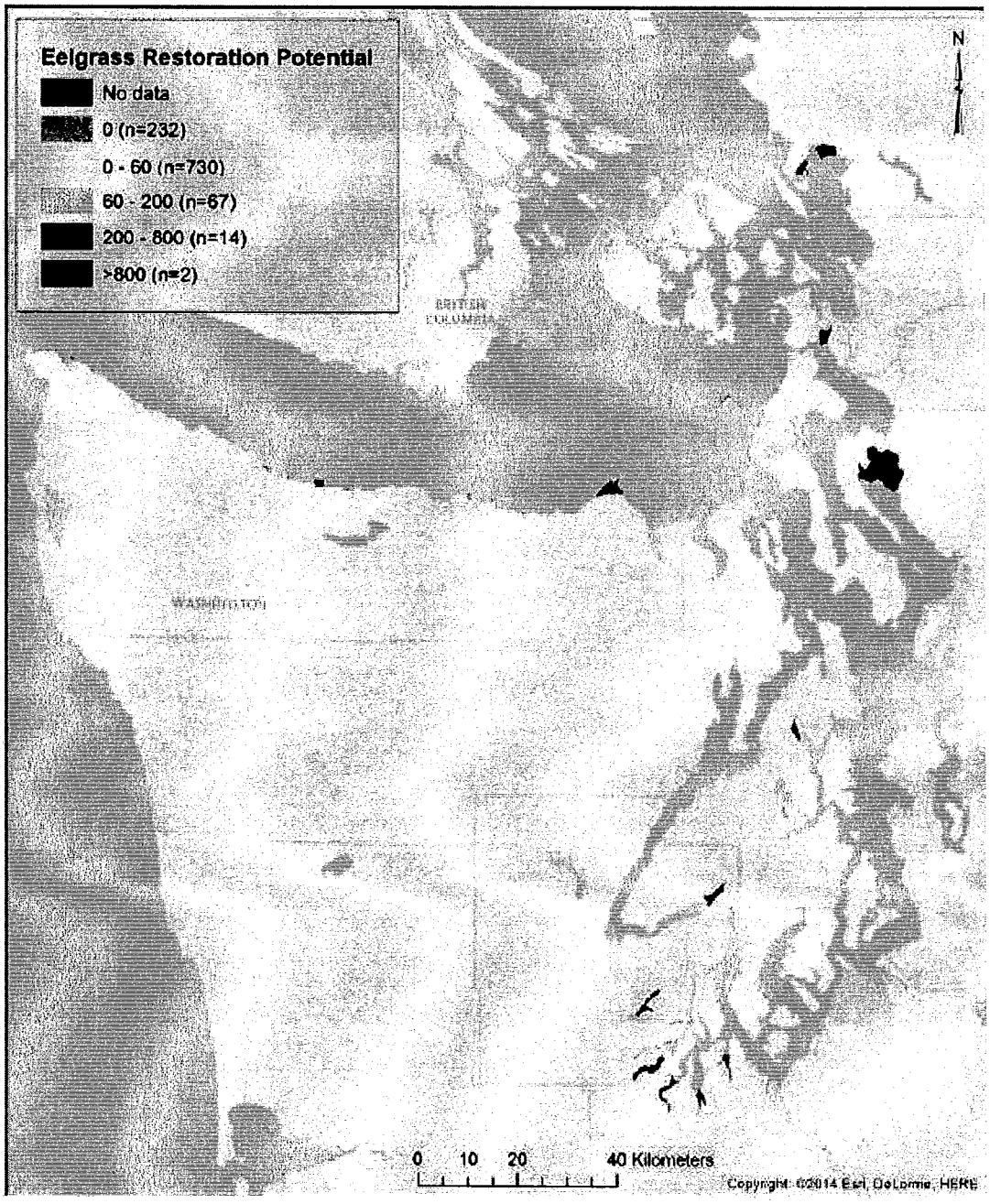


Figure 4-9. Areas identified with eelgrass restoration potential that are currently devoid of eelgrass. Higher eelgrass restoration potential score indicates greater potential (from Thom et al. 2014).

4.2.5. Effects of future actions

The population growth in Puget Sound counties combined is estimated to increase 25% between 2015 and 2040 with growth being fairly equal spread among the counties ranging from 10% in San Juan County to 36% in Whatcom County (WOFM 2012). In general the more urban areas are predicted to

COE 125674

have greater population increases than the more rural counties (Figure 4-10). The population growth in Grays Harbor County is estimated to increase 5% between 2015 and 2040 (WOFM 2012). More recent demographic data indicates that Pacific County lost population in 2015 compared to the previous year. The population growth in Pacific County is estimated to increase 6% between 2015 and 2040 (WOFM 2012). More recent demographic data indicates that Pacific County lost population in 2015.

Presently, Willapa Bay remains a rural economy will reliance on marine and resource extraction jobs. This is expected to continue. There is unlikely to be significant habitat restoration actions in the region because there are limited numbers of ESA listed species which traditionally attract restoration dollars (CRS 2007). The aquaculture industry is expected to continue to be a driving influence on the ecology of the bay.

COE 125675

Figure 4-10. Expected population growth in the counties surrounding the inland marine waters

COE 125676

Future actions were determined in part by examination of local shoreline plan updates which estimate future growth/development and other activities over a planning horizon Table 4-5. Local governments are on different update schedules. Some local governments have completed their comprehensive updates. Others are under way or have not begun.

Table 4-5. Anticipated future actions for county shoreline master plan updates

	Anticipated future activities	Source
Grays Harbor County	support expansion of agriculture, encourage expansion of aquaculture, Encourage new water-oriented commercial development, encouirage recreation development	Preliminary Draft Grays Harbor County Shoreline Master Program August 2016
Pacific County	future development is expected to follow the slow pace of development experienced in recent years : Tourism, recreation, residential, aquaculture, and fishing	DRAFT Cumulative Impacts Analysis Pacific County's Shoreline Master Program 2015
Whatcom County		
Skagit County	residential development-significant in some locations; large amount of industrial property is available for potential future redevelopment	Cumulative Impacts Analysis of Skagit County's Shoreline Master Program 2016
Island County	residential development, aquaculture, docks/piers limited to areas where currently clustered	SMP update Cumulative Impacts Analysis 2013
Snohomish County	residential infill; dock, pier, or ramp construction, bulkhead development associated with residential use; expanded agricultural use; creation of more parks/public water access sites	Exhibit A, Amended Ordinance No. 12-025 Snohomish County Shoreline Management Program: Shoreline Environment Designations, Policies and Regulations 2012. Appendix C – Summary of Potential Development Impacts and Proposed Regulatory and Non-Regulatory Offsets
King County	limited residential development	King County Shoreline Cumulative Impacts Assessment September 2010
Pierce County	residential development, new and reconstruction of docks/piers, limited recreational development; aquaculture	SMP update Cumulative Impacts Analysis 2014
Thurston County	residential development	Final Draft Thurston County Shoreline Master Program Update Inventory and Characterization Report SMA Grant Agreements: G0800104 and G1300026 June 30, 2013 Prepared By: Thurston County Planning Department

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Mason County	residential development	Mason County SMP Cumulative Impacts Analysis: February 2016
Kitsap County	residential development; limited commercial development	Revised DRAFT Cumulative Impacts Analysis for Kitsap County's Shoreline Master Program 2013
Jefferson County	"residential development, master planned Resorts, marinas, co	

Increased development is expected to lead to increases in the impacts discussed under the previous section including increases in nutrients degrading water quality conditions for eelgrass, increases in overwater structures, increased damage from boating and anchoring. Residential development along shorelines typically involves installation of septic systems which results in nutrient addition to marine waters (Pierce CIA, Island CIA). Human-induced disturbances are expected to increase, and may exacerbate, eelgrass loss in Puget Sound (Thom et al. 2014). Efforts by the State to minimize these future impacts are likely to have some beneficial effects at reducing the rate of impact.

Aquaculture

Aquaculture is an important industry in Puget Sound, Willapa Bay, and Grays Harbor accounting for significant percentage of the nation's shellfish production. The industry is growing and expected to continue well beyond the expiration of the 2017 NWP 48. As the industry expands, more tidelands with and without eelgrass are expected to be put into production. The effects of aquaculture on eelgrass are expected to continue into the future and would not likely cease upon the expiration of the 2017 NWP 48. One geoduck plant-to-harvest cycle can take 7 years which is beyond the 5 year timeframe of a NWP. All active and fallow acreage collocated with eelgrass would continue to impact the eelgrass or remove it entirely at least for periods of time. New areas that are put into culture may or may not be subject to restrictions on eelgrass as discussed previously.

The impacts to eelgrass from aquaculture can be temporary, depending on the activity, because the habitat conditions themselves (elevation, water quality, etc) are not permanently altered which allows eelgrass to eventually recover given sufficient time. The timeframe for recovery has been documented to be 2 to 5 years depending on the activity and other factors. This recovery timeframe may or may not allow for a full recovery of eelgrass before the next aquaculture disturbance. Even for disturbances spaced sufficiently apart, for example on a geoduck farm where geoducks are planted and covered with nets for 2 years before a 5 year period when eelgrass recovery can occur. After 5 years, geoduck harvest disturbs/removes the eelgrass once more. While this process allows for eelgrass recovery at the site, the frequency of disturbance and relatively long recovery times result in a local habitat condition where eelgrass more often than not is either not present or present at a much reduced functional state. This is the future condition of eelgrass on tidelands that are engaged in aquaculture. This effect would persist as long as aquaculture is occurring at the site. In some cases such as when nets are placed over planted clam beds, any eelgrass is likely to be permanently smothered and not recover because of the permanence of the nets which are only removed between harvest and the next planting cycle which may only be a matter of weeks or months. This is insufficient time for eelgrass to recover.

COE 125678

Construction Projects

Water clarity in nearshore areas is often reduced by the presence of suspended sediments, which can reduce the light input to eelgrass beds below that required for eelgrass growth. Studies in Puget Sound and elsewhere document that suspended sediments from land use actions can increase nearshore turbidity for extended periods (Thom et al. 2011).

A summary of all RHA Section 10 and CWA Section 404 activity permitted by the Corps in recent years is illustrated in Figure 4-11. This level of permit activity is expected to continue in the future. In most cases effects to eelgrass from these activities would avoided, minimized, or mitigated consistent with Washington State regulations.

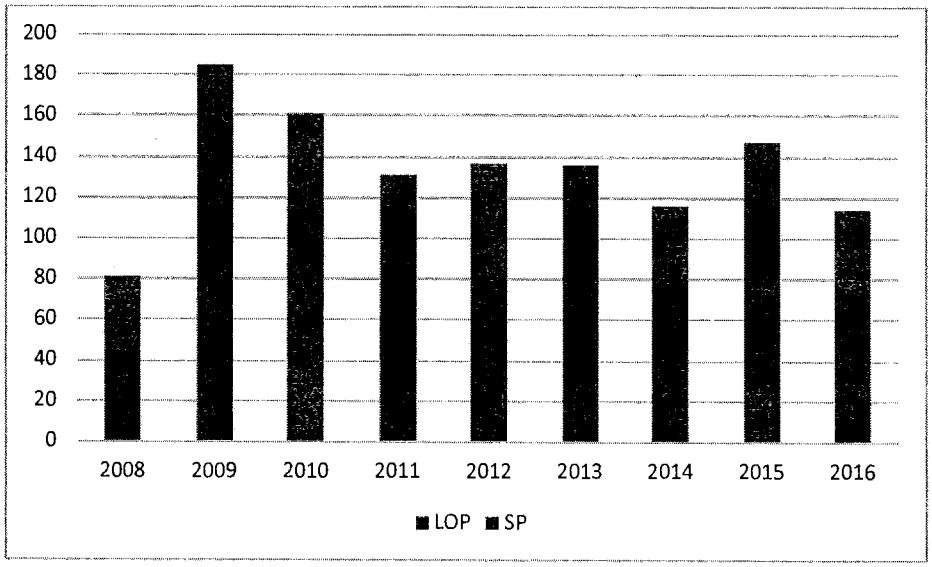

Figure 4-11. RHA Section 10 and CWA Section 404 standard permits and LOPs for all activities 2008-2016

Proposed new construction projects include:

- Shell Anacortes Rail Unloading Facility. Equilon Enterprises, LLC, dba Shell (the Applicant), is proposing to construct and operate a crude-by-rail unloading facility at the existing Shell Puget Sound Refinery (PSR) in Anacortes, Washington. Each unit train arriving at the rail unloading facility would carry approximately 60,000 to 70,000 barrels of crude oil. The facility would receive six unit trains per week, with each train having up to 102 tank cars. The proposed project would not result in a change in refining capacity of the Shell PSR (EIS _Wdoes website). The project is currently being revised.

- Westway proposes expanding its existing bulk liquid storage terminal to allow for the receipt of crude oil unit trains, storage of crude oil from these trains, and shipment of crude oil and other materials by vessel and/or barge from Port of Grays Harbor Terminal 1. According to the project proposal, the Westway expansion project would be done in two phases. The information below

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includes the proposed construction and operations for both phases. First phase would increase rail line traffic by 730 rail trips (loaded and unloaded) per year and vessel traffic in Grays Harbor by approximately 400 vessel trips per year. The second phase would increase PS&P rail line traffic by 365 rail trips (loaded and unloaded) per year and vessel traffic in Grays Harbor by approximately 120 vessel trips per year (City of Hoquiam and WDOE 2016). The proposed action is currently being revised. EIS identified potential impacts to eelgrass as a result of changes to grain size and turbidity. Increased vessel traffic may impact eelgrass on the margins of the channel

Climate change

Both sea level rise and warmer water temperatures are predicted to occur in the future as a result of climate change in Washington State (WDOE 2012). Sea level rise would result in increased depth and light attenuation may contribute to vulnerability of eelgrass and/or result in eelgrass decline at the lower edges of beds. The response of eelgrass may be to move upslope if there are suitable areas available. Although a higher sea level will probably affect eelgrass, the actual effect is very uncertain, and will interact with stressors that act upon water clarity (Thom et al. 2011). Predicted effects to eelgrass include loss of two-thirds of the low tidal areas in Grays Harbor and Willapa Bay, and increased sediment from beach erosion could impact eelgrass (WDOE 2012).

Extended periods of high temperatures reduce eelgrass growth and survival (Thom et al. 2011, WDNR 2010). In places where the water warms substantially in the summer (e.g., poorly flushed shallow bays) small increases in the temperature would result in loss of the plants. Increasing or consistently warm water temperatures in conjunction with low oxygen conditions or anoxic events may preclude growth and survival of Z. marina (WDNR 2010).

4.2.6. Summary and Conclusion

Eelgrass (*Z. marina*) is included in this analysis because it plays a key role in the aquatic ecosystem, is considered a protected species by the Federal government and the State of Washington, is the focus of significant restoration, monitoring, and planning initiatives, and the proposed action has substantial adverse impacts on this species.

The cumulative impacts on eelgrass are summarized in Table 4-6 for the geographic regions analyzed.

Table 4-6. Summary of stressors and primary cumulative effects on native eelgrass (*Z. marina*)

stressor	Puget Sound	Willapa Bay	Grays Harbor
Invasive species	Z. japonica is widespread (acreage unknown); acreage impact on Z. marina is unknown but considered limited	Z. japonica is widespread (18,000 acres); herbicide currently used to control which has adverse effects on Z. marina where the two are collocated	Z. japonica is widespread (4,210 acres);
Nutrient driven harmful algal blooms	nutrients and algal blooms are increasing; further increases are expected due to increased population and development; acreage impact	significant increasing nitrate trend; effect uncertain	no significant nutrient trends

COE 125680

Suspended sediment	historical effects likely from logging and development; increasing nearshore development may increase future suspended sediment	historical effects likely from logging and development; some current high sediment loads documented, uncertain effects	historical effects likely from logging and development; limited future effects
Climate change	Sea level rise may cause shifts in eelgrass up slope provided habitat is available - net effect uncertain; future increases in water temperature may reduce productivity and survival		
Overwater structures	numerous and increasing; new standards for light penetration decrease future effects; estimated 560 eelgrass acres affected	limited in extent	limited to few developed locations
Historical oyster harvest	4-5,000 acres of Olympia oyster reef lost, eelgrass may have replaced to some degree although this is unknown	6-24,000 acres of Olympia oyster reefs lost, eelgrass has colonized many of these former oyster reef areas	Unknown
Aquaculture	widespread historical impacts; large acreages (> 4,000) potentially impacted by proposed action, and by future expected aquaculture	widespread historical impacts; large acreages (20,000) potentially impacted by proposed action and by future expected aquaculture	widespread historical impacts; large acreages (2,000) potentially impacted by proposed action, and by future expected aquaculture
Storms	can have large impact; eelgrass typically recovers quickly because the underlying conditions that created the habitat conditions in the first place remain the same; negligible long term impact		
Construction projects	historical impacts; future impacts likely to be mitigated based on current regulations	historical impacts; future impacts likely to be mitigated based on current regulations	historical impacts; future impacts likely to be mitigated based on current regulations
Boat grounding/ anchoring	Large boating population that is increasing which suggests continued impacts; spatial extent likely limited	Limited effects	Limited effects
Propeller wash/ boat wake	Likely to be limited in extent		
Shoreline armoring	Historical and likely continuing impacts although not clearly documented	Some limited historical impacts likely	Some limited historical impacts likely
Dredging/ filling	large unknown acreages lost due to historical filling and dredging; future effects likely mitigated		
Anthropogenic contaminants	Contaminants present but effects uncertain	No effects expected	Contaminants present but effects uncertain
Disease	wasting disease present in Puget Sound, effects uncertain	no known effects	no known effects
Organic matter discharge/ sulfides	Likely historical effects due logging; uncertain effects currently but expected to be limited in extent	Likely historical effects due to logging; future effects not anticipated	Likely historical effects due to logging; future effects not anticipated

There are historical impacts to eelgrass that are both negative and positive. Substantial losses have occurred due diking, filling, dredging, development, and pollution/nutrients. Historical aquaculture has also negatively impacted eelgrass in all of the regions. In Willapa Bay, the historical harvest and removal of the native Olympia oysters from as much as 25% of the bay allowed eelgrass to expand into this area. The extent of this change is unknown but may be in the 1,000s of acres. This likely occurred in Puget Sound and Grays Harbor as well but at a lesser scale.

Currently the primary adverse effects to eelgrass occur from urbanization/development activities and its associated pollution (primarily in Puget Sound) and aquaculture. Anticipated future impacts include urbanization/development, aquaculture, and climate change related effects. Current less developed areas in north Puget Sound and Hood Canal are expected to see some of the fastest population growth. This is also where the most extensive eelgrass beds occur in the Puget Sound.

Significance

Significance is determined by context and intensity which are defined below. With respect cumulative impacts, 40 CFR 1508.27(b)(7) states, "The following should be considered in evaluating intensity: Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts."

Context

A determination of significance requires consideration of both context and intensity (40 CFR 1508.27(a)). Context means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

Nationally eelgrass has declined dramatically with 90% declines documented both along California and the Atlantic coast (NOAA 2017). It is considered a special aquatic site with protections under the CWA. Regionally eelgrass is protected by the State of Washington under the Shoreline Management Act and HPA regulations, and there is stated objective to increase its abundance in Puget Sound by 20% by 2020. Locally, eelgrass conditions differ among the three geographic areas analyzed as discussed in Table 4-7. Puget Sound has more stressors acting on eelgrass and the State has identified recovery goals for the species. In Willapa Bay, the number of stressors may be less but the relative effect of individual stressors such as competition with the non-native eelgrass and aquaculture may be greater than the effect of those stressors in Puget Sound. Moreover, eelgrass in Willapa Bay may be more extensive today than it was historically, although this is uncertain, due to the large accumulations of Olympia oysters that were present and subsequently harvested. The role of eelgrass locally is also relevant as its importance may be greater if it is located at river mouths where it can provide greater benefits to certain species such as juvenile Chinook salmon. Eelgrass further from river mouths may be less valuable to this species as a rearing habitat simply due to its distance from the salmon migration pattern.

There are a number of affected interests including shellfish growers, fishing interests, salmon recovery interests, tribal communities, NGO's, natural resource agencies, and development interests. Today shellfish growers are unique in that they are in direct competition with eelgrass and directly affect it. Historically, dredging and other construction projects also directly affected eelgrass but today these

types of projects are typically avoided or mitigated. Aquaculture is unique in that its impacts are not mitigated. Indirect effects of development and urbanization and degraded water quality, while likely substantial, are not yet well understood. As knowledge is gained additional restrictions may be imposed to prevent impacts. This has been the case with overwater structures which now typically are required to allow light to penetrate through the structure so as to minimize impacts to eelgrass. The other affected interests mentioned above generally support protection and restoration of eelgrass.

Intensity

The following factors should be considered when evaluating intensity (40 CFR 1508.27). These factors are discussed in the context of cumulative impacts.

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Beneficial effects to eelgrass have occurred in Puget Sound through restoration projects.

(2) The degree to which the proposed action affects public health or safety.

No public health or safety issues are identified.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

Eelgrass itself is considered an ecologically critical area by the CWA and the State of Washington.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The concerns surrounding eelgrass have been extremely controversial in the State of Washington as evidenced by recent court cases specifically involving eelgrass affected by aquaculture, interest in public meetings and concerns/comment letters submitted to the Corps expressing concerns for eelgrass. Impacts associated with development also can generate controversy.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

There is uncertainty with respect to all elements of the issue including the population of eelgrass itself, past, present, and future effects, and effects of the proposed action. The uncertainty is primarily about the magnitude of effect, however, as there is little debate among the scientific community about the stressors on eelgrass and effects of aquaculture in particular.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

It is uncertain whether the proposed action will set precedent for future actions; however, there is strong potential for this to occur. The 2017 NWP 48 has been issued twice previously and is likely to be issued again in 2022. Each iteration of the permit has been updated based on experiences with the previous version.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

Aquaculture represents a substantial impact to eelgrass based simply on the acreages involved. While impacts are temporary if it is assumed all aquaculture activities cease with the expiration of the 2017 NWP 48, the likely reissuance of the permit and nearly certain continuation of aquaculture beyond the permit expiration date guarantee these impacts, temporary or not, will continue well in to the future. This is further discussed below.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

No impacts to these resources is anticipated.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

The proposed action is likely to adversely affect designated critical habitat for several species listed under the ESA including Puget Sound Chinook salmon, Hood Canal summer run chum salmon, and Puget Sound steelhead. Adverse effects are due in part to impacts on eelgrass (NMFS 2015). Recent programmatic ESA consultation concluded terms and conditions were required to protect eelgrass from aquaculture.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The action does threaten a violation of State requirements under the Shoreline Management Act to achieve no net loss of eelgrass and Federal requirements to protect eelgrass imposed under the ESA for aquaculture activities. The proposed action is not consistent with either of these requirements.

Significance threshold

The cumulative impacts of past and present activities on eelgrass on an acreage basis is unknown. What is known is that eelgrass has been lost in Puget Sound. Also known is that native eelgrass is under threat in all three regions by various stressors. In Willapa Bay and Grays Harbor this is principally from invasion of non-native eelgrass, which is believed to provide many of the functions of native eelgrass, potential changes in the water temperature and sea level from climate change, and from aquaculture. In Puget Sound the list of stressors includes those just listed and also water quality and habitat changes from urbanization and development which manifest themselves in a number of ways (degraded water quality, overwater structures, mooring anchors, boat traffic).

Estimates exist for the current distribution of the species in each region. Recent trends only exist for Puget Sound and while these trends are subsamples of the total population, they are considered to reflect the status of the population as a whole. The recent trend indicates eelgrass areas have been stable. On a smaller scale, eelgrass trends are variable with some areas showing declines and others increases. The eelgrass estimates from Willapa Bay and Grays Harbor cannot be meaningfully used to examine trends because of the different methodologies used.

The determination of a significance threshold, a threshold that if reached is indicative of significant effects, is desirable in cumulative effects analysis (CEQ 1997). In the State of Washington it is evident based on the establishment of a 'no net loss' requirement for eelgrass that a threshold of significance has already been established in this region and that it has been reached. This is supported by WDFW (2010) which stated the following regarding eelgrass status, "The broad patterns of development and shoreline modification around the Puget Sound basin have caused small, incremental effects that have

become cumulatively significant". In Puget Sound this is further supported by 1) the designation of eelgrass as critical habitat for multiple endangered species, and 2) the establishment of a goal to increase eelgrass by 20% for Puget Sound ecosystem recovery generally. Additional losses beyond this threshold would therefore be considered significant. The loss and/or degradation of potentially 1,000s of acres of eelgrass in Puget Sound alone, which is anticipated to occur under the proposed action, would thus be considered a significant cumulative impact under NEPA. There is more uncertainty with respect to losses in Willapa Bay and Grays Harbor. While the state requirement extends to these two embayments, there is substantially more eelgrass present as a percentage of estuary area, and it is possible eelgrass populations in these embayments have not experienced declines relative to historical populations. There are Federal protections including designation of eelgrass as EFH and an HAPC under the MSA and the general CWA protection of eelgrass as a special aquatic site. Given this background, it is likely that eelgrass populations in Grays Harbor and Willapa Bay can sustain losses without triggering a significance threshold. However, the loss and/or degradation of potentially 1,000s of acres of eelgrass in Willapa Bay and Grays Harbor is considerable and is likely to have ramifications for many additional species in these areas. These losses combined with the State and Federal protections, and the NEPA regulations which specifically states that significance cannot be avoid by breaking down the action into smaller parts (40 CFR 1508.27 (b)(7)), these impacts would also be considered significant.

The 2013 estimated eelgrass area is 55,870 acres in Puget Sound. The proposed action is anticipated to degrade or remove over 4,000 acres which represents 7% of this total. Over 2,600 of these acres are undisturbed by aquaculture on fallow lands. This is a large magnitude impact that is certain to occur. The magnitude of future impacts from development and climate change are unknown and less certain. In some cases the eelgrass will be replaced with oysters which provide comparable levels of productivity and function for some species such as salmon and Dungeness crab. For some species, such as herring, important functions of the habitat (i.e., spawning substrate) will be lost. In other cases, eelgrass habitat would be replaced with cover nets which provide relatively low habitat value compared to the eelgrass. Furthermore the benefits provided by oyster habitat are ephemeral because of the disturbance cycle associated with aquaculture. The eelgrass populations also decline seasonally so this may be comparable to disturbances from oyster aquaculture. The timing of aquaculture impacts are not seasonal but occur year around.

Impacts to eelgrass from aquaculture are on their surface temporary because the underlying habitat conditions (substrate, elevation, and water quality) remain the same allowing eelgrass to recover once the disturbance is removed. However, the regular disturbance associated with aquaculture both under the 2017 NWP 48 and under future permits results in a condition where eelgrass rarely recovers to its predisturbance condition. Even if full recovery is achieved, there is a substantial period of time where temporary losses of eelgrass will occur for periods of years. This temporary impact will undoubtedly have adverse effects on the species that depend on eelgrass habitat such as Dungeness crab, herring, and salmon. Loss of several years of eelgrass function at the mouth of a salmon stream for example will reduce the available rearing habitat for this species and result in fewer of that species surviving to adulthood. This would affect several year classes of that species and any fisheries on that species. In cases where the species is listed under the ESA, decreased survival of several year classes may have long term ramifications for the recovery of that species. NEPA defines significant effects as being both short- and long-term (40 CFR 1508.27(a)). The fact that effects may be temporary does not by itself exclude them from a determination of significance.

COE 125685

Given the magnitude of the impacts in acreage, the importance of eelgrass to the marine ecosystem, and the scale of the aquaculture impacts relative to other stressors, the impacts are considered significant.

4.3. Pacific sand lance and surf smelt

These species are analyzed together due to their similar life history and the similar list of stressors to the species.

The Pacific sand lance, is found from southern California around the north Pacific Ocean to the Sea of Japan, and across Arctic Canada. It is generally acknowledged to be of great ecological importance in local marine food webs (Bargmann 1998). The relative abundance of Puget Sound surf smelt, sand lance are unknown (Pentilla 2007). Greene et al. (2015) found evidence that suggested surf smelt populations in the south and central Puget Sound area have declined up to 100 fold in the last 40 years while sand lance populations have increased throughout all areas of Puget Sound during that same timeframe.

The following summaries of surf smelt and sand lance biology is from Pentilla (2007):

The surf smelt is a common and widespread nearshore forage fish throughout Washington marine waters. Spawning activity occurs in a wide variety of wave-exposure regimes, from very sheltered beaches in southernmost Puget Sound and Hood Canal to fully-exposed pebble beaches on the outer coast of the Olympic Peninsula. Spawning activity is distributed throughout the Puget Sound Basin, and stock boundaries cannot be defined geographically. Currently, about 10 percent of the shoreline of the Puget Sound Basin is documented to be surf smelt spawning habitat. Spawning regions are commonly occupied during the summer (May-August), fall-winter (September-March), or yearround (spawning every month, perhaps with a seasonal peak).

The life history of the surf smelt is intimately linked to nearshore geophysical processes. The critical element of surf smelt spawning habitat is the availability of a suitable amount of appropriately textured spawning substrate at a certain tidal elevation along the shoreline. Their potential spawning/spawn incubation zone spans the uppermost onethird of the tidal range, from approximately +7 feet up to extreme high water in central Puget Sound or the local equivalent. Spawning substrate grain size is generally a sand-gravel mix, with the bulk of the material in the 1-7 mm diameter range (Schaefer 1936, Penttila 1978).

WDFW surveys have documented surf smelt spawning habitat along 195 lineal statute miles in Puget Sound (Bargmann 1998). Their life history is unknown. There is no evidence of widespread migrations to and from the outer coast.

Sand lance, colloquially referred to as candlefish by local anglers, are also a common and widespread forage fish of the nearshore marine waters of Washington, including all of the greater Puget Sound Basin. Very little species-specific biological data are available (Field 1988). Sand lance spawning habitat has been documented in the Puget Sound Basin only since late 1989, when a protocol for detecting eggs in suitable substrate was developed (Penttila 1995a, b). Currently, about 10 percent of the basin's shoreline has been documented as sand lance spawning habitat (Figure 6). Additional sand lance spawning beaches continue to be found during ongoing habitat survey projects (WDFW unpub. data). In

COE 125686

many instances, the spawning beaches of fall-winter surf smelt and sand lance populations overlap geographically.

Although the species are taxonomically unrelated, the spawning habitat of the Pacific sand lance generally resembles that of the surf smelt: upper intertidal beaches consisting of sand and gravel (Penttila 1995b). Their spawning sites are also similarly scattered evenly over the landscape of the Puget Sound Basin, to such a degree that hypothetical geographical stock boundaries are not apparent. Co-occurrence of eggs of the two species in the substrates is common during the winter, when the spawning seasons of Puget Sound sand lance and winter-spawning surf smelt populations overlap. The eggs of both species can be found incubating in the same substrate at the same time (Penttila 1995b). Sand lance spawning habitat attributes derive from physical forces acting on sediment in the upper third of the intertidal zone, generally between mean higher high water (MHHW) and about +5 feet in tidal elevation in central Puget Sound or local equivalent. The grain-size spectrum of typical sand lance spawning substrate can be characterized as sand, finer-grained than that of surf smelt, with the bulk of the material in the range of .2-.4 mm in diameter (Penttila 1995b; WDFW unpub. data).

Bargmann 1998: The actual spawning habitat of the Pacific sand lance was virtually unknown prior to the discovery of their spawn deposits in the upper intertidal zone of Port Gamble Bay in 1989. Systematic surveys have documented sand lance spawning habitat on 129 lineal statute miles of Puget Sound shoreline (Pentilla 1995a, 1995b, 1997). The sand lance spawning habitat survey was estimated to be about 75% complete for the Puget Sound basin prior to being reduced by budget reductions in 1997. Sand lance spawning populations on Washington's outer coast and coastal estuaries have not been surveyed, although the occurrence of yolk sac sand lance larvae in those areas in the winter months indicates their presence.

Status

Washington State has protections in place for forage fish species as discussed below.

- The language of Washington Administrative Code (WAC) 220-110, the Hydraulic Code Rules governing hydraulic permit approvals by the WDFW, lists herring, surf smelt and sand lance spawning habitats as "marine habitats of special concern." A "no net loss" approach is applied to these habitats.

- The WDFW Hydraulic Code Rules stipulate that the construction of bulkheads and other bank protection must not result in a permanent loss of forage fish spawning beds (WAC 220-110-280(4)).

- Permissible in-water development activities are also subject to seasonal work-closure periods during local forage fish spawning seasons (WAC 220-110-271(1)). WDFW hydraulic permits granted for in-water development actions may stipulate certain measures to mitigate unavoidable forage fish habitat losses and address interruptions to beach sediment sources and movements (Pentilla 2007).

- Grounding of floats and rafts is prohibited on surf smelt, Pacific herring, and sand lance spawning beds by WDF per WAC 220-110-300 (1).

COE 125687

- The state Growth Management Act includes herring and surf smelt spawning areas as examples of priority fish and wildlife habitat conservation "critical areas", for which there is an expectation of mapping and protective designations. This species group's ecological importance and critical habitat vulnerability have led to their inclusion in the species and habitat lists of the WDFW's Priority Habitats and Species Program.

- The PSP has identified a goal to remove more shoreline armoring in Puget Sound than is constructed between 2011 and 2020.

Similar to the discussion above for eelgrass, SMP guidelines under the Shoreline Management Act contain protections for forage species including sand lance and surf smelt:

- WAC 172-32-186(8) directs SMPs to "include policies and regulations designed to achieve no net loss of those ecological functions". WDOE (2010) indicates that "the no net loss standard is designed to halt the introduction of new impacts to shoreline ecological functions resulting from new development. Both protection and restoration are needed to achieve no net loss."

- Protecting critical saltwater habitats is important to achieving no net loss of ecological functions. The SMP Guidelines state, "Critical saltwater habitats require a higher level of protection due to the important ecological functions they provide" [WAC 173-26-221(2)(c)(iii)(A)]. Critical saltwater habitats include "...all kelp beds, eelgrass beds, spawning and holding areas for forage fish, such as herring, smelt and sandlance; subsistence, commercial and recreational shellfish beds; mudflats, intertidal habitats with vascular plants, and areas with which priority species have a primary association" (WAC 173-26-221(2)(c)(iii)(A)).

- The shoreline vegetation conservation section [WAC 173-26-221(5)] defines vegetation conservation as "activities to protect and restore vegetation along or near marine and freshwater shorelines that contribute to the ecological functions of shoreline areas." These activities include "the prevention or restriction of plant clearing and earth grading, vegetation restoration, and the control of invasive weeds and nonnative species (WDOE 2011).

The SMP guidelines (WDOE 2015) include specific provisions for aquaculture including:

- Forage fish spawning habitat (Figure 16-5) is a critical saltwater habitat requiring protection. All aquaculture should be sited outside known forage fish (such as Pacific herring and sand lance) spawning habitat, if possible. If not possible, operating during certain work windows and conducting surveys and monitoring for forage fish activity can be used to avoid and mitigate impacts.

- SMPs should require forage fish spawning baseline surveys for new intertidal aquaculture that will occur at or near documented forage fish spawning habitat. The surveys should be conducted by trained personnel using appropriate protocols approved by WDFW. Other aquaculture permits may require a survey and Ecology recommends that proponents be allowed to submit these to meet local requirements.

- Ecology recommends that shellfish culturing be restricted to below the +5 feet Mean Lower Low Water tidal elevation if the area is documented as Pacific sand lance spawning habitat by WDFW or a site specific survey. Also, shellfish culturing should be restricted to below the +7 feet Mean

COE 125688

Lower Low Water tidal elevation if the area is documented surf smelt spawning habitat by WDFW or a site specific survey.

4.3.1. Past and present effects

Shoreline armoring

Shoreline modifications and development often negatively affect spawning sites of forage fish. A significant proportion of productive forage fish spawning habitat probably was lost in the Puget Sound basin prior to 1973 when shoreline armoring was largely unregulated (Pentilla 2007). Shoreline armoring and pollution were suggested as reasons for declining smelt population in Puget Sound by Greene et al. (2015).

Williams and Thom (2001) reviewed the potential impacts of various forms of shoreline armoring on nearshore environmental factors and resources in the Puget Sound region. Shoreline armoring may be the primary threat to surf smelt and sand lance spawning habitat (Thom et al. 1994). Armoring affects spawning habitat by physical burial of the upper intertidal zone during the course of creating or protecting human infrastructure and activities. Armoring alters the grain size making it potentially unsuitable for forage fish spawning (Dethier et al. 2016).

The sheltered bays of the inland waters so important to spawning forage fish have also been the shorelines of highest interest for commercial and residential development. Armoring also blocks, delays or eliminates the natural erosion of material onto the beach and its subsequent transport (Johannessen and MacLennan 2007). These processes maintain forage fish spawning substrate on the upper beach (Williams and Thom 2001). Although beaches may appear to be stable, their sediment is in constant motion, driven by prevailing wind and waves. The sand and gravel making up forage fish spawning substrate moves along the shoreline and eventually off into deep water, and must be replaced by new material entering the shoreline sediment transport system. A lack of a constant supply of new sand and gravel, primarily derived from eroding shoreline bluffs, may lead to coarsening, lowering of the beach elevation, and thus longterm degradation of spawning habitat.

Results of the PSNERP Change Analysis indicate that shoreline armoring occurred along 27 percent of Puget Sound (Myers 2010). The percent of armored shoreline varied considerably (9.8–62.8 percent) depending on the sub-basin. The different types of shoreline armoring and density are illustrated in Figure 4-12. Relevant to surf smelt and sand lance spawning, 27% of barrier beaches and 33% of bluff backed beaches were armored or 392 out of 1,224 miles (Myers 2010).

COE 125689

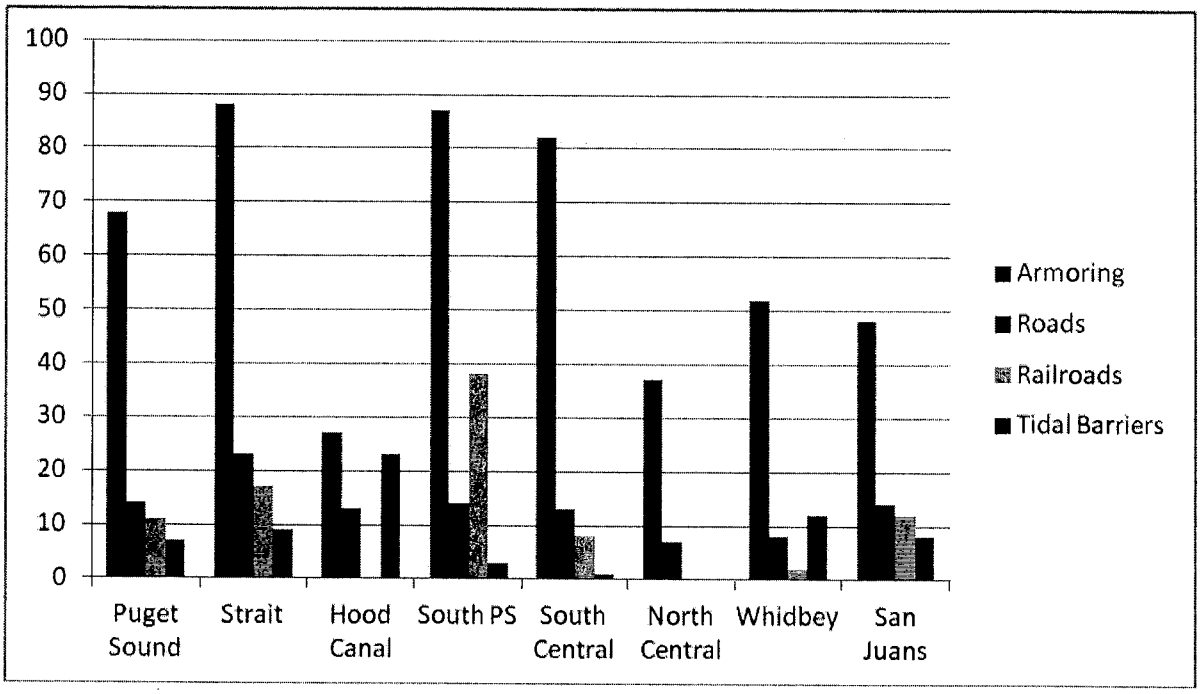

Figure 4-12. Presence of different stressors along mapped fill shoreline for Puget Sound and subbasins, expressed as a percentage (%) of fill length that stressors occupied (for example, Armoring was present along 68 percent of filled shoreline length in Puget Sound as a whole) (Strait, Strait of Juan de Fuca; PS, Puget Sound; Whidbey, Whidbey Basin) (from Myers 2010).

Recent data from Hydraulic Project Approvals (permits issued for in-water work and shoreline construction activities) indicate more armoring was gained than lost cumulatively since 2011, resulting in a net cumulative length of 1.1 miles (6,000 feet). However, in 2014, more armoring was removed than was added, a ratio that aligns well with the 2020 PSP target of no net change in armoring relative to the baseline year of 2011 (Hamel et al. 2015).

Overwater structures

Nightingale and Simenstad (2001) reviewed the potential impacts of various forms of overwater structure (e.g., docks, ramps, floats, boathouses) on nearshore environmental factors and biological resources in the Puget Sound region. The impacts on forage fishes and their critical habitats vary with the species and the size and configuration of the structure. Surf smelt and sand lance spawning habitats may persist beneath overwater structures if the structures span the spawning habitat zone, and pilings have minimal displacement of beach area, so that upper intertidal sediment distribution and movement are not affected (WDFW unpub. Data, in Pentilla 2007).

Marine Riparian Vegetation

A significant attribute of surf smelt spawning habitat may be the overhead shading provided by the canopies of mature trees rooted in the backshore zone bordering the spawning beaches. Studies have strongly suggested that the presence of shading terrestrial vegetation in the marine riparian corridor has

COE 125690

a positive effect on the survival of surf smelt spawn incubating in sand-gravel beaches in the upper intertidal zone during the summer months within the Puget Sound Basin (Penttila 2002).

Fishing

Surf smelt are recreationally and commercially important harvests for human consumption at scattered locations throughout the Puget Sound Basin. Commercial and recreational Surf Smelt fisheries each estimated at 100,000 pounds annually. The population size in Puget Sound is unknown.

Pacific sand lance have never been harvested commercially in the Puget Sound Basin, and commercial exploitation of the species has recently been banned by the Washington Department of Fish and Wildlife (WDFW), given their important ecological role. Incidental catches of sand lances are dip-netted from "bird-balls" or "bait balls" by recreational anglers during local salmon fishing seasons as a preferred sport-bait for Chinook salmon (Pentilla 2007).

4.3.2. Effects of the proposed action

The effects of the proposed action are discussed above in Section 3. They include removing spawning habitat by placement of nets, floats, barges, or other structures on spawning beaches, smothering eggs by trampling by foot or vehicle or grounding of vessels on beaches, and direct mortality of adults due to capture in aquaculture cover nets. There are no timing restrictions or monitoring associated with the proposed action that could minimize these effects.

Surf smelt and sand lance would be particularly vulnerable to cover nets installed along the shorelines because of their spawning behavior. If not dissuaded from spawning by the nets, they could be captured and killed by the nets. If they are persuaded from spawning, this habitat no longer provides the spawning function for these species.

There are currently an estimated 1,162 aquaculture acres collocated with mapped smelt and 416 acres collocated with mapped sand lance spawning habitat. GIS analysis indicates that aquaculture project areas collocated with spawning habitat extend waterward from the shoreline about 150-600 ft. Conservatively assuming each aquaculture project area extends out 400 ft waterward of the shoreline results in an estimated 109 ft of lineal shoreline per acre. This translates to totals of 24 miles (126,658 lineal ft) of surf smelt and 9 miles (45,344 lineal ft) of sand lance spawning habitat affected by aquaculture. Note this does not account for impacts that may occur to adult fish migrating along the shoreline to spawning areas that may encounter nets outside of the spawning area.

4.3.3. Effects of future actions

Development

Urbanization and development are expected continue in Puget Sound as discussed above. This results in continued shoreline armoring, overwater structures, and loss of marine vegetation.

New armoring continues to be constructed at an average pace of 0.7 miles (3,700 feet) per year (mean of 2011 – 2014), but the pace has slowed progressively since 2012. In contrast, shoreline armoring is removed at an average rate of 0.4 miles (2,200 feet) per year (Hamel et al. 2015).

Recent Corps permitting for overwater structures is illustrated in Figure 4-6.

COE 125691

State regulation administered under SMPs may minimize these effects to some degree but this is uncertain.

Aquaculture

Similar to the above discussion for eelgrass, aquaculture is certain to continue beyond the expiration of the 2017 NWP 48. The impacts described for the proposed action would thus continue into the future and likely increase as additional area is put into aquaculture production.

Fishing

Fishing for surf smelt is expected to continue.

Climate Change

Urban communities are likely to respond to sea level rise with an increase in armoring to delay the natural erosion of shorelines. This response will "squeeze" forage fish spawning beaches between rising water levels and armoring structures. USGS researchers are using models to understand the effects the "squeeze" will have on fish that rely on beaches for their survival (Liedtke 2012).

4.3.4. Summary and conclusion

The cumulative impacts on eelgrass are summarized in Table 4-7.

Table 4-7. Summary of Cumulative Effects on Pacific herring

stressor	Puget Sound	Willapa Bay	Grays Harbor
Shoreline armoring	Likely caused the greatest historical impact; shoreline armoring expected to continue, new state regulations may limit to impacts to some degree	Limited in extent; limited future armoring	Concentrated in certain areas; limited future armoring
Overwater structures	numerous and increasing;	overwater structures limited to a few areas;	overwater structures limited to few developed locations
Aquaculture	Historical impacts likely; currently an estimated 1,162 aquaculture acres collocated with mapped smelt and 416 acres collocated with mapped sand lance spawning habitat; present impacts will continue into the future	Unknown historical impacts; no mapped spawning habitat currently	Unknown historical impacts; very limited spawning habitat currently that is not collocated with aquaculture
Fishing/ overfishing	200,000 lbs surf smelt harvested annually; uncertain effects on population	No known effects	No known effects

COE 125692

Climate change	Sea level rise is may eliminate forage fish spawning habitat as beaches become compressed against the shore

Significance

Context

A determination of significance requires consideration of both context and intensity (40 CFR 1508.27(a)). Context means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.

Surf smelt and sand lance are both broadly distributed in Washington's marine waters but very limited is known about their life history. Their population size and structure is unknown but there is concern they are declining, at least in Puget Sound, in part due to losses of spawning habitat. Very limited study suggests surf smelt may have declined in Puget Sound, perhaps dramatically, while sand lance populations may have increased. There is virtually no information on these species in Grays Harbor and Willapa Bay. These species play an important role in the marine food web as highly nutritious prey for many predators including species listed under the ESA such as marbled murrelet and salmon species. Regionally spawning habitat is protected by the State of Washington affords some protection to spawning habitat under the Shoreline Management Act and HPA regulations.

The primary impact to these species both historically and presently is considered to be loss of beach spawning habitat due to shoreline armoring. Other activities and structures that are occur along the nearshore beach habitat such as docks and piers and aquaculture are also likely to have some impact. These impacts are expected to continue into the future. Sea level rise associated with climate change may exacerbate these impacts.

There are a number of affected interests including shellfish growers, fishing interests, salmon recovery interests, tribal communities, NGO's, natural resource agencies, and development interests. Development and aquaculture interests generally are competing with resource agency interests over habitat protections.

Intensity

The following factors should be considered when evaluating intensity (40 CFR 1508.27). These factors are discussed in the context of cumulative impacts.

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Limited beneficial impacts have occurred in the form of bulkhead removal and beach restoration in Puget Sound.

(2) The degree to which the proposed action affects public health or safety.

No public health or safety issues are identified. Shoreline armoring provides certain protections for personal property.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

COE 125693

Forage fish spawning habitat is identified as an ecologically critical area.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

Impacts to forage fish spawning habitat from various impacts including development activities and aquaculture have generated much recent concern as evidenced by regulations promulgated by the state for their protection.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

There is high uncertainty with respect to impacts on forage fish due simply to the very limited current understanding of the ecology and population of the species.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

It is uncertain whether the proposed action will set precedent for future actions; however, there is strong potential for this to occur. The 2017 NWP 48 has been issued twice previously and is likely to be issued again in 2022. Each iteration of the permit has been updated based on experiences with the previous version.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

Aquaculture and the other identified stressors represents a largely unknown impact to forage fish. These stressors do represent known impacts to habitat that is an important part of the species life history. The cumulative impacts to this habitat are substantial at present and they are expected to increase in the future. This is further discussed below.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

No impacts to these resources is anticipated.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

The proposed action is likely to adversely affect designated critical habitat for several species listed under the ESA including Puget Sound Chinook salmon, Hood Canal summer run chum salmon, and Puget Sound steelhead. Adverse effects are due in part to impacts on eelgrass (NMFS 2015). Recent programmatic ESA consultation concluded terms and conditions were required to protect eelgrass from aquaculture.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The proposed action is inconsistent with State requirements under the SMA to protect forage fish spawning habitat. The development related stressors would also be inconsistent with these requirements, although there are competing SMA requirements related to property safety that are relevant to shoreline armoring projects.

Significance threshold

The cumulative impacts of past and present activities on surf smelt and sand lance are unknown due to the lack of any population data. The determination of a significance threshold relevant to the species

itself is therefore not possible. Knowledge is limited to known impacts to the species spawning habitat but even here there is a fair amount of uncertainty. The geographic locations of spawning habitat are not entirely known with even less known about the species activities in Willapa Bay and Grays Harbor.

Despite this a significance threshold can be established for the known spawning habitat for the 75% of Puget Sound that has been inventoried. The State of Washington has determined that a 'no net loss' policy is justified for forage fish spawning habitat. The PSP has further identified a goal of removing more shoreline armoring than is placed. These actions the contention that the significance threshold has already been reached from the cumulative impacts that have occurred to date meaning that any additional impacts would be considered significant.

Currently there are 195 mapped miles of surf smelt and 129 mapped miles of sand lance spawning habitat in Puget Sound. Shoreline armoring in Puget Sound occurs on 392 out of the 1,124 miles of the beach type habitat used for spawning by these species in Puget Sound. There is substantial overlap between the mapped spawning habitat and armoring.

Aquaculture in Puget Sound affects an estimated 24 miles or 12% of the total surf smelt spawning habitat and 9 miles or 7% of the total sand lance spawning habitat. These are certainly not insignificant percentages. Coupled with likely direct mortality of adults associated with the extensive placement of cover nets throughout Puget Sound (potentially 6,000 acres), the potential for significant effects certainly exists. However, the degree to which aquaculture activities are actually collocated with spawning habitat is unknown because the culture activities typically occur lower on the beach than spawning. The exception is clam culture above the +5 ft MLLW spawning zone for sand lance. The degree to which this exception occurs is unknown. In many cases aquaculture operations could be conducted with negligible impacts on forage fish spawning that occurs on beaches immediately upslope of the culture. These farms would rarely if ever conduct activities in the upper slopes of the adjacent beach where spawning occurs. On the other hand, it is just as likely that many operations would conduct substantial activities in these upslope areas including driving vehicles, storing materials, and even culturing itself (as discussed previously in the case of sand lance). In these cases, substantial harm to spawning fish can occur or spawning areas could be removed from use by the population. The issue is really about individual husbandry practices of which there is a wide range. It is unknown if one the scenarios described above predominates. May be more important is the fact that there are no restrictions in this regard for the proposed action. It must therefore be assumed that these types of impacts will occur. The conservative approach would assume common occurrence. Given the potential for significant impacts due simply to the large acreages involved and the fact any impacts will continue well into the future, it is prudent to default to the consensus of the state scientific experts who have determined that an important threshold of cumulative effects has already been reached as described above. The conclusion therefore is that significant cumulative effects to surf smelt and sand lance spawning habitat would occur due to the proposed action.

COE 125695

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COE 125699

AQUACULTURE CUMULIATIVE EFFECTS ANALYSIS REVIEW SCHEDULE (February 2017)

REVIEWER and WRITER	First Draft issued for review	Reviewers response to comments	Comments meeting (if needed)	Second draft issued for review	Reviewers response to comments	Comments meeting (If needed)	Finalize Document
	1 Feb	6 Feb	7 Feb	9 Feb	13 Feb	14 Feb	17 Feb
Pozarycki	X		X	X		X	X
Harrington		X	X	X		X	
Sanguinetti		X	X		X	X	
Tillinger		X	X		X	X	
Bennett		X	X		X	X	
Walker		X	X		X	X	
McGowan		X	X		X	X	
Gesl?							
Derosa?							

Thurston County Shoreline Master Planning Update
November 28, 2018

Comments by Jim Gibbons
President and Founder of Seattle Shellfish

To: Brad Murphy, County Planner

Our company has been farming shellfish, predominantly geoduck clams, for 22 years, 20 of them in Thurston County. We currently employ about 70 full-time employees, about a dozen of whom live in the county. Our average compensation is just over $50,000 per year and also includes a robust health and dental package. Our collective sales to date are over a hundred million dollars.

More importantly, 45 of our 70 leases are in Thurston County. Those upland lessors, the majority of them elderly individuals on fixed incomes, have earned about $13 million dollars. That works out to an average of $185,000 per Thurston County lease.

Not only do shellfish growers depend on clean water, farmed shellfish remove excess nutrients that Puget Sound residents continue to dump into Puget Sound. According to the National Oceanic and Atmospheric Administration, "Sixty-five percent of U.S. estuaries and coastal water bodies are moderately to severely degraded by excessive nutrient inputs, which lead to algal blooms and low-oxygen (hypoxic) waters that can kill fish and seagrass and reduce essential fish habitats." The Environmental Protection Agency states that "nutrient pollution is one of America's most widespread, costly and challenging environmental problems, and is caused by excess nitrogen and phosphorus in the air and water" and that "marine dissolved oxygen is showing a long term decline in the waters of Puget Sound..." What does all this mean? In short, think Hood Canal fish kills arriving here in Thurston County.

The Woods Hole Oceanographic Institution is on record stating that "shellfish are by far the most cost-effective strategy to control pollution." Also, Environmental Defense is on record saying that "One type of aquaculture—mollusk farming—actually reduces nutrient pollution."

In terms of shellfish aquaculture, Kitsap County is recognized as having one of the most regressive Shoreline Master Plans in the state. I am very disappointed that Thurston County has chosen to copy the plan of Kitsap County, where there is no aquaculture, rather than the more shellfish aquaculture friendly plan of Mason County, where shellfish aquaculture still thrives.

To give you an idea what this means, Pierce County is also not friendly to aquaculture. Five years ago, we began a permit process there, like the one you're proposing. It cost $600,000 in attorney and expert witness fees and took three years to complete. All for a ten acre farm.

Because of the current cumbersome permitting process in Thurston County, our company is not attempting to permit new geoduck farms. Additionally, your proposed Shoreline Master Plan will virtually end all new oyster and clam farms in the county. Instead, new shellfish farmers will go to Mason County or Pacific County where expensive and time consuming permits above and beyond the federal U.S. Army JARPA permit are not required for new oyster or clam farms.

If Thurston County's goal is to kill the growth of any new oyster or clam farms or the ambitions of any new Thurston County shellfish farmers, then continue on your current path. Otherwise, start the process over and aim for a Shoreline Master Plan friendly to shellfish aquaculture.

28 November, 2018
Thurston County proposed Shoreline Master Program new regulations
Public hearing, Thurston County Courthouse 6:30 pm

Comments by Daniel Barth:

To Brad Murphy, County Planner, Commissioners and County elected officials and staff.

Thank you for the opportunity to speak to you all tonight. I am here to speak in opposition to the adoption of these proposed rules, requirements and regulations. I believe they are overreaching, not founded in science, poor business practice and unnecessary. They discourage, inhibit and reject opportunities for economic development, environmental stewardship and suppress certain members of our community. I encourage you to NOT approve these proposed rules.

I am a service disabled combat veteran of the Vietnam War. Together with my son a service disabled Iraq War Veteran we started Patriot Shellfish Farms. Our vision is to engage Veterans and Service members in small business in rural America through shellfish and seaweed farming. Thus, Veterans farming food in America for America and beyond.

Remember 22 veterans and 1 service member kill themselves every day. 1 in 3 women in the military has been sexually assaulted. The physical and emotional scars of war stay with us for life. I encourage you all to read Stephanie Westlund's book "Field Exercises: How veterans are healing themselves through outdoor activities". This includes agriculture and aquaculture. I know from personal experience.

In my opinion the proposed rules do not say "Welcome Home, thank you for your service and sacrifice". Rather they say go away, don't look for help or support from Thurston County.

America imports almost 85% of the seafood consumed here. Aquaculture in Thurston County could impact that number. If the County regulators and a small number of vocal aquaculture opponents would rather wear a red ball cap that says "Make China Great Again" and buy imported foods, so be it!

But if you care about America and our Veteran community I urge you to table these proposed rules, work with the shellfish and seaweed farmers already here and provide opportunity for new farmers to be part of our community. You already have some of the most restrictive shoreline regulations in the State.

Yes Aquaculture is a preferred use in the Shoreline program. It is also mandated to be fostered and supported by Federal and State legislation and Policy

Putting up road blocks to America's veterans and support industries tell me you don't care.

Time is limited here to further present my objections and offer positive response and suggestions and input.

On behalf of our local, State and National veteran community I urge you to reconsider adopting these proposed rules.

Thank you.

Daniel Barth
Patriot Shellfish Farms
Homegrown by Heroes
Sea-Rations
Blue Greens Co.

dbarth@localaccess.com

Thurston County Shoreline Stakeholders Coalition

4108 Kyro Rd SE. Lacey, WA 98503

November 28, 2018

TO: Thurston County Planning Commissioners

From: John Woodford, Chairman
Doug Karman, Vice-Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Draft Update of the Shoreline Master Program (SMP)

At the November 7, 2018 Planning Commission Meeting the Planning Department stated that an administrative permit would be required if just one board on your Pier, float or wharf needs to be replaced. In fact, according to the draft, any work in the buffer or on the shoreline would need an Administrative Permit. If taken literally, we would even need to get an Administrative permit to mow our lawns, weed our planting areas or plant/transplant native trees or bushes. If we didn't get the permit we would be committing a misdemeanor and could be arrested.

We have suggested to the Planning Department that they develop a pamphlet, regulation or policy booklet that would describe those things you can do in the buffer, on the shoreline or on Piers, floats or wharfs without a permit. There is precedence for this set by other governing agencies and would reduce confusion, time and cost to both the resident and the Planning Department without negatively impacting shoreline ecological function.

At the same meeting the Planning Department said that they do not want deck boards on a pier, float or wharf replaced with boards. They want the boards replaced by grated material. This recommendation is based on marine requirements not fresh water lake requirements. Grated material is not necessary on fresh water and is a safety hazard to our children. Not one of the reasons used to justify the grating material exist on fresh water. Piers, floats and wharfs are utilized differently on fresh water vs. salt water and they are constructed differently. The SMP should make this differentiation.

The suggested timeline included in the meeting material for tonight includes a recommendation for an open house on December 19th. Based on past poor performance of public notification and the holiday season, we believe that the open house should be moved to the new year. This would be the right thing to do, if we are really interested in transparency.

On October 10th you instructed the Planning Department to include in the timeline a meeting where selected community stakeholders could have additional time to present their proposal to the Planning Commission. Looking at the timeline included in tonight's meeting material, it is obvious that the Planning Commissioners October 10th direction has been ignored.

Respectfully submitted,

John Woodford, Chairman

Doug Karman, Vice-Chairman

Thurston County Shoreline Stakeholders Coalition

4108 Kyro Rd SE. Lacey, WA 98503

November 28, 2018

TO: Thurston County Planning Commissioners

From: John Woodford, Chairman
Doug Karman, Vice-Chairman
Thurston County Shoreline Stakeholders Coalition

Re: Draft Update of the Shoreline Master Program (SMP), Chapter 19.600

As shoreline home owners in unincorporated Thurston County, we continue to have issues with not only the draft SMP content and updating process, but now we find the apparent deliberate deletion of nearly three quarters of the chapter being presented this evening is unacceptable. Memo = ten pages. Chapter 19.600 = thirty-eight pages.

Chapter 19.600, Shoreline Use and Modification Development Standards, is the subject of this evenings Planning Commission Work Session. However, staff's Memorandum has omitted the majority of that Chapter. Following are the Chapter sub-headings; those in red have been omitted from the Memorandum.

- 19.600.100 Applicability – Omitted
- 19.600.105 (Shoreline) Use and Modifications Matrix
- 19.600.110 Agriculture – Omitted
- 19.600.115 Aquaculture
  - A. Environmental Designations Permit Requirements – Omitted
  - B. Application Requirements
  - C. Development Standards – Out of sequence; follows 19.600.160.B. under Mooring Structures
- 19.600.120 Barrier Structures and In-stream Structures – Omitted
- 19.600.125 Boating Facilities – Omitted
- 19.600.130 Commercial Development – Omitted
- 19.600.135 Dredging and Dredge Disposal – Omitted
- 19.600.140 Fill – Omitted
- 19.600.145 Forest Practices/Timber Harvest – Omitted
- 19.600.150 Industrial Development – Omitted
- 19.600.155 Mining – Omitted
- 19.600.160 Mooring Structures and Activities
  - A. Environmental Designations Permit Requirements – Omitted
  - B. Application Requirements
  - C. Development Standards – Omitted
- 19.600.165 Recreation and Public Access – Omitted
- 19.600.170 Residential Development
  - A. Environmental Designations Permit Requirements – Omitted
  - B. Development Standards
- 19.600.175 Shoreline Stabilization – Omitted
- 19.600.180 Transportation – Omitted
- 19.600.185 Utilities - Omitted

The same thing happened at the November 7th Planning Commission meeting when staff offered a Memorandum and Power Point presentation on Chapter 19.500, Permit Provisions, Review and Enforcement. Both of the offerings ended with the Shoreline Application Flow Chart. The following indicates the cut-off of Chapter 19.500:

- 19.500.050 Statement of Applicability and Purpose
- 19.500.075 Permit Types Definitions
- 19.500.100 Permit Application Review and Permits
  - A. Permit Application Review
  - B. Substantial Development Permit
  - C. Exemptions from Substantial Development Permits
  - D. Conditional Use Permits, including Administrative Conditional Use Permits
  - E. Variances and Administrative Variances
- 19.500.105 Procedure
  - A. Permit Process Summary
  - Figure 19.500.105(A)(7). Shoreline Application Flow Chart
  - B. Pre-submission Conference - Omitted
  - C. Minimum Application Requirements - Omitted
  - D. Notice of Application - Omitted
  - E. Public Hearings and Notice of Decision - Omitted
  - F. Initiation of Development - Omitted
  - G. Permit Revisions - Omitted
  - H. Time Requirements and Expirations - Omitted
  - I. Shoreline Master Program Amendment - Omitted
  - J. Administrative Interpretation - Omitted
  - K. Monitoring - Omitted
- 19.500.110 Enforcement and Penalties - Omitted
  - A. Authority - Omitted
  - B. Process – Omitted
  - C. Civil Penalties - Omitted
  - D. Criminal Penalties - Omitted

All of these "red" items need to be heard by the Planning Commission; you, and the public, are being presented a very selective portion of the SMP.

Regarding "transparency," there has been nothing posted on the Community Planning website under the heading *Shoreline Code Updates – Meetings* since the September 12, 2018, BoCC meeting.

Respectfully submitted,

John Woodford, Chairman

Doug Karman, Vice-Chairman

December 19, 2018

Thurston County Planning Commission
Thurston County Courthouse, Building One
2000 Lakeridge Drive SW,
Olympia, WA 98502-1045

Dear Planning Commissioners:

Thank you for your thoughtful consideration of the update to the Shoreline Master Program. We and thousands of other homeowners are deeply affected by the County's SMP. Living near shores and wetlands, we have a direct interest, and responsibility, to carry out the program. We request ways to support our legal, daily use of our homes and promote our environmentally-conscious use of our homes and yards. In particular, we ask your consideration of the following:

1. As currently written, the draft SMP would implement a new system of shoreline permits to cover all actions a home owner might take anywhere within 200 feet of the highwater mark. Activities large or small would require either a Substantial Development Permit or a new, "written approval" available from the County's permit office (pages 62 and 65 of the draft SMP). The wording covers "all development" which by definition in the SMP covers any activity and is alarmingly broad.
2. We also note that other building and site regulations, in addition to the shoreline regulations, will continue to apply. These building regulations already provide comprehensive oversight and raise a question of why additional scrutiny is required with a "written approval".
3. Thousands of homes are in the SMP's jurisdiction at the County's many rivers, lakes, streams, wetlands and areas of salt water. We question the logistics and the effectiveness of such scrutiny of each and every one of them. What is it that home owners are doing so wrong?

We ask that this broad and cumbersome control system be rethought along these lines:

1. Acknowledge the controls already in place with building and shoreline permits. Acknowledge the new dock and bulkhead regulations of the state that will be added for further control.
2. Support home owners in being proactive every day within this framework of controls.
   - Step up the outreach with a message of what's possible to do today with everyday maintenance and repair.
   - Don't add more permits and permissions. Drop the proposed "written approval" process.
   - Specifically encourage plantings along shorelines. Actively connect home owners with resources. Do not require permits and permissions. Provide "credit" toward future mitigation for large projects under permits. Put real life into the wording of the voluntary private restoration discussed in Appendix C, page C-13.

Respectfully,

Katherine Knight (Katsea@aol.com
Kathryn Townsend kath.townsend@gmail.com
Cynthia Rubl crubl1@hotmail.com
Meredith Rafferty 618 77th Ave NE, Olympia WA

Thurston County Planning Commissioners
March 6, 2018
Shoreline Master Program Comments

Greetings! I am here to comment on the work of the Thurston Shoreline Master Program.

I am concerned about the County's trend of converting shorelines to other uses. The SMP guidelines (WAC 173-26-186(8) provide for development standards and use regulations designed to achieve **no net loss** of shoreline ecological functions. The Thurston County SMP is an important tool for the County to protect our shorelines for fish and wildlife as well as public enjoyment. The SMP needs to uphold no net loss at a minimum, and should be proactive and aim for **"net gain".**

The following areas need to be addressed:

Buffers: Shoreline buffers are important management tools which protect and provide benefits to water quality and habitat. With climate change causing sea level rise, I am astounded in the draft Chapter 19.400 that buffers have been reduced. Shortened buffers will impair "no net loss" of ecological function! **Current standard SMP buffer widths or setbacks should not be modified or reduced.**

Mitigation: Encourage **long-term net gains** in both program planning and project specific designs when conducting mitigation sequencing (avoiding, then minimizing, finally compensating for impacts). Require compensatory mitigation to occur in the same habitat area for gain in the same ecological functions.

Aquaculture: Aquaculture's use of shorelines must be consistent with the regulations of the Shoreline Management Act (SMA) , the Shoreline Master Program and Best Available Science. A water dependent use, aquaculture is polluting our shorelines with plastics and will increase with industry expansion. Industrial aquaculture has taken over many of our coves and inlets, altering the habitat, reducing biodiversity, and posing threats to nearshore habitat for eelgrass and forage fish, threatening salmon and Orca recovery. Aquaculture operations have been allowed to *destroy habitat* when preparing shellfish beds, *endanger native species & wildlife* (starfish, crabs, birds and sea mammals) with plastic netting, and *disrupt the substrate* with high pressured hoses when harvesting (without hydraulic permits!) A 2017 Army Corp of Engineers draft Cumulative Impact Analysis concluded: "Given the magnitude of the impacts in acreage, the importance of eelgrass to the marine ecosystem, and the scale of the aquaculture impacts relative to other stressors, the impacts are considered **significant**."

http://users.neo.registeredsite.com/3/7/5/12218573/assets/2017_NWP48_Draft_Cumulative_Imapct_Analysis.pdf Although this report was not released (heavy lobbying to bury it?), the science, results and recommendations are valid. It's the Army Corps' own scientists, research and report!

Aquaculture operations and permits need to comply with the Endangered Species Act, the Shoreline Management Act and both the State and National Environmental Policy Act restrictions.

19.300.120 Economic Development
B. Policy SH-23 *Water-oriented economic development, such as those aquaculture activities encouraged under the Washington Shellfish Initiative, should be RESTRICTED, (not encouraged) and shall be carried out in such a way as to minimize adverse effects and mitigate unavoidable adverse impacts to achieve no net loss of shoreline ecological function. SHOULD BE MODIFIED TO READ:* ***restricted***

I also noticed in Chapter 19.600 that Aquaculture operations will be allowed under "C", conditional use permits. I thought recent court judgments required SDPs for geoduck operations. How is this being reconciled?

Limit industrial aquaculture expansion to protect forage fish habitat and salmon/Orca recovery.
Ban hydraulic harvesting practices or require an HPA permit
Limit/phase out the use of marine plastics.

Climate Change: Sea level rise associated with climate change may result in efforts to increase armoring (shoreline modifications and development) which often negatively affects spawning sites of forage fish and shortens buffers. The Puget Sound Partnership has identified a goal to remove more shoreline armoring in Puget Sound than is constructed between 2011 and 2020. **Limit armoring projects**.

Please include these important recommendations as you consider the SMP draft

Thank you!

Phyllis Farrell
7600 Redstart Dr. SE
Olympia, WA.

Patrick and Kathryn Townsend
7700 Earling Street NE
Olympia, WA 98506

March 6, 2019

COMMENTS ON CURRENT VERSION OF THE THURSON COUNTY SMP

19.600.115.A.3.b	"An SDP shall be required for the planting, growing and harvesting of farm-raised geoducks only if the specific project or practices causes substantial interference with normal public use of surface water." This is contradicted by the rulings of Hearing Examiner Bjorgen and Judge Tabor on appeal in 2011, which concluded that that the SDP requirement is met because of the use of "structures", i.e., the 43,560 PVC per acre edifice constructed on the tideland. See our information on this topic sent to Brad Murphy, the County Commissioners and members of the Planning Commission.
19.600.115.B.2	This paragraph about "geoduck aquaculture" is illogical. -- There is no source for "best available information". -- a-k are included only "where applicable" of **if already part of information submitted for another federal or state agency.** --If "best available information" is not available, there is not logically or adequately a way within this rule to describe existing and seasonal conditions. -- If information in a-k is NOT ALREADY PART OF INFORMATION SUBMITTED FOR ANOTHER FEDERAL OR STATE AGENCY, then based on the logic of the sentence, it is not required. **At the very least Paragraph 2 should be re-written for clarity.**
19.600.115.B.2.j	1. What is the definition and who determines what is "probable direct, indirect and cumulative impacts"?
19.600.115.B.2.k	2. Who determines the "visual assessment" of the operation? The property owners? The operator? An "assessor" hired by the property owner or the operation? The viewer or its paid assessor? The County? Mike Kain says the County doesn't even have the money to come out and check the geoduck operations that they permit, so this is probably something that sounds nice and is completely meaningless. This needs to be defined, otherwise it won't be done.

19.600.115.B.3.i	This allows the operator to use feed, herbicides, antibiotics, vaccines, growth stimulants, anti-fouling agents, or other chemicals. So, the County wants to save the salmon and the Orcas? Under this regime, you can probably forget it.
19.600.115.B.3.k	Water quality should be checked at specific times during the plant-harvest season. How does the County know when water quality testing "is required."
19.600.115.B.3.l	With what is allowed in 19.600.115.3.i, no rational person would expect anything other than "net loss."
19.600.115.C.1.a	Define "consistent with control of pollution and prevention of damage to the environment." The items in 19.600.115 B.3.i would indicate a high likelihood of pollution and damage to the environment. Additionally, when aquaculture was first made a "preferred use" was long before current methods using PVC plastics and plastic netting. The amount of PVC plastic is approximately 7 miles of PVC weight approximately 16 tons.
19.600.115.C.1.b	Allowing the takeover of our tidelands by industrial aquaculture is a guarantee for the loss of the food chain on the tidelands, promises invasive species (as were brought in by shellfish operations in Willapa Bay) and doesn't apparently allow for revoking a permit for any reason other than perhaps abandonment. Other reasons might be bad behavior on the part of the grower, introduction of invasive species, further decline of salmon and orcas, decline of the food web and any number of scientific reasons. Here you have bureaucrats telling an industry they can basically do what they want on one of the most precious areas of land in our state--Puget Sound tidelands.
19.600.115.C.1.c	Who decides where aquaculture would result in a net loss of shoreline ecological functions, etc.? It has already resulted in a net loss of such and the County does not seem to care.
19.600.115.C.1.e	Aquaculture activities within shorelines of statewide significance should be banned. What's the point of having shorelines of statewide significance if we allow them to be taken over by industrial activity.
19.600.115.C.1.g	Further nonnative species should not be cultivated in Washington State waters. Look at what happened in Willapa Bay and Grays Harbor.
19.600.115.C.1.h	There is no way, in a waterfront community, that the industry can "hide" its barges. I'm sure one in Dana Passage is over 4-6 feet high and the other one is literally a houseboat.

19.600.115.C.1.i	Owner's identifying marks on their equipment must be required. It's nonsensical to say, "where feasible." What is "feasible?" It's hard to believe that such flimsy language is used to create meaningless interpretation. Did this come from the DOE? Who determines if a structure or equipment is "abandoned or unsafe"? When an operator literally parks his barge in an area for some 10 years, is that considered "abandonment?"
19.600.115.C.1.n	Whoever wrote this is nuts. You can't avoid ecological and aesthetic impacts from aquaculture operations by making straight rows of PVC. Remember, that's 43,560 PVC pipes per acres which is about 7 miles weighing approximately 16 tons. It would be more honest to admit there are impacts instead of pretending that there are none.
19,600.115.C.1.n.ii	The idea that predator exclusion devices can blend in with the natural environment is ridiculous, ludicrous, nonsensical and absurd. Hard to fathom that our State and County government officials could come up with something like this and say it with a straight face.
19.600.115.C.1.n.vi	Point to the "federal and state regulations" mentioned. You need a link. The problem is the predator exclusion methods unintentionally kill and injure wildlife. The "exclude" wildlife from their habitat.
19.600.115.C.1.n.vii	All you are doing here is making the planting and harvesting area visible with unsightly PVC and Nets in an area for 100% of the time. We would rather have 1.5 years with pipes and nets in all areas and 4.5 to 5.5 years with no pipes and nets.
19.600.115.C.2.c	This industry is changing. It would be more intelligent to require an SDP or CUP for every planting cycle.
19.600.115.c.2.d	If no CUP is required for each individual site, how do you track the individual sites? This is a land-grab for the industry without having to take responsibility for different parcels and very possibly different sediments, conditions and neighbors.
19.600.115.c.2.e	"...noise and light impacts to nearby resident shall be mitigated to the greatest extent practicable." What is "greatest extent practicable?" The irony of this is, of course, that the County makes hardly any money from the shellfish industry. They make most of their money from the high property taxes of shoreline residents. So why is the County "giving away the store"? What compulsion is bringing this on.
19.600.115.c.3.g	Net pens should be banned--that is if we want to save our native salmon. Who is in charge here? The people of Washington State or the big net pen salmon companies?

Appendix C Table c.4-1

Protect: Ironically and unfortunately this entire section, "General Management Recommendations and Options for Marine and Estuarine Shoreline Project" appears to be diametrically opposed to the 19.600.115 aquaculture section. This section, unlike the 19.600.115 section speaks about "identifying and designating critical habitat features," providing "protected shallow water migration corridors," prohibiting "grounding of floats, rafts, docks and vessels," etc. along with "work together to ensure continued understanding and enjoyment of nearshore resources."

It is almost as though some forward-thinking County personnel wrote this section and the shellfish industry wrote the 19.600.115 section. Interested parties would like to understand this extreme dichotomy. It is incongruous and contradictory.

Appendix C Table c.4-1

Restore: "Exert long-lasting restorative effects on ecosystem processes, remove or present physical and chemical disturbance." Why then, would you allow "physical and chemical disturbance" on the tidelands with shellfish aquaculture: 43,560 PVC pipes PER ACRE equaling approximately 7 miles weighing approximately 16 tons and allowing the use of chemicals. How can anybody respect the County when different jurisdictions are so at odds with one another.

Appendix C Table c.4-1

Enhance: "Create/ promote structural elements (habitats) and/or mimic natural processes."

1. Why rebuild beaches that are eroded and then allow industrial shellfish aquaculture that will inevitably create an imbalance in the ecosystem from monoculture, harvesting to 3 feet in depth the entire area along with silting. Look at what happened in Willapa Bays and Grays Harbors--they so imbalanced the system they came to rely on pesticides.

2. Why place materials to facilitate establishment of desired habitat and then ruin it with industrial aquaculture.

3. If the aquaculture industry moves features on the beach, plants a monoculture, harvests the entire area to 3 feet in depth, does that fall into the need for restoration, or so we simply understand that that beach is now gone?

4. We control for invasive species and then allow the shellfish industry to use feed, herbicides, antibiotics, vaccines, growth stimulants, anti-fouling agents, or other chemicals. 19.600.115. B.3.i This is illogical and incongruous and causes the ordinary person who wants to protect Puget Sound to lose faith in our County officials

5. Why place so much control in the SMP on upland shoreline owners and then give the tidelands away to industrialization by the shellfish industry? This is foolish.

Patrick and Kathryn Townsend
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February 27, 2019

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Subject: Geoduck operations as developments with "structures"

Dear Brad and Sarah,

In the last Thurston County stakeholders meeting, Kathryn and I introduced the finding of Hearing Examiner Thomas Bjorgen, which concluded that geoduck operations are a development because the tubes and nets are "structures." It has recently come to our attention that this decision was appealed to the Washington State Superior Court and heard by Judge Gary Tabor. Judge Tabor affirmed the findings of Hearing Examiner Bjorgen. He confirmed that the tubes and nets used in geoduck facilities are structures, disagreed with the Washington State Attorney General's earlier opinion on this subject, and affirmed that Thurston County was acting correctly in requiring a Shoreline Substantial Development Permit (SSDP) for geoduck operations. Judge Tabor also confirmed that Thurston County is not bound to follow the Washington State Department of Ecology guidelines when making this determination. Copies of both Hearing Examiner Bjorgen's decision and Judge Tabor's decision are attached.

In 2006, Thurston County first made the determination that a shoreline substantial development permit is required for any commercial aquaculture operation with a fair market value exceeding $5000 based on the Shoreline Master Program for the Thurston Region, including geoducks. The county continued to require SSDPs for geoduck operations prior to the appeal to the hearing examiner in 2010, and the subsequent appeal to the Superior Court in 2011. Thurston County continued to require SSDPs after Judge Tabor's ruling in 2011.

Thurston County and its taxpayers have expended significant resources to examine this issue, establish this policy, and defend this interpretation. To the best of our knowledge it continues to be the policy of Thurston County today. We see no justification to change this policy in the new SMP regulations. Geoduck operations

clearly involve structures and should be subject to all regulations involving structures. To arbitrarily change this policy in the new SMP regulations without a substantive review of the policy would be wasteful of taxpayer and county resources, unfair to property owners, and would be arbitrary and capricious.

We look forward to the modification of the proposed Thurston County SMP regulations to reflect the last decade of policy and legal work on this issue.

Sincerely,

Patrick and Kathryn Townsend

P.S. We have asked our attorneys to explore this issue further and expect them to issue a letter next week providing further guidance and background on this issue.

Cc:
Thurston County Planning Commission
https://www.thurstoncountywa.gov/email/pages/default.aspx?List-ID=328

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ORDER ON CROSS-MOTIONS FOR SUMMARY JUDGMENT OF THE HEARING EXAMINER FOR THURSTON COUNTY

CASE NOS: 2010100540, 2010100420, and 2010100421 (Appeal of three administrative determinations by Resource Stewardship Department)

APPELLANTS: Taylor Shellfish Co., Inc., d/b/a Taylor Shellfish Farms; and Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood.

SUMMARY OF APPEALS: Taylor Shellfish Farms and Arcadia Point Seafood appeal determinations by the Thurston County Resource Stewardship Department that certain proposed geoduck aquaculture operations are "developments" under the state Shoreline Management Act.

SUMMARY OF ORDER:

The Department's summary judgment motion that the proposed geoduck operations are a "development" under the SMA because they involve "construction of a structure" is granted. The Appellants' summary judgment motion on the same issue is denied.

The summary judgment motions by the parties on whether the proposed operations are a "development" under the SMA because they involve "removal of any sand, gravel, or minerals" are denied due to the presence of genuine issues of material fact.

On the third ground of the administrative determinations, whether the tubes and netting serve as an obstruction on the beach, summary judgment is granted in favor of the Appellants on the issue of sediment movement: the proposed operations are not developments due to their effect on the movement of sediment. Summary judgment is not entered at this time on the other issues relating to this third ground, due to the need for further examination of the public trust doctrine and review of whether any Shoreline Hearings Board decisions address whether the "placing of obstructions" includes obstructions to marine life.

RECORD:

The procedural history of these motions is described in the Order, below. The following documents are relevant to these motions and are admitted into the record:

Exhibit 1. Appeal dated July 6, 2010 by Taylor Shellfish Co., Inc., d/b/a Taylor Shellfish Farms of the administrative determination dated June 30, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100540. This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 2. Appeal dated July 8, 2010 (stamped as received by Development Services on July 9, 2010) by Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood of the administrative determination dated July 1, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100420.
This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 3. Appeal dated July 8, 2010 (stamped as received by Development Services on July 9, 2010) by Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood of the administrative determination dated July 1, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100421.
This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 4. E-mail sent August 23, 2010 from Thomas Bjorgen to the parties.

Exhibit 5. E-mail sent August 24, 2010 from Thomas Bjorgen to the parties (Prehearing order).

Exhibit 6. E-mail sent October 26, 2010 from Thomas Bjorgen to the parties (Second prehearing order).

Exhibit 7. E-mail sent November 2, 2010 from Thomas Bjorgen to the parties (Second prehearing order supplement).

Exhibit 8. E-mail sent November 24, 2010 from Laura Kisielius to Thomas Bjorgen.

Exhibit 9. Stipulated Facts Regarding Proposed Geoduck Farm Operations, dated December 3, 2010, and accompanying e-mail sent December 3, 2010 from Laura Kisielius to Thomas Bjorgen.

Exhibit 10. E-mail sent December 8, 2010 from Thomas Bjorgen to the parties (Third prehearing order).

Exhibit 11. Appellants' Motion in Limine, dated December 8, 2010, with attachments.

Exhibit 12. Thurston County's Response to Motion in Limine, dated December 15, 2010, with attachments.

Exhibit 13. Appellants' Reply in Support of Motion in Limine, dated December 22, 2010, with attachments.

Exhibit 14. E-mail sent January 3, 2011 from Thomas Bjorgen to the parties.

Exhibit 15. E-mail sent January 3, 2011 from Jeff Fancher to Thomas Bjorgen, and e-mail sent January 4, 2011 from Laura Kisielius to Thomas Bjorgen.
Exhibit 16. E-mail sent January 6, 2011 from Thomas Bjorgen to the parties.

No testimony was taken in deciding these motions.

ORDER

A. Nature and location of the proposed geoduck operations.

The Appellants desire to establish shellfish farms on tidelands along Henderson Inlet in unincorporated Thurston County. To that end, Appellant Taylor Shellfish leased tidelands on Thurston County Assessor's Parcel No. 11905230300, known as the Lockhart property. Appellant Arcadia Point leased two tideland parcels, Assessor's Parcel No. 11905330200 (the McClure property) and Assessor's Parcel No. 11905230400 (the Thiesen property). The Lockhart and Thiesen properties are adjacent. The McClure property is approximately 1/4 mile south of the Thiesen property. Ex. 9, Stipulated Facts, Section 1.

Arcadia Point intends to use the McClure and Thiesen properties for geoduck farming. Its proposed method of operation is set out in Sections 4, 5, 8 and 9 of the Stipulated Facts at Ex. 9. In summary, the area on which the geoduck operations would be located on the McClure property is from .60 to .75 acres in size. On the Thiesen property the area is approximately 1.0 to 1.5 acres. PVC tubes four inches in diameter and ten inches in length would be pushed vertically into the beach substrate at a density not to exceed one tube per square foot. Approximately four to six inches of each tube will be exposed at the surface of the sand when the tide is out. Juvenile geoduck clams will be inserted into each tube, which will then be covered with a mesh cap secured with a rubber band. The purpose of the tubes and mesh caps is to prevent predators from killing juvenile geoducks. In 12 months or less, the mesh caps will be removed and the tubes will be covered with area netting to contain the tubes as the geoducks grow and push the tubes from the sand and to protect them from predators. The net is secured using "U" shaped rebar, which will be pushed in flush with the sand. No later than 24 months after insertion, the tubes and area netting will be removed entirely, although the netting may be installed again depending on the level of benthic predators. Between five and seven years after planting, the geoducks will be removed. Harvesting will take place by loosening the sand around the geoduck using a pressurized hose and nozzle and a vessel-mounted high volume, low pressure water pump. The clams would be extracted one at a time by hand. Ex. 9, Stipulated Facts, Sections 4, 5, 8 and 9.

Taylor Shellfish intends to use the Lockhart property for geoduck farming. The area subject top the operations would be from .12 to .9 acres in size. Its proposed method of operation is the same as that described above, with the small differences noted in Section 6 of the Stipulated Facts. These differences are not relevant to the decision of these motions.

The parties stipulate that the purpose of the area or canopy nets "can be to contain loose tubes, to prevent predators from killing juvenile geoducks, or both." Ex. 9, Section 8.

B. Procedural history.

The Appellants and the County staff disagreed whether the proposed activities constituted "development" under RCW 90.58.030 (3), part of the state Shoreline Management Act (SMA). The Appellants and the County Staff agreed that the Appellants would submit information to the County for the sole purpose of allowing the Staff to administratively determine whether the proposals were "developments" under the SMA. The Appellants submitted this information. Ex. 9, Stipulated Facts, Sections 2 and 3.

On June 30, 2010 the Resource Stewardship Department issued an administrative determination for the proposal on the Lockhart property, found at Ex. 1. On July 1, 2010 the Department issued administrative determinations for the proposals on the Thiesen and McClure properties, found, respectively, at Ex. 2 and 3.

Each of these administrative determinations concluded that the proposed activities constituted "development" under the SMA.[1] Each determination rested on the same four grounds:

1. The placement of tubes and netting on the beach constitutes construction of a structure.

2. The method of harvest will remove some amount of sand and other minerals from the seabed.

3. The tubes and netting serve as an obstruction on the beach.

4. The tubes and netting, even though temporary, will potentially interfere with the normal public use of the surface waters, particularly during low tides.

See Ex. 1, 2 and 3.

On July 6, 2010 Taylor Shellfish Farms appealed the Department's determination relating to the proposed operations on the Lockhart property.
On July 9, 2010 Arcadia Point Seafood appealed the administrative determinations relating to the proposed operations on the Thiesen and McClure properties.

On December 3, 2010 the parties submitted a set of stipulated facts, found at Ex. 9.

On December 8, 2010 the Appellants submitted a motion in limine, found at Ex. 11, asking that issues related to the first three grounds of the administrative determinations set out above be determined as a matter of law on the basis of the stipulated facts, without the submission of testimony. The motion also asked that the fourth ground be determined after a hearing, with the opportunity to submit testimony and other evidence.

On December 15, 2010 the Department filed its response to the motion in limine, found at Ex. 12. The Department opposed the motion in limine and also asked that, based solely on

[1] Each of these determinations also concludes that the proposals are "substantial" developments, because they exceed the set monetary threshold. Their characterizations as "substantial" is not at issue in these appeals.

the stipulated facts, all three proposals be found to meet the definition of development, obviating the need for a hearing on the appeals.

On December 22, 2010 Appellants filed their reply in support of their motion in limine, found at Ex. 13. Among other matters, the Appellants characterized the Department's position as seeking to convert the motion in limine to a partial summary judgment motion requesting a decision on the first three grounds of the administrative determinations as a matter of law based on the stipulated facts. After receiving clarification from each party, the Hearing Examiner at Ex. 16 characterized the posture of the motions as follows:

> Each party requests summary judgment in its favor on each of the first three grounds on which the administrative determinations at issue are based. Each party asks that summary judgment be granted on the basis of the stipulated facts of December 3, 2010.
>
> Neither party asks to submit additional briefing on the summary judgment motions.
>
> Each party agrees that the fourth ground of the administrative determinations would be decided through an evidentiary hearing. The results of the summary judgment motions may affect whether that ground is reached.
>
> If any part of the motion in limine remains live after the summary judgment decision, it will be decided soon after.

C. <u>The summary judgment motions</u>.

1. <u>Authorization of summary judgment motions</u>.

Summary judgment in Superior Court is granted

> "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law."

Superior Court Civil Rule (CR) 56.

Chapter II, Section 2.6 of the Hearing Examiner Rules imposes a page limitation for motions, plainly implying that motions are authorized. The heart of summary judgment is simply the determination that under agreed or uncontested facts, a party is entitled to prevail under applicable law. Since this determination would be made without an evidentiary hearing, it is suitable for decision by motion under the Hearing Examiner Rules, especially when all parties agree to it. Thus, summary judgment is one of the motions impliedly authorized by the Hearing Examiner Rules.

2. <u>Interpretation of relevant SMA provisions</u>.

Each party makes a number of arguments as to how the SMA should be interpreted in resolving the issues presented by this appeal. These more general points are addressed before reaching the specific issues on appeal.

The Department points out that RCW 90.58.900 states that the SMA

> "is exempted from the rule of strict construction, and it shall be liberally construed to give full effect to the objectives and purposes for which it was enacted."

The Department also notes that the Supreme Court has held that "the SMA is to be broadly construed in order to protect the state shorelines as fully as possible." Buechel v. Department of Ecology, 125 Wn.2d 196, 203 (1994).

The SMA serves both the purposes of protecting the natural and ecological functions of the shorelines and planning for and fostering all reasonable and appropriate uses. See 90.58.020. Therefore, the mandate of RCW 90.58.900 to liberally construe the Act to serve its purposes does not perceptibly push in either direction in construing the definition of development. The holding in Buechel, on the other hand, has much less of the protean about it. The Court's direction to broadly construe the Act to protect the shorelines as fully as possible leans in favor of a broader scope of the definition of "development", everything else being equal, since that will ensure a more thorough implementation of shoreline policies through the permitting process.

The Appellants contend that the broader scope of "development" argued by the Department is inconsistent with the policies of the SMA. The Appellants state that RCW 90.58.020 directs that preference be given to shoreline uses that, among other things, recognize and protect the statewide interest over local interest, result in long term over short term benefit, and protect the resources and ecology of the shoreline. The Appellants then cite to WAC 173-26-241 (3) (b) which states that shellfish aquaculture is of statewide interest and that, "properly managed, it can result in long-term over short-term benefit and can protect the resources and ecology of the shoreline." Therefore, Appellants argue, shellfish aquaculture is a preferred use under RCW 90.58.020, leaving the Department's broad reading of "development" inconsistent with the Act.

However, the statement in RCW 90.58.020 on which the Appellants rely applies to shorelines of statewide significance, and the sites at issue are not such shorelines under the definitions in RCW 90.58.030. On the other hand, the preferences in RCW 90.58.020 cited by the Appellants do seem consistent with the general purposes of the Act. This shows that the Appellants' argument retains its force, even if these are not shorelines of statewide significance.

Turning to the merits of that argument, RCW 90.58.020 states in pertinent part:

> "The department, in adopting guidelines for shorelines of statewide significance, and local government, in developing master programs for shorelines of statewide significance, shall give preference to uses in the following order of preference which:
>
> (1) Recognize and protect the statewide interest over local interest;

(2) Preserve the natural character of the shoreline;

(3) Result in long term over short term benefit;

(4) Protect the resources and ecology of the shoreline;

(5) Increase public access to publicly owned areas of the shorelines;

(6) Increase recreational opportunities for the public in the shoreline;

(7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary."

This, by its express terms, is a ranking of preference among different uses. It does not suggest that any use, no matter how highly ranked, should be preferred over no development by narrowing the scope of permitting requirements. Such a conclusion would ignore the status of the natural features of the shorelines as an element of the statewide interest and the highly ranked position of the natural character of the shorelines in the hierarchy of preferences in RCW 90.58.020. Thus, these policies do not favor either interpretation of "development" in these appeals.

The Appellants state also that shellfish beds are identified as both priority habitats and critical saltwater habitats by the state shoreline rules. They argue that the Department's attempt to regulate shellfish beds as developments is antithetical to the SMA's protection of critical saltwater habitats and that a similar argument was rejected by the Ninth Circuit in APHETI v. Taylor Resources, 299 F.3d 1007 (2002). The issue in that case, in the words of the Court, was

"whether the mussel shells, mussel feces and other biological materials emitted from mussels grown on harvesting rafts . . . constitute the discharge of pollutants from a point source without a permit in violation of the Clean Water Act."

APHETI, supra. The Court answered this question in the negative for a number of reasons. Most pertinently, the Court stated that

"Congress plainly and explicitly listed the “protection and *propagation* of . . . shellfish” as one of the goals of reduced pollution and cleaner water. 33 U.S.C. § 1251(a)(2) (emphasis added) . . . It would be anomalous to conclude that the living shellfish sought to be *protected* under the Act are, at the same time, “pollutants,” the discharge of which may be *proscribed* by the Act. Such a holding would contravene clear congressional intent, give unintended effect to the ambiguous language of the Act and undermine the integrity of its prohibitions."

Id. at 1016. The Applicant argues it is similarly anomalous to conclude that shellfish beds to be protected from encroaching development are also regulated as development under the SMA. Ex. 13, pp. 6-7.

The Appellants' argument is supported by the inference in APHETI that the Clean Water Act's goal of protecting and propagating shellfish means that the natural emissions of shellfish are not subject to NPDES permits. The shoreline rules have a similar goal of protecting

shellfish beds as critical saltwater habitats. The heart of the Court's reasoning, though, was the anomaly of deeming shellfish protected by the Act to be pollutants which can be proscribed under the Act. A similar contradiction is not present in requiring shellfish operations to obtain a permit under the SMA, since the more particular scrutiny afforded by the permit process should better reconcile potentially conflicting shoreline policies touching shellfish farming. Without deciding the issue, the rationale of APHETI could provide an argument against denial of a permit once the merits of the permit are reached. For the reasons given, though, I do not believe it supports any exemption from the permit process itself.

WAC 173.26.020 (24) defines priority habitat as "a habitat type with unique or significant value to one or more species." It states further that an area classified as priority habitat must have one or more of thirteen listed attributes, one of which is "shellfish bed". However, to say that a priority habitat may be a shellfish bed does not imply that all shellfish beds are priority habitats. To do so ignores the heart of the definition that a priority habitat must have unique or significant value to one or more species. The stipulated facts and cited legal authority are insufficient to show that the beds in question are priority habitats.

On the other hand, WAC 173-26-221 (2) (c) (iii) does plainly define critical saltwater habitats to include all commercial and recreational shellfish beds, among other items.[2] Master programs, according to WAC 173-26-221 (2) (c) (iii) (B), "shall include policies and regulations to protect critical saltwater habitats and should implement planning policies and programs to restore such habitats." This subsection states further that "all public and private tidelands or bedlands suitable for shellfish harvest shall be classified as critical areas", presumably critical saltwater habitats.

The designation of shellfish beds as a critical area, though, hardly implies a blanket exemption from shoreline permit requirements. On the contrary, the complexities of applying other shoreline policies in light of those protecting critical saltwater habitats, if anything, increases the worth of a principled permit process. Designation as a critical saltwater habitat does not support a narrower reading of "development" and a consequently narrower scope of the permit process.

3. The first ground of the administrative determinations: that the placement of tubes and netting on the beach constitutes construction of a structure.

By agreement of the parties, the facts on which summary judgment will be decided are those set out in the stipulation of facts at Ex. 9. Those facts relevant to decision of this first ground are set out in Sections 4, 5, 6 and 8 of the stipulation and are summarized above, although not necessarily comprehensively. Any factual allegations not set out in the stipulation will be considered, if at all, only in deciding whether genuine issues of material fact are present.

[2] WAC 173-26 comprises the 2003 shoreline rules, which govern the adoption of shoreline master programs. The County's current SMP was adopted before those rules were promulgated and therefore is not subject to their terms. WAC 173-26-010, however, states that "[t]he provisions of this chapter implement the requirements of [the SMA]." Therefore, I believe the Appellants are correct that these rules may be consulted in interpreting the SMA, even though the County's new master program is not yet adopted.

Factual allegations outside the stipulation will not be considered in establishing any matter of fact.

A substantial development permit (SDP) is required for a use or activity on the shorelines which is both "substantial" and a "development". RCW 90.58.140. Under RCW 90.58.030 (3) (e), a development is "substantial" if its total cost or fair market value exceeds $5718 or if it materially interferes with the normal public use of the water or shorelines of the state. It is not disputed that the cost or value of each proposed operation would exceed this monetary threshold. Thus, the validity of the administrative determinations turns on whether the proposed geoduck operations count as "development".

"Development" is defined by RCW 90.58.030 (3) (a) as

> "a use consisting of the construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal of any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters overlying lands subject to this chapter at any state of water level;"

This definition is the same as that in WAC 173-27-030.

Under these definitions, the key question in the challenge to the first ground of the administrative determinations is whether the proposed operations will involve "construction" of a "structure".

The shoreline rules define "structure" as

> "a permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner, whether installed on, above, or below the surface of the ground or water, except for vessels."

WAC 173-27-030 (15).

The Thurston Region Shoreline Master Program (SMP), on the other hand, defines "structure" as

> "[a]nything constructed in the ground, or anything erected which requires location on the ground or water, or is attached to something having location on or in the ground or water."

This definition, especially its reference to "anything erected which requires location on the ground or water", could, in this context, be substantially broader than the definition in WAC 173-27-030 (15).

Local master programs must be consistent with the shoreline rules found in the WAC. RCW 90.58.080 (1).[3] An ordinance improperly conflicts with a statute if it "permits or licenses

[3] See Footnote 2, above.

that which the statute forbids and prohibits, and vice versa." Weden v. San Juan County, 135 Wn.2d 678, 693 (1998); citing Bellingham v. Schampera, 57 Wn.2d 106, 111 (1960). The broader scope of the definition of "structure" in the SMP, above, does not prohibit that which the statute (or rule) permits, but rather it arguably requires an SDP for an activity for which the statute or rule would not. The requiring of a permit, though, could have just as severe consequences as a flat prohibition. Thus, the Weden/Schampera approach seems also suited to determining whether an SMP's broader definition of "development" would conflict with the WAC rule. Since the broader SMP definition would require an SDP for a use for which the WAC rule would not, it would raise an impermissible conflict by analogy to those decisions.

Perhaps an even more basic principle in determining whether a subordinate level of government may expand restrictions adopted at a superior level is legislative intent. See Ray v. ARCO, 435 U.S. 151 (1978). In that case the Supreme Court held that certain state regulations of oil tankers were preempted by federal law, because

> "[e]nforcement of the state requirements would at least frustrate what seems to us to be the evident congressional intention to establish a uniform federal regime controlling the design of oil tankers."

Ray, 435 U.S. at 165. Although the SMA is focused on local control, it does include detailed definitions as to what counts as a substantial development and establishes the permit for a substantial development as a centerpiece of shoreline regulation. This permitting scheme was adopted by the legislature in service of the sometimes jostling goals of protecting the natural and ecological functions of the shorelines, while planning for and fostering all reasonable and appropriate uses. See 90.58.020.

The adoption of detailed permit thresholds to serve potentially conflicting goals strongly suggests that the legislature intended they be followed. Although a county has ample scope in adopting the policies under which SDPs are judged, I think it must accept the state's call as to when they are required. Therefore, the definition of structure in WAC 173-27-030 (15) will control.

Returning to the examination of that definition, the geoduck activities described in the stipulation do not constitute "a permanent or temporary edifice or building". Thus, they do not involve a structure under the first element of the definition.

The second element is disjunctive: "any piece of work artificially built or composed of parts joined together in some definite manner . . ." Under this, a use involves a structure if it involves a "piece of work artificially built". Under customary definitions, the PVC tubes are pieces of work and are artificially built. This seems plainly to classify them as structures under WAC 173-27-030 (15). The Appellants argue to the contrary that although the tubes are artificial, the tubes and netting together are not a piece of work artificially built, since "built" is defined as "composed of pieces or parts joined systematically". Ex. 13, p. 10. Since the tubes are not joined together by the net, the Appellants argue, the use is not "built" under applicable definitions. Id.

Under this argument, a use could consist of different structures (pieces of work artificially built), but would not itself be a structure unless the constituent structures were "joined

systematically". This position taxes logic with the result that a use consisting exclusively of structures would itself not be a structure unless the constituent structures were satisfactorily joined. Similarly, it contradicts the definition of structure as "any piece of work artificially built". (Emph. mine.) It also would effectively remove the "or" from the definition of structure by requiring that constituent structures also be joined systematically. For these reasons, I don't believe this argument is consistent either with the text of the definitions or the purposes they serve. The proposed geoduck operations involve structures.

The second prong of the disjunctive definition noted above is "a piece of work . . . composed of parts joined together in some definite manner". Whether the proposal involves a structure under this definition is less certain. The only way in which the PVC tubes are arguably "joined together" in the proposed operations is through the area net which is spread over them. The net is not attached to the tubes, but is stretched over them and anchored to the sea bottom with rebar. The Appellants argue through a forceful analogy that if this is enough to make a structure, then every woodpile with a tarp over it is also a structure, since the tarp protects the pile from the elements as the net protects the geoducks from predators. If it be objected that the net also holds loose tubes together, the analogy could be modified to a tarp spread over a pile of leaves to keep them from blowing away. In either event, deeming the presence of the tarp sufficient to transform the pile into a structure seems counter to both ordinary usage and the building codes.

What may seem absurd under one set of laws, though, is not necessarily so under others. As far as process is concerned, the heart of the purpose of the SMA is the recognition that

> "coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

RCW 90.58.020.

Turning to substance, the legislature stated that

> "[i]t is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto."

RCW 90.58.020.

The SMA implements these policies in part through a permit system. The definition of development is in large part the litmus showing when a permit is required for a proposed use. Whether or not it is absurd to deem the tarp to make a structure, it is not irrational or absurd for the legislature to decide that having parts joined together in some definite manner makes a piece of work a "structure" in applying this prong of the definition of development. To fully serve the SMA policies just noted, interpretation should lean in the direction of the broader reading of these definitions. Inclusion of a doubtful case in the permit process better serves those policies, both procedural and substantive, than exclusion.

The PVC tubes, mesh caps and nets are pieces of work, individually or collectively. The tubes are parts of that work. Their array or configuration is in "a definite manner". The question, then, is whether they are "joined together" in that manner.

The area net is spread over and comes into contact with the tubes, but is not attached to them. The two purposes of the nets are to contain loose tubes and afford protection from predators. Ex. 9. Thus, the nets do not hold the tubes together or in place. Only when they come loose does the net contain them.

"Join" is not defined in the SMA, its implementing rules or the SMP. The principal dictionary definitions of "join" are

> "to put or bring together and fasten, connect or relate so as to form a single unit, a whole or continuity . . .
>
> to put or bring into close contact, association or relationship . . .
>
> to come into the company of . . ."

Webster's Third New International Dictionary (1976). The third of these entries, though, is likely not apt, since its examples all relate to persons.

The use of the terms "fasten" and "connect" in the first entry suggests that the net does not "join" the tubes, since the net is not attached to them and only holds them together if they come loose from the sea bottom. On the other hand, the facts that the net is anchored so as to close the area of the tubes to predators and that it is placed to contain the tubes as they are pushed from the sand suggests that it brings the parts into association or relationship, thus falling within the second entry. Ordinary English usage welcomes either reading.

The objective of statutory construction is "to ascertain legislative intent as expressed in the statute." Martin v. Meier, 111 Wn.2d 471, 479 (1988). More specifically,

> "[i]n determining the meaning of words used but not defined in a statute, a court must give careful consideration to the subject matter involved, the context in which the words are used, and the purpose of the statute [cit. om.] 'Language within a statute must be read in context with the entire statute and construed in a manner consistent with the general purposes of the statute.' [cit. om.]"

PUD of Lewis County v. WPPSS, 104 Wn.2d 353, 369 (1985). In short, the "paramount concern"

> "is to ensure that the statute is interpreted consistently with the underlying policy of the statute."

Safeco Insurance Co. v. Meyering, 102 Wn.2d 385, 392 (1984).

For the reasons expressed above, when the text of the law and available definitions leave the matter equally doubtful, the procedural and substantive polices of the SMA are better served by navigating the permit process. Therefore, the PVC tubes should be deemed "joined" for purposes of the definition of "structure".

The final step is to determine whether the use involves the "construction" of a structure, as stated in RCW 90.58.030 (3) (a), when none of the constituent parts of the operations is actually constructed in the shoreline. Although "construction" is not defined in the SMA, other definitions in it answer this question.

RCW 90.58.030 (3) (e) defines substantial development and exempts from its scope the "construction or modification of navigational aids such as channel markers and anchor buoy." Unless they are deemed "obstructions', navigational aids would only be deemed developments or substantial developments by virtue of involving construction of a structure. Buoys and the like are constructed on shore and placed in waters subject to the SMA. Thus, under the Act the placement of structures in the shorelines counts as construction. Therefore, placement of the tubes and nets involve "construction" of a structure.

These conclusions, however, are contradicted by Attorney General Opinion (AGO) 2007 No. 1. That opinion addressed, among others, the question whether shoreline substantial development permits are required for planting, growing and harvesting farm-raised geoducks by private parties. The method of geoduck operations examined by the AGO is virtually the same as that involved in these appeals. The AGO concluded that geoduck operations would fall within the definition of "development" in the SMA only if they caused substantial interference with normal public use of the surface waters, one of the elements of that definition. The AGO concluded that geoduck operations would not fall within any of the other elements of the definition of development.

The AGO cited the definition of structure from WAC 173-27-030 (15) as "a permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner", the same definition analysed above. The AGO noted that the PVC tubes are not edifices or buildings and do not form an edifice or building taken together. The opinion stated also that the tubes are not parts joined together in a definite manner. Therefore, it concluded, geoduck operations do not involve structures.

This analysis, however, ignored without explanation the element of the definition including "any piece of work artificially built". In doing so, the AGO read the word "or" out of the definition in violation of the canon of construction that a legislative body is presumed not to have used superfluous words and that meaning, if possible, must be accorded to every word in a statute. See Applied Industrial Materials v. Melton, 74 Wn. App. 73 (1994). The only way of

according meaning to every word in the definition of "structure" is to deem it also to include "any piece of work artificially built". When that is done, as shown above, the proposed operations must be deemed to involve structures.

In addressing the "composed of parts joined together" prong of the definition, the AGO concluded that the tubes do not meet this description, but did not analyse the definition of "join" or the structure or function of the area net. Those analyses, as shown above, indicate that the tubes and net constitute a structure under this prong also.

The AGO states that its conclusion is reinforced by the decision in Cowiche Canyon Conservancy v. Bosley, 118 Wn.2d 801 (1992), in which the Court rejected the argument that the removal of railroad trestles was a development, because it modified a structure. The Department argues at Ex. 12 that Cowiche Canyon has no application to this case, because it involves removal, not installation. The Appellants reply at Ex. 13 that the relevance of the case lies in its use of a common-sense approach in concluding that removal is not modification. The Appellants are correct, but the analysis above applies that common-sense approach in concluding that these operations are structures under the definition.

As the Appellants point out in Ex. 13, Attorney General Opinions are not controlling, but are entitled to great weight. Thurston County v. City of Olympia, 151 Wn.2d 171, 177 (2004). As also pointed out by Appellants, greater weight attaches to an agency interpretation when the legislature acquiesces in that interpretation, and the legislature has not overturned this AGO, even though it has adopted legislation concerning geoducks since its issuance. Legislative acquiescence, however, "is not conclusive, but is merely one factor to consider." Meyering, 102 Wn.2d at 392.

These rules, I believe, mean that an Attorney General Opinion is something more than a tiebreaker if a decision cannot be made on other grounds. They mean, at least, that an AGO must play a prominent and weighty role in making the decision. It is not, however, conclusive.

Here the AGO failed to consider part of the definition which it was construing, the element deeming "any piece of work artificially built" to be a structure. Nor did it offer any analysis construing the definition to exclude that element. This decision, therefore, does not so much disagree with the AGO's analysis, as fill in an element not treated in it. This decision does disagree with the AGO's conclusions, but, for the reasons above, I believe that disagreement is well founded.

The other element of the definition, "piece of work . . . composed of parts joined together in some definite manner . . ." is, as noted, a much closer call. As such, the deference accorded Attorney General Opinions becomes more important. However, as noted the AGO does not analyse the definition of "join" or the structure or function of the area net. When that is done, and the policies of the SMA and the canons of construction are examined, the discussion above shows, I believe, that the better interpretation is that this counts as a structure. Following the AGO in spite of this would elevate "great weight" to conclusiveness, which is not the role of an AGO.

4. The second ground of the administrative determinations: that the proposal will involve the removal of sand, gravel or minerals.

As noted, "development" is defined by RCW 90.58.030 (3) (a) to include "removal of any sand, gravel, or minerals".

The Department states at Ex. 12, pp. 9-10, that proposed operations will remove sand from the site, will generate a turbid plume which transports sediment off the site, will result in loss of elevation at the site due to sand removal, and will increase erosion during storms. The Department bases these factual allegations on a consultant statement and the Washington Geoduck Growers Environmental Codes of Practice, part of Ex. 12.

None of these factual allegations are included in the stipulation of facts at Ex. 9. The principal stipulated facts concerning harvesting are that the sand around the geoduck will be loosened using a pressurized hose and nozzle and a vessel-mounted high volume, low pressure water pump. The clams will then be extracted one at a time by hand. See Ex. 9, Sections 4 and 9.

The parties have stipulated that the summary judgment motions will be decided on the basis of the stipulated facts. This is consistent with the nature of summary judgment, which can only rely on facts which are agreed or which raise no material issue. See CR 56. The Appellants make clear at Ex. 13, p. 2 that they dispute the factual allegations made by the Department in Ex. 12 and are ready to offer contrary evidence.

For these reasons, the factual allegations in Ex. 12 cannot be relied on for the truth of the matters asserted. Only the facts stipulated in Ex. 9 may play that role. The allegations in Ex. 12, however, along with the Appellants' statement at Ex. 13, p. 2, show that the amount and nature of sand or sediment removal is a genuine issue of fact.

The Department points out also that the definition of development includes "removal of **any** sand, gravel, or minerals" (emph. added) and argues that by their nature these operations will result in some removal of sand and sediment through injection of pressurized water and loosening of the geoducks. Based on the stipulation only, I expect the Department is correct in this factual assertion. However, I do not believe the Department is correct in the implied corollary, that the disturbance of the minutest amount of sediment counts as removal under the definition. If that were the case, as the Appellants argue, walking on the beach at low tide would be a "development", since some sand or mud would be removed on shoes. To avoid this strained or absurd consequence, some minimal amount or type of removal of beach material must be allowed without triggering characterization as a development. The nature of that threshold need not be determined here. Its presence, though, means that the Department's argument cannot be accepted.

The Appellants invoke in their favor the canon of construction providing that the meaning of words may be indicated or controlled by those with which they are associated. See State v. Roggenkamp, 153 Wn.2d 614, 623 (2005). They argue that since sand, gravel, and minerals are all materials that are mined in the shorelines, this prong of the definition is intended only to capture the mining of those materials. The purpose of the canons of construction, as with all statutory construction, is to identify and serve legislative intent. Martin, supra. To determine that intent, a court will look first to the language of the statute. Where statutory language is plain and unambiguous, a statute's meaning must be derived from its wording. SEIU v. Superintendent of Public Instruction, 104 Wn.2d 344, 348 (1985).

The use of the word "any" in this definition signals a plain intent to include actions beyond mining. The ambiguity in the *de minimus* threshold just discussed is best dissolved by judicial implication of a reasonable minimum level, not through narrowing the definition's scope to contradict its terms. Further, the inclusion of "dredging" in the definition of development, an activity commonly associated with seabed mining, suggests that the prong of the definition under consideration was intended to reach beyond mining. The reference to "removal of any sand, gravel, or minerals" is not restricted to mining.

The Appellants' principal argument on this point rests on the AGO discussed above and the adherence of the Department of Ecology and Department of Natural Resources to it. The AGO characterized geoduck harvesting as incidentally releasing silt and sediment which may temporarily be found in the surrounding water. AGO 2007 No. 1, p. 2. The AGO concluded that this did not involve the "removal of any sand, gravel, or minerals" for two reasons. First, the disruption of substrate around a geoduck cannot legally be distinguished from clam digging or raking and it would be too burdensome to require substantial development permits for all significant clam beds. Id. at 7. Second, only a "minimal" amount of materials would be removed.

The Attorney General is authorized to give written opinions "upon constitutional or legal questions." RCW 43.10.030 (7). The conclusion that a specific set of facts falls within a statutory definition is an opinion on a legal question. Thus, this AGO's analysis of whether described geoduck operations constituted a structure was an authorized role of an AGO. Here, in contrast, without citing any evidence, the AGO concludes that the geoduck operations will only remove a "minimal" amount of materials and thus do not meet this prong of the definition of development. This conclusion is announced, no matter what the consistency of the substrate, what the pressure of the water used, what the length of water injection, or what the characteristics of water or current; and without any consideration of how much sand or sediment might in fact be removed under these varying conditions. These are factual determinations and, as the assertions of the Appellants and Department suggest, likely highly contested factual determinations. As such, they are not amenable to determination as a matter of law or by definition. The AGO's attempt to do so, I believe, was beyond the authority of RCW 43.10.030 (7).

The AGO also expresses concern that a contrary interpretation would have the unintended consequence of requiring other clam operations to obtain a substantial development permit. This would be persuasive if it were established that geoduck and other clam harvesting disrupts a similar amount of substrate and that other clam harvesting is exempt from obtaining a substantial development permit. The first point is a matter of fact which is assumed by the AGO. The second is a legal issue which is touched only through the statement: "We find no indication that the SMA has ever treated clam harvesting, alone, as development." AGO 2007 No. 1, p. 2. The lack of such an indication, however, doe not necessarily show that all clam harvesting is in fact exempt under the SMA.

Whether these geoduck proposals constitute development through the removal of any sand, gravel, or minerals raises a number of issues of material fact and is not amenable to resolution through this AGO. Therefore, the summary judgment motions by Appellants and the Department on this issue are denied.

5. The third ground of the administrative determinations: that the tubes and netting serve as an obstruction on the beach.

RCW 90.58.030 (3) (a) defines development to include "placing of obstructions". Because the definition also includes "any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters", the obstructions referred to seem intended to be other than those interfering with normal public use of the surface of the waters. The administrative determination on appeal is consistent with this view, finding that the tubes and netting are an obstruction "on the beach".

The tidelands on which these operations are proposed are privately owned. See Ex. 9, Section 1. Under general principles of property law, the private owners could exclude the public from walking on their beaches. See Presbytery of Seattle v. King County, 114 Wn.2d 320 (1990) (the right to exclude others is one of the fundamental attributes of property ownership). The AGO discussed above concluded that tubes could obstruct one walking on the beach, but that would only be relevant if the public had a right to use the tidelands. Thus, the AGO concluded, a geoduck operation on private tidelands would not constitute development through the placing of obstructions. Implicit in this holding is the view that "obstructions" refers to the impeding of human passage, not that of fish, shellfish or sediment.

The AGO's conclusion that tubes and nets cannot obstruct public passage on beaches which the public has no right to use is sound in both logic and policy. Before resting in that conclusion, though, the public trust doctrine must be examined.

Our Supreme Court outlined the public trust doctrine in the following holdings from Caminiti v. Boyle, 107 Wn.2d 662 (1987):

> ". . . the State's ownership of tidelands and shorelands is not limited to the ordinary incidents of legal title, but is comprised of two distinct aspects.
>
> The first aspect of such state ownership is historically referred to as the jus privatum or private property interest. As owner, the state holds full proprietary rights in tidelands and shorelands and has fee simple title to such lands. Thus, the state may convey title to tidelands and shorelands in any manner and for any purpose not forbidden by the state or federal constitutions and its grantees take title as absolutely as if the transaction were between private individuals . . .
>
> The second aspect of the state's ownership of tidelands and shorelands is historically referred to as the jus publicum or public authority interest . . . More recently, this jus publicum interest was more particularly expressed by this court in WILBOUR v. GALLAGHER, 77 Wn.2d 306, 316, 462 P.2d 232, 40 A.L.R.3d 760 (1969), CERT. DENIED, 400 U.S. 878 (1970) as the right
>
> > 'of navigation, together with its incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes generally regarded as corollary to the right of navigation and the use of public waters.'
>
> The state can no more convey or give away this jus publicum interest than it can "abdicate its police powers in the administration of government and the preservation of the peace . . . Thus it is that the sovereignty and dominion over this state's tidelands and

> shorelands, as distinguished from TITLE, always remains in the State, and the State holds such dominion in trust for the public. It is this principle which is referred to as the 'public trust doctrine'. "

Caminiti, 107 Wn.2d at 668-670 (footnotes and citations omitted). See also Wilbour v. Gallagher, 77 Wn.2d 366 (1969), State v. Longshore, 141 Wn.2d 414 (2000), and Washington State Geoduck Harvest Assoc. v. DNR, 124 Wn. App. 441 (2004).

The requirements of the public trust doctrine, the Court held, "are fully met by the legislatively drawn controls imposed by the Shoreline Management Act . . ." Caminiti, 107 Wn.2d at 670.

As stated in the excerpt from Wilbour v. Gallagher, above, the public trust doctrine protects the right of navigation,

> "together with its incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes generally regarded as corollary to the right of navigation and the use of public waters."

In the unpublished opinion of Bainbridge Island v. Brennan, No. 31816-4-II, (2005), Division II of the Court of Appeals held that under the public trust doctrine, the public may use tidelands when covered by water, but the public has no right to walk across private property when the tide is out.

The Supreme Court approached the same issue in State v. Longshore, above, when it decided that the public trust doctrine does not give the public the right to gather naturally growing shellfish on private property. The Court expressly stated, though, that it did not determine whether the public has a right to cross over private tidelands on foot. Longshore, 141 Wn.2d at 429, n. 9.

With the unpublished status of Brennan and the express "non-decision" of Longshore, the fairest conclusion is that our appellate courts have not yet decided whether the public trust doctrine gives the public the right to walk across private tidelands. Consistently with the AGO, whether the PVC tubes are obstructions on the beach and hence "developments" depends on whether the public has that right. Given the complexities of the application of the public trust doctrine, this is not an issue that should be decided without briefing. Therefore, the summary judgment motions on this issue should not be decided at this time.

The remaining issue is the Department's contention that the tubes and nets constitute obstructions on the beach, because they impede the passage of fish and other sea creatures or the flow of sediment.

"Obstruction" is not defined in either the SMA, its implementing rules, or the SMP. No case law or Shoreline Hearings Board decisions on the meaning of obstruction were cited. As noted, the AGO takes the position that obstruction applies only to human passage. The Department argues that the mandate to construe the SMA broadly to protect the state shorelines as fully as possible means that obstructions to marine life must also be considered. The Appellants cite the AGO, point out that the Department's consultants conclude that the effect of the tubes on sediment movement is likely negligible, point out that requiring marine

animals to move around the tubes does not comport with the accepted definition of obstruction, and raise a number of factual issues.

With none of the arguments being definitive, I would normally defer to the view expressed in the AGO, because it is a rational way of implementing the purposes of the SMA. However, because the issue might be treated in the decisions of the Shoreline Hearings Board, it makes most sense to allow the parties to research that, if desired, before deciding whether obstructions of marine life count as obstructions under the definition of development. The one holding that can be made at this time is that the proposed operations do not meet the definition of development due to their effect on sediment flow. Even if the obstruction of sediment flow fell within the definition of development, the facts alleged by the Department, if considered, would show only that the proposals' effect on sediment movement would be negligible. Thus, assuming all pertinent legal and factual issues favorably to the Department, no obstruction of sediment would be shown.

D. Summary of order.

1. The Department's summary judgment motion that the proposed geoduck operations are a "development" under the SMA because they involve "construction of a structure" is granted. The Appellants' summary judgment motion on the same issue is denied. The first ground of the administrative determinations on appeal, that the placement of tubes and netting on the beach constitutes construction of a structure and consequently a development, is upheld.

2. The summary judgment motions by the parties on whether the proposed operations are a "development" under the SMA because they involve "removal of any sand, gravel, or minerals" are denied due to the presence of genuine issues of material fact.

3. On the third ground of the administrative determinations, whether the tubes and netting serve as an obstruction on the beach, summary judgment is granted in favor of the Appellants on the issue of sediment movement: the proposed operations are not developments due to their effect on the movement of sediment. Summary judgment is not entered at this time on the other issues relating to this third ground, due to the need for further examination of the public trust doctrine and review of whether any Shoreline Hearings Board decisions address whether the "placing of obstructions" includes obstructions to marine life.

4. The effect of the above decisions is that the proposed operations are deemed "developments" under the SMA under the first ground of the administrative determinations, requiring a substantial development permit for the proposals. Thus, unless this determination is reversed, a hearing on a substantial development permit is required for the proposed operations, and the appeals of the other grounds of the administrative determinations are mooted, as well as the motion in limine.

Dated this 21st day of January, 2011.

_____
Thomas R. Bjorgen

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR THE COUNTY OF THURSTON

TAYLOR SHELLFISH COMPANY, INC.,	)	
Petitioners,	)	
vs.	)	
THURSTON COUNTY, et al.,	)	SUPERIOR COURT NO. 11-2-01019-5
Respondents.	)	

RULING OF THE COURT

BE IT REMEMBERED that on October 21, 2011, the above-entitled and numbered cause came on for hearing before JUDGE GARY R. TABOR, Thurston County Superior Court, Olympia, Washington.

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October 21, 2011 Olympia, Washington

AFTERNOON SESSION

Department 4 Hon. Gary R. Tabor, Presiding

APPEARANCES:
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Pamela R. Jones, Official Reporter

* * * * *

THE COURT: Counsel, in my time as a judge, one of my goals has been to try to do my preparation up front when matters come before me so that, if possible, I can issue a ruling after I've heard oral argument. It's come back to me that some people think, well, how can a judge just rule off the top of their head. I've spent considerable time going through the briefing and the record in this particular case to try to understand the issues. Counsels' arguments here today have been helpful to me, but I am prepared to issue a ruling.

I've somewhat jokingly said also over the years, that a judge has a pretty thankless job, because anytime a judge rules, half the room is mad at the judge. And while that's somewhat tongue in cheek, it's still obvious that somebody wins and somebody loses in issues that come before a court. That does

not mean that I don't take matters very seriously. I've also said that I have to call things the way I see them, and that does not mean that I'm taking my job less than very seriously.

While I recognize that in many cases any decision that this Court makes may be reviewed by a higher court, that does not in any way remove the responsibility from this Court to rule as I think the law and/or the facts require. I think that counsel both agree that the primary issue in this particular case boils down to definitions, and so we start out with the idea that there may be cases of substantial development requiring a specific permit process or review. I don't think anybody disagrees that this would be substantial, but the issue is, is it a development or are these three applications developments. It is only a development if the definition of "structure" applies, and so I've heard extensive argument. There's been extensive briefing about what the term "structure" means.

There has been an Attorney General's Opinion that indicated that the term "structure" did not apply to this type of situation in the opinion of the Attorney General. Well, everybody has conceded that this Court is not bound by an Attorney General's Opinion.

It doesn't mean that I shouldn't take it into account, doesn't mean that I can't agree with it, it means I don't have to. I guess I would just pose this: If the Attorney General had ruled that this was a structure, I suspect that petitioners here would be arguing that I don't have to follow the Attorney General's Opinion and they would be right. The issue is how I'm going to interpret this, because I agree that on issues of law this Court has the right to a de novo determination.

Now, by saying that, however, that does bring into play another issue. While my determination of the law can be de novo, I don't believe that I'm required here today to determine what the law is. Now, I may very well do so and give you my opinion; I'm not sure that that's required. I think what's required is whether I determine that the standard has been met and the standard is "clearly erroneous." Everybody agrees that that's the standard at least as to a portion of this. The petitioners have argued that it is clearly erroneous because it didn't follow what the law is if I accept the definition of "structure" that they pose.

By having to reach the issue of whether or not there is this clearly erroneous standard being met

here, however, I think I have to go back to what everybody has had to argue about structure. I found the hearings examiner's review of interpretation of the term "structure" extremely helpful. And by saying that, let me just stop for a moment and say one other thing.

When I was an attorney sitting on the other side of this bench, one of my pet peeves was a judge ruling on something that I'd argued and taking all day to do it, and it really frustrated me when I had to sit and listen to a judge drone on and on not knowing where the judge was going. And so one of my attempts to deal with that from the very beginning is I try not to beat around the bush too far. There is a danger to that. By telling you where I'm going, some people may not hear another word that I say if I've ruled against them. On the other hand, that's why we have a court reporter. People can go back, and I am going to tell you where I'm going and I'm going to go back and cover some of the territory that brings me there.

I'm denying the petitioner's appeal in this case because I believe that the term "structure" does apply to a situation such as this. I believe that the hearings examiner's analysis of this, including

looking at definitions of words, was clearly more in-depth and, in my opinion, appropriate than the Attorney General's Opinion. As Mr. Fancher has pointed out, the Attorney General's Opinion about the idea of structure, first of all, misinterprets the fact that there are two provisions to that definition, and secondly, only gives a few lines of analysis.

I believe, first of all, that the PVC tubes that we've talked about have been artificially built despite argument about "built" really means joined together, which I don't agree with because that's the second part of the two-part test. "Artificially built" can mean manufactured or in some other way fashioned. It is built. It's clear that that's built.

And secondly, as to "parts joined together," it seems to me that it is clear that when you take however many thousand tubes we're talking about and place them in a rather precise location in reference to one another, that is, a relative position of approximately one every square foot or slightly less than that, in the case of one of the farms, when the domain, if you will, the area of the farm is determined by those so-called juvenile clams, I found

that a little bit interesting, that term, but I understand we're talking about very small little clams that are being planted, if you will, in those tubes in the location that's allowed if the permit is issued, inside those tubes that are sunk into the sand are covered either individually or by an area netting. That is clearly, in my opinion, joined together in some definite manner. There is a relationship between the various tubes, in my opinion.

Now, having determined that I believe that's the commonsense determination of the law, I go back to the idea that I don't think I have to determine what the law is. I think what I just told you was probably dicta, because I think the real issue for me is whether or not the petitioners in this case have met their burden of proof for challenging this particular finding by, ultimately, the Board of County Commissioners, and that's clearly erroneous. "Clearly erroneous" means by definition that it's absolutely without question. There are very few issues in the law that are absolutely without question. I realize there are standards, criminal matters are beyond a reasonable doubt, most civil matters are by a preponderance of the evidence, but

an issue of saying absolutely this is what it means and no definition otherwise could be accepted is not met in this particular case.

When I look at the analysis by the hearings examiner versus the analysis by the Attorney General, and I guess I need to address the analysis that went along with the Attorney General by the Ecology saying that because of the Attorney General Opinion, the only issue for these types of projects is whether or not there is interference with normal public use of the surface waters. I don't agree with that.

But let me then go a step further in saying even if I am mistaken that Ecology's rule should be the standard, there is a troubling issue that, well, while it was addressed by the petitioners, I still think causes a problem in this particular case, and that is that Ecology in coming up with rules, while they did say that the Attorney General's Opinion should be part of those rules, they also pointed out that these rules, which they then call guidelines, don't apply to jurisdictions that have master programs already in effect that are already approved. That's the case here. And so I don't believe that those guidelines specifically apply. I believe there's a reason for that, and that is because the

local jurisdiction has been given deference about coming up with particular plans that accomplish the purposes of the Shoreline Management Act. While I recognize that there may have to be a review of a particular jurisdiction's decisions in that regard, I believe that the purposes that were cited by Mr. Fancher, both in his brief and orally here today, really go a considerable distance to say that there's a reason for allowing local jurisdictions to make decisions in cases like this.

I do not find that the County Commissioners exceeded their authority by clearly and erroneously determining that this was a substantial development. Their reliance upon the decision by the hearings examiner was within their discretion. They did not have to find for that, and so I'm upholding the decision by the Board of County Commissioners.

Now, there are several other issues that I need to address even though you know where I'm going. First of all, it my determination that I am only looking at the first issue of the four issues that were originally addressed. The parties here agree that the fourth issue about whether or not there's potential interference with normal public use of the surface waters is reserved for another day anyway.

But the second and third issues as to whether or not the method of harvest would remove some amount of sand or other minerals from the seabed, and third, that the tubes and netting would be an obstruction on the beach, are simply not ripe. Actually, I hadn't considered an argument that this was a ripeness issue, but that made absolute sense when I heard the two attorneys address it in that respect. I believe that the hearings examiner did not specifically rule on those issues two and three. As a matter of fact, he indicated that he would need more facts before he decided either issue, specifically as to number two, the removal of sand or minerals, and as to number three, there was more information that needed to be considered.

I noted, as has been pointed out here both orally and in the briefs, that there was a clear agreement by the growers that's found at record page 1181, that summary judgment is appropriate on the three grounds, but it goes on to say that if there is an issue that needs more factual determination, that there would need to be a further hearing. That was never requested, and so I'm not even going to go behind the decision by the hearings examiner and actually the decision by the Board of County Commissioners that's

specifically here for review today because those two issues are not ripe.

Now finally, in regard to telling you why I'm ruling as I've told you I am, I need to address the constitutional issues. First of all, the constitutional attack has a standard that is probably greater than any other standard I can think of, and that is, a court would have to find that the decision was arbitrary and capricious. My understanding of that standard is that I would have to find that no person in their right mind could ever rule in such a way, totally arbitrary, totally capricious. It does not concern itself with what the law says or what the facts are. It simply is a ruling without explanation. I don't find that to be the case here.

The primary argument is, again, that the County Commissioners did not address the WAC, which I pointed out is only a guideline, it is only a recommendation, and it is specifically not applicable to the County, as I understand it. And then finally, as to the whole process, I've read with interest the process that occurred in this particular case from the two meetings, the public meetings. They were public, they were open to anyone that wanted to appear, they did not concern any of these three

projects, they were informational meetings, and while the County Commissioners may have indicated that the Department could move forward as they saw fit, they did not predetermine any of these issues.

I'll also note with some interest that the petitioners were given the specific opportunity to object to the Board of County Commissioners at the time of the hearing. That's in the record, page 7 and 8. They chose not to file any objection. Now, I realize that constitutional issues didn't have to be raised with the hearing examiner or with the Board of County Commissioners, they can be raised to this Court, but there was no challenge to the Board of County Commissioners as being inappropriately comprised or that the fact that one County Commissioner had, apparently, talked with a representative of one of the petitioners; that there had been these public meetings in which, apparently, there weren't any specific invitations that went out to the petitioner parties in this particular case. But as I said, I don't find that those meetings were specifically on the issue that would later come before the Board of County Commissioners.

Let me just point out that if the petitioners had won in a hearing before -- well, let's go back.

Let's say they'd won with the Department, then there wouldn't have been a reason to complain. If they had won with the hearings examiner, there wouldn't be a reason to complain and they wouldn't be filing any review by the Board of County Commissioners. Now, I understand that the Department might, in that regard, but it simply does not appear to this Court that there was any violation of fundamental fairness or due process in the fact that a County Commission wears a number of hats at a number of different times, and the fact that they were talking with one of their Departments about issues that, while similar and in general on the same subject, they were not predetermining how they would decide a case when it came before them in their administrative review capacity or judicial capacity, if you will. And so I do not find that there was a violation of due process in this particular case.

Again, perhaps this is dicta, interesting that at one point the petitioners felt that they might not pursue requesting the permits until there had been further rulings by the state. At some point, then, they determined that they were going to go forward with objecting to having to present or request permits in this regard. Perhaps, and I don't know

and that's why this is probably dicta, they saw the writing on the wall that the Department of Ecology was actually going to formulate plans that appear to be more onerous as far as the review that would take place.

In that regard, it's interesting to this Court that the argument was that while definitions apply, and thus the petitioners should win, the plan doesn't apply because it's not in effect yet because the County has not implemented the changes and has a time period to do that. I understood that was December of this year, but I also heard that there was a one-year time period that could be set out if that's requested. In any event, this whole procedure involved whether or not a particular requirement would be placed upon the petitioners which they indicate is quite burdensome, or had the matter not come along as it did, what would have been a more burdensome or onerous process after the guidelines that have now been spoken of are implemented.

Finally, let me say that while I understand this appeal was about words, it's really interesting to me, and I asked I guess both counsel about this, the legislature, and this is a statute, 28B.20.475 at subsection (5) specifically states that they want

more study about how structures should be addressed in these types of situations. Specifically, they said the environmental effects of structures commonly used in the aquaculture industry to protect juvenile geoducks from predation. It seems to me that the idea of structure has been an issue that reasonable minds could differ on all along in this particular case, and I do not find that the Department of Ecology and their definition of "structure" is so iron clad that there is not an opportunity for reasonable minds to differ and, thus, the standard that I pointed out earlier as clearly erroneous has not been met in this particular case, and, if push comes to shove, this Court would say Ecology's definition of "structure" was not appropriate, and that the plain meaning of the term "structure" is more appropriately found in the analysis of the hearing examiner.

And so having ruled, are there any issues that I need to address that I failed to cover?

MR. FANCHER: Not from the County, Your Honor.

THE COURT: Then you will prepare findings or an order. I don't know that there have been to be findings and conclusions in that we have a record here.

MR. FANCHER: That's correct. Usually in a LUPA we just do an order very simple, either -- well, in this case it would just be denying the petition and because any review further up is a de novo anyway, so that's how it usually works.

THE COURT: All right. Then I assume that you'll need some time to prepare that. What I would suggest is if the two attorneys or the parties in this case in consultation with one another can agree as to language, that's fine, just submit that ex parte. If there needs to be a hearing based upon a disagreement about language, then you would need to note that for a presentation hearing.

MR. FANCHER: Thank you, Your Honor.

THE COURT: I appreciate the hard work on both sides in this case. We'll be in recess.

MS. KISIELIUS: Thank you, Your Honor.

(A recess was had.)

CERTIFICATE OF REPORTER

STATE OF WASHINGTON)

COUNTY OF THURSTON)

I, PAMELA R. JONES, RMR, Official Reporter of the Superior Court of the State of Washington, in and for the County of Thurston, do hereby certify:

That I was authorized to and did stenographically report the foregoing proceedings held in the above-entitled matter, as designated by counsel to be included in the transcript, and that the transcript is a true and complete record of my stenographic notes.

Dated this the 28th day of October, 2011.

PAMELA R. JONES, RMR
Official Court Reporter
Certificate No. 2154

Written Comments received during public comment 3/20/2019

7541 Holmes Island Rd SE
Olympia, WA 98503-4026
March 20, 2019

Thurston County Planning Commissioners
2000 Lakeridge Drive SW
Olympia, WA 98502

Commissioners,

Following are a few of my observations as we move into Planning Commission Work Sessions on the draft SMP strike-thru version. For a very long time, years now, I have been very concerned with the near total lack of transparency in the process to date. When directing comments and questions to Staff, please ask about:

1. What specific efforts have been made by the CPED to notify the citizens of Thurston County about this new series of Work Sessions?

2. Will Community Stakeholder meetings resume? These meetings were suspended last spring with the adoption of the "pause" in public input, and there has been no indication that they will return.

Please, also, take a few minutes (about ten minutes) in the near future to view a portion of the video of the Board of County Commission Agenda Setting meeting on Tuesday, February 19, 2019…just a few days prior to the release of the draft SMP strike-thru documents. Go to https://www.youtube.com/watch?v=6uAbI0L2UOw. Fast forward to about 2:00:32 (the 2 hour, 32 second point) You will see Joshua Cummings, accompanied by Cynthia Wilson and Brad Murphy, present an update on the SMP progress. Mr. Cummings begins by stating that CPED has proceeded "as directed by the BoCC" in 2017 to:

- Reduce buffers where possible, and

- Increase flexibility for it's citizens.

I will present more about buffers at a future Work Session; most of us shoreline residents have really only been concerned with buffer reductions in the Shoreline Residential Designation…because that's the way it has always been.

But I take serious exception to the second point. "Increased flexibility for it's citizens" has neither been represented in the strike-thru nor the original September 2017 versions of the draft SMP. That statement is simply not true.

Thank you for your consideration,

John H. Woodford

cc. Brad Murphy

Thurston County Shoreline Stakeholder Coalition Key Issues

Updated March 14, 2019, following release of the SMP *strike-thru* version

Following are the Coalition's key issues with the current draft Shoreline Master Program (SMP):

1. **All legally constructed homes and appurtenant structures should be considered "conforming"** rather than "legally nonconforming" even if constructed in the buffer or setback. This interpretation is allowed per RCW90.58.620 as amended on or after September 1, 2011.
    a. "Residential structures and appurtenant structures that were legally established and are used for a conforming use, but that do not meet standards for the following to be considered a conforming structure: Setbacks, buffers, or yards; area; bulk; height; or density; and
    b. "Classifying existing structures as legally conforming will not create a risk of degrading shoreline natural resources" [200 c 323 41.]
    c. Reconstruction in the same footprint is excluded from a Substantial Development Permit (SDP) in the SMP Chapter 19.500. Therefore, it should not be considered "nonconforming" because you can reconstruct in the same footprint.
    d. The Thurston County Legal Department says the Planning Department can go either with "Conforming" or "Nonconforming" and there would be no problem if the SMP if different than other regulations. Our position is that the label "nonconforming" has a negative impact on home values and permit process/resources.

    Staff has actually doubled down on this issue, changing "legally nonconforming" to "nonconforming." Ecology has no issue with "conforming." "Conforming" has been used by many jurisdictions.

2. **Maintenance, repair, remodel and/or reconstruction within the existing footprint must be exempt from SDPs.** Under the new *strike-thru* draft SMP version this Key Point has been accommodated; see 19.400.100.B.1.b and e. However, this update has not been picked up in Chapter 19.500. **Remodel and/or reconstruction** have not been added to Ch 19.500.100.C.3.b...exemptions from SDPs.

3. **Positive, as well as negative, impacts to shoreline ecological function should be considered**. When considering mitigation for a development the County must consider more than just the negative impacts on shoreline ecological function. The proposed development may very well provide positive impacts or net gains to shoreline ecological function. This needs to be added to the SMP. If there is a positive impact, the development should be exempt from a SDP. Staff has not considered this issue.

4. **Establish fresh water requirements for piers, floats, wharves and bulkheads to address the unique habitat characteristics associated with shoreline residential use:** In the current draft SMP, the requirements for all piers, floats and wharfs are formulated for marine and large lake environments. These do not apply to most of the lakes in Thurston County which are typically spring fed and are eutrophic. Thurston County Lakes are not habitat for Salmon. There is no need to utilize grating or transparent decking. This type of decking will provide a negative impact on bass, perch, sunfish, bluegill and minnows which are the main recreational fish in these lakes. Grating or transparent will also expose our vulnerable populations to an unsafe condition. The SMP must separate appropriate requirements based upon the existing shoreline environment...Marine, Lakes or Rivers. Although both WDFW and Ecology acknowledge that requirements for fresh and marine waters are different, CPED staff has not considered this point. Ch 19.600.160.C.1.r. (grating requirements) does not apply to lakes.

5. **The dollar threshold exemption for wharves, piers and floats on fresh water should be increased:** The draft SMP sets the dollar threshold for all docks in lakes at $10,000. Ecology's Shoreline Permitting Manual states, "In fresh waters, if the fair market value of the dock does not exceed: (1) $20,000 for docks that are constructed to replace existing docks, are of equal or lesser square footage than the existing dock being replaced,

and are located in a county, city, or town that has updated its SMP consistent with the master program guidelines (173-26 WAC); or (2) $10,000 for all other docks constructed in fresh waters." Staff has not considered this issue.

6. **Take action to exempt development, repair and maintenance of single-family residences and appurtenances from the County's proposed new "written approvals" process.**
   a. As currently presented, the draft SMP would implement a new system of shoreline permitting to cover all actions a property owner might undertake anywhere within 200 feet of the shoreline (Ordinary High Water Mark).
   b. Activities, large and small, would require either a Substantial Development Permit (SDP) or a new "written approval" from the County's Permitting Center. The draft SMP wording covers "all development" which, by definition in the SMP, covers any activity and is alarmingly broad.
   c. Basically, a "written approval" is a permit to get an exclusion. This would include replacing a rotting/broken board on your pier/float/wharf, weeding and planting in your natural area, planting native water plants on the shoreline, etc. We recommend a booklet, pamphlet, etc., as other governmental agencies do, that tells you what you can do without applying for a permit. The booklet/pamphlet becomes your permit.
   d. Also, please note, this new shoreline permitting is an overlay of existing building and site permitting...which still apply.

   Staff has not considered this issue.

7. **Language should be added to the SMP to protect existing uses, as well as structures:** Residential use is a preferred use according the State's Shoreline Master Act and the County's SMP should reflect this fact in the mitigation requirements. Mitigation design standards should be written that continue the homeowner's use and view as a preferred use. In addition, the lakes in Thurston County are eutrophic. By requiring mitigation that screens the near shore from parental view you create an unsafe condition for young swimmers, reduce the desirability for swimming in the near shore, reduce water clarity and available areas for fish spawning. The near shore is where the young learn to safely swim. Staff has not considered this issue.

8. **Mitigation Banking:** How can the shoreline property owners be motivated to voluntarily improve shoreline function without being forced to? Mitigation Options, Ch 19.400.110.B.5, seems to open the door a bit for voluntary mitigation, but with sever time limitations. "...where documented restoration activities have occurred **within the previous three years, but after the effective date of this Program**..." Why are these time restrictions included?

9. **Recognize the significant damage to shoreline ecological function on freshwater lakes due to higher water levels and 4-foot waves**: The SMP should allow the modification of bulkheads to protect the existing shoreline from erosion. Fresh water lake conditions are quite different from those in a marine environment. Staff has not considered this issue.

10. **Allow decks in the Buffer:** Decks and patios are currently allowed in the County building and land use codes. Further, Ecology's representative to the STAG/Regulatory Group has agreed to the principle that decks are acceptable uses in the Buffer. Staff has not considered this issue.

11. **Allow landward development within the buffer across the entire width of a residence:** This is allowed by Ecology; there is no need for the County to limit this development to 500 square feet. See 19.400.100.B.1.d. Ecology has no such requirement. The 500 square foot limit was originally adopted by the city of Spokane, then arbitrarily picked-up and used by other jurisdictions.

Patrick and Kathryn Townsend
Protect Zangle Cove
7700 Earling Street NE
Olympia, WA 98506

March 19, 2019

Thurston County Commissioners
Thurston County Planning Commission
2000 Lakeridge Dr SW # 269
Olympia, WA 98502

Subject: Comments on Thurston County SMP

Dear Commissioners and members of the Planning Commission,

We are acutely concerned about the rapid expansion of industrial geoduck operations in Thurston County. These operations involve massive amounts of plastic PVC/HDPE and netting and destroy large areas of natural tideland in sensitive estuaries. We believe that the proposed SMP does not adequately address these losses to the ecosystem, losses that impact forage fish, salmon and the southern resident killer whales that depend on salmon.

We'd like to bring your attention to the Cumulative Impact Analysis written by the Army Corps of Engineers (ACOE) in 2017. It was not formally released but was obtained through a FOIA request by a local environmental organization. It clearly identifies the threat of these commercial operations to salmon and concludes that these operations likely violate the SMA and the ESA (see page 111 and related). Here is a link to that document from the Protect Zangle Cove website:

http://users.neo.registeredsite.com/3/7/5/12218573/assets/2017_NWP48_Draft_Cumulative_Impact_Analysis.pdf

Also we would like to bring your attention to the Bjorgen and Tabor decisions that concluded that geoduck operations are "developments" because they involve "structures." In 2006 Thurston County determined that geoduck operations required a Shoreline Substantial Development Permit (SSDP). In 2010 this was appealed by the shellfish industry to hearing examiner Thomas Bjorgen who did an extensive analysis and ruled in favor of Thurston County and against the geoduck operators. The Bjorgen ruling was appealed to Superior Court and heard by Judge Tabor. In 2011, Judge Tabor confirmed Bjorgen's analysis that geoduck operations are developments because the PVC tubes and nets are structures. In the current version of the new SMP, without reference to or acknowledgement of these decisions, Thurston County is simply eliminating this requirement to obtain an SSDP and substituting the less stringent Conditional Use Permit.

Here are the links to the Bjorgen and Tabor rulings:

http://users.neo.registeredsite.com/3/7/5/12218573/assets/20110121_ThurstonCnty_HearingExaminer_Bjorgen_Order_SDP.pdf

http://users.neo.registeredsite.com/3/7/5/12218573/assets/20111021_TaylorArcadia_vs_ThursCnty_Superior_Tabor.pdf

To our knowledge, there was no public process or discussion about eliminating the requirement for an SSDP and the action to do so appears to be arbitrary and capricious. We would hope that the County Commissioners and the Planning Commission would call this out as an unacceptable relaxation of regulations that are intended to protect Puget Sound.

Additionally, it is hard to understand how such massive structures on the tidelands (some 43,560 PVC pipes per acre, approximately 7 miles of PVC weighing approximately 16 tons covered with plastic netting) would escape setback and permitting requirements that are mandatory for any development on the shorelands.

Finally, we would like to bring your attention to the extreme disparity in language and concepts between Section 300 (General Goals and Policy)/Appendix C (Restoration) and Section 600 (Aquaculture). Section 300 appears to be written by Thurston County personnel who genuinely regard the protection of our shorelines as an important and worthy goal. Appendix C on Restoration also promotes protection of natural functions, prohibition of Net Loss, and recognition of the primacy of ecological functions.

Section 600 - Aquaculture, however, appears to be written by the proponents of the shellfish industry who have a different agenda. As one example, Section 19.600.115(B)(3)(i) allows the use of ***"herbicides, antibiotics, vaccines, growth stimulants, antifouling agents, and other chemicals ..."***. At a time when these pollutants are threatening endangered species in Puget Sound, this is extremely risky and therefore insupportable. Numerous other provisions of Section 600 - Aquaculture are also of major concern. The disparity between wording in Section 300 and Appendix C on the one hand and Section 600 on the other hand, is striking.

Kathryn and I hope that the County Commissioners will address this disparity and the other points we raise regarding the ACOE cumulative impact study and the legal foundation for requiring a Shoreline Substantial Development Permit for geoduck aquaculture.

Thank you for your attention to these issues in the draft SMP.

Patrick and Kathryn Townsend
Protect Zangle Cove

Cc: Phyllis Farrell, Anne Van Sweringen, Thurston County Planners

Written comments I received during public communications on 4/17/19

7600 Redstart Dr. SE
Olympia, WA 98513

April 17, 2019

Mr. Brad Murphy
Senior Planner, Shoreline Master Program (SMP)Review
Thurston County
2000 Lakeridge Dr. SW
Olympia, WA 98502

Re: SMP Review

Dear Mr. Murphy,

The South Sound Sierra Club Group is concerned about the County's trend of converting shorelines to favor industrial aquaculture.

In the draft SMP Chapter 19.300 General Goals and Policies, and section 19.300.120 Economic Development, B. Policy SH-23 "Water-oriented economic development, such as those aquaculture activities encouraged under the Washington Shellfish Initiative, should be **encouraged** and shall be carried out in such a way as to minimize adverse effects and mitigate unavoidable adverse impacts to achieve no net loss of shoreline ecological functions." The bolded word should be changed to **limited** due to the industry's harmful practices in bed preparation (scraping, removal of sand dollars, starfish and eelgrass), the use of heavy equipment on fragile beaches, plastic pollution with pvc pipes and netting, the spraying of pesticides and herbicides and hydraulic harvesting disrupting the substrate.

I urge a careful review of industry practices to limit expansion and more rigorous environmental protections in order to favor shoreline ecological function and public access and recreation of our **public** waters. Too much of Thurston County's shorelines has been diverted to a monoculture that is a significant risk to our forage fish habitat so important to salmon and Orca recovery.

We are not opposed to shellfish aquaculture, but advocate for environmentally responsible practices which should be specified in the SMP.

On behalf of the South Sound Sierra Club Group, representing over 2400 members, I urge you to incorporate these recommendations when finalizing the Thurston County Shoreline Master Plan.

Respectfully,

Phyllis Farrell, Chair,
South Sound Sierra Club Group

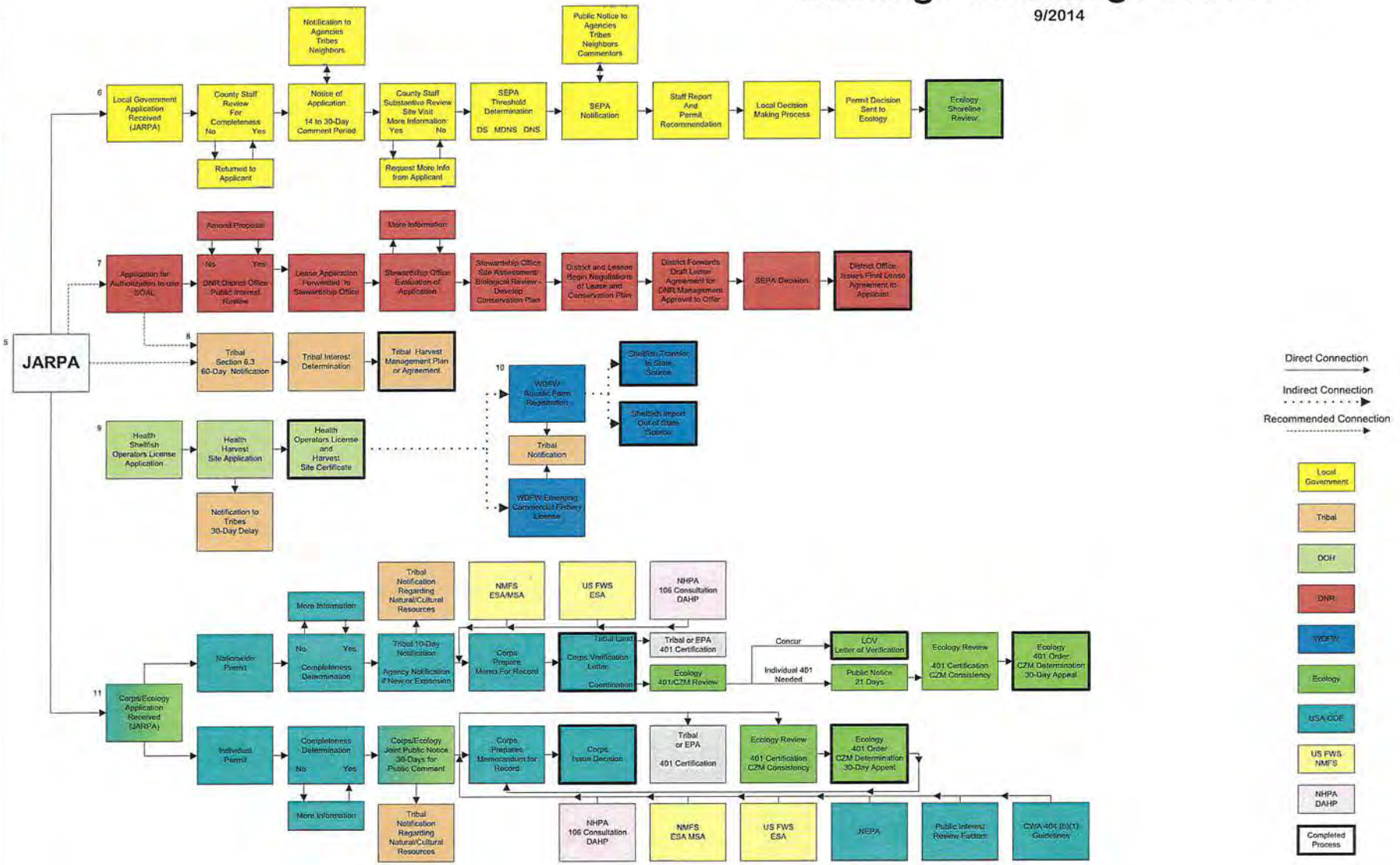
cc: Thurston County Commissioners
Thurston County Planning Commission

Existing Permitting Processes

9/2014

Early Inquiries:
These are items to check prior to starting the application process, as they might direct the subsequent permitting path.

1. Health Growing Area Classification
2. DNR Ownership Determination
3. Tribal Interests Determination
4. Local Government Application Pre Submission Conference



Direct Connection

Indirect Connection

Recommended Connection

- Local Government
- Tribal
- DOH
- DNR
- WDFW
- Ecology
- USA COE
- US FWS NMFS
- NHPA DAHP
- Completed Process

Chapter 19.300 General Goals and Policies

Following are comments from Patrick and Kathryn Townsend and Jean Vanek, residents of Boston Harbor, regarding Chapter 19.300 of the Thurston County Draft SMP Update.

Strike-out comments by Thurston County are in Red
Townsend comments are in Yellow
Vanek Comments in Blue
New Comments in Beige

PT/KT: The Draft SMP Update, including Chapter 19.300, is often vague, self-contradictory, and borders on incoherent. Many of the terms used in the Draft SMP Update are not defined, which will certainly lead to inconsistent implementation and possibly legal challenges. There is no clear map on the changes between the 1990 SMP and the Draft SMP Update which makes it difficult to evaluate additions and deletions of terms and policies or to understand what is new. Since this document will be in effect for some 25 or more years, we respectfully request that the author(s) of this document be identified (as they are in the 1990 SMP) and that the County engage policy experts and professional writers to go back to the 1990 SMP and start from scratch in updating it. Citizen stakeholders should be included in this process from the beginning. This document will have an impact on property owners, the shoreline environment, recreational use as well as economic use for years to come and it is not a good sign that it appears to be so garbled.

PT/KT: We are aware that it is extremely unlikely that our request for a "re-do" will be undertaken, because the County has made it clear that its primary objective is to "get it done" rather than to "do it right."

PT/KT: In Section Two (General Goals and Policies) of the previous 1990 version of the SMP, "Purpose", "Definition" and "goal statements" were delineated for each of the five specific shoreline environments. The current SMP Update lumps all the shoreline environments together related to goals. We would suggest going back to the topic format of the 1990 SMP, which delineates "Goal Statements' for each shoreline environment, because that would be more accurate, cleaner and more understandable. If there are policies that cover all the shoreline environments with nuances, those policies can be in a "general" section.

PT/KT: In the 1990 SMP, overarching goal, purpose and statement of policy are stated at the beginning of this Chapter (Section Two). Though some re-wording may be appropriate, having this section in the document gives a sense of the broad objectives of the Shoreline Management Plan and we question why it was completely removed from the current version. The SMP must give a sense of the larger vision and values related to our shorelines and the use of our shorelines. This section should go back in.

19.300.00 NEW: (Actually this is from the 1990 Version of the Thurston County SMP--it should be put back in.)

I. Goal

The goal of this Master Program is to preserve to the fullest possible extent the scenic, aesthetic and ecological qualities of the Shorelines of the Thurston Region in harmony with those uses which are deemed essential to the life and well-being of its citizens.

II. Purpose

The local governments of Thurston County recognize that the Shorelines of the State and the Region are among the most valuable and fragile of our natural resources. There is great concern regarding their utilization, protection, restoration and preservation. In addition, these local governments find that the ever-increasing pressures to accommodate additional uses on the shoreline necessitates increased management coordination in the development of the Shorelines. These local governments further find that much of the Shorelines of the Region and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately-owned or publicly-owned Shorelines of the State is not in the best public interest; and therefore, coordinated planning necessary in order to protect the public interest associated with the Shorelines of the State while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational and concerted effort, jointly performed by federal, state and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the Shorelines of the State and Region.

III. Policies

It shall be the policy of the local governments of Thurston County to provide for the management of the Shorelines of the State and Region by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the State and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.

To implement this document, the public's opportunity to enjoy the physical and aesthetic qualities of natural Shorelines of the State and Region shall be preserved to the greatest extent feasible consistent with the overall best interest of the people generally. To this end, uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment or are unique to or dependent upon use of the State's shoreline. Alterations of the natural condition of the shorelines, in those limited instances when authorized, shall be given priority for single-family residences, ports, shoreline recreation uses including but not limited to parks, marinas, piers and other improvements facilitating public access to shorelines of the Region; industrial and commercial developments which are particularly dependent on their location, or use of, the shorelines of the Region; and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the Region. Permitted uses of the Shorelines of the State and Region shall be designed and conducted in a manner to minimize, to the extent feasible, any resultant damage to the ecology and environment of the shoreline area and interference with the public's use of the water.

19.300.050 Applicability

A. The general goals and policies of this chapter apply to all use and development activities within

the Program's jurisdiction, regardless of environment designation. As provided in WAC 173-26-191, these policies are the basis for regulations that govern use and development along the shoreline. Some Program policies may not be fully achievable by regulatory means but may be pursued by other means as provided in RCW 90.58.240.

PT/KT: This statement is in contradiction to the 1990 SMP "goals and policies" which gave "Purpose," "Definition" and 8 "Goal Statements" for each of four categories of shoreline environment: "Natural, Conservancy, Rural and Urban." We question why, in terms of goals, these are all now being lumped together. For example, in the "Natural Environment" the 1990 SMP states: **"Economic development is not a goal of the Natural Environment."** However, in the SMP Update, the Goal for **all** shoreline environments is: "*Provide for the location and design of industries, transportation, port and tourist facilities, commerce and other developments that are particularly dependent upon a shoreline location and/or use,* ***when the shoreline can accommodate such development.***

Who decides "when the shoreline can accommodate such development"? If it cannot accommodate this year, then maybe next year?? Again, we strongly suggest going back to the topic format of the 1990 SMP, delineating each shoreline environment separately, because it is much cleaner and more readable and understandable. If there are policies that cover all the shoreline environments, those policies can be in a "general" section.

B. Regulation of administrative actions contained herein must be implemented with consideration to the Public Trust Doctrine, regulatory takings, and other applicable legal principles as appropriate.

~~19.300.100 Shorelines of Statewide Significance~~

~~A. Designation~~

~~The Shoreline Management Act designated certain shoreline areas as shorelines of statewide significance. Shorelines thus designated are important to the entire state. Because these shorelines are major resources from which all people of the state derive benefit, the statewide interest should be recognized and protected over the local interest.~~

~~Those areas that have been designated as shorelines of statewide significance (RCW 90.58.030) in Thurston County are:~~

~~1. *Puget Sound* - those areas lying seaward from the line of extreme low tide.~~

~~2. *Nisqually Delta* - From DeWolf Bight to Thurston County line, from the line of extreme low tide to the OHWM.~~

~~3. *Chehalis River* - From Lewis-Thurston County line downstream to the Thurston-Grays Harbor County line, excluding all federal lands. The flow exceeds 1,000 cubic feet per second (cfs) mean annual flow (MAF) at Lewis County line.~~

~~4. *Nisqually River* - From the Pierce-Thurston County line in Alder Reservoir downstream along left shore only, (exclude area from LaGrande Dam downstream to powerhouse due to use of aqueduct; also exclude all federal lands) to the Nisqually Indian Reservation boundary.~~

~~The flow exceeds 1,000 cfs MAF at Pierce County line in Alder Reservoir.~~

~~5. *Alder Lake* – That portion of the lake from the Pierce County line up to the OHWM.~~

~~6. Shorelands and wetlands associated with 1 through 5 above.~~

~~KT: As described in our letter to Brad Murphy and the Thurston County Planners on 1/25/2018 regarding the definition of "Shorelines of Statewide Significance" in Chapter 19.150.740, number 6 of this paragraph is not in compliance with RCW 90.58.030 (2)(f). It should read:~~

~~**Shorelands and wetlands associated with 2 through 5 above.**~~

~~See Dept. of Ecology's explanation of the Shorelines of Statewide Significance, which confirms this correction.~~

~~http://198.239.150.195/programs/sea/sma/st_guide/jurisdiction/ssws.html~~

~~See: RCW Definitions and Concepts: Shorelines of Statewide Significance) (2)(f)~~

~~B.~~19.300.100 ~~County-wide Policies~~ Shorelines of Statewide Significance

Goal: To ensure that the statewide interest is recognized and protected over the local interest in shorelines of statewide significance, the County shall review all development proposals within shorelines of statewide significance for consistency with RCW 90.58.020 and the following policies (in order of preference):

B. County-Wide Policies

1. Policy SH-1 Recognize and protect the statewide interest over local interest.

PT/KT: What was the specific criteria used for determining statewide interest over local interest? The primary considerations that are stated in Policy SH3-2 relate to economic interest. What happened to the concept that **"the public's opportunity to enjoy the physical and aesthetic qualities of natural Shorelines of the State and Region shall be preserved to the greatest extent feasible consistent with the overall best interest of the people generally."** (See Policies, above, from the 1990 Thurston County SMP.)

a. The Washington Departments of Fish and Wildlife and Ecology, affected tribes, other resources agencies, and interest groups should be consulted for development proposals that could affect anadromous fisheries or other priority species or habitats.

PT: "other priority species" should be defined, or the relevant source for defining priority species should be identified.

b. Recognize and take into account state agencies' policies, programs and recommendations in developing and administering use regulations.

2. Policy SH-2 Preserve the natural character of the shoreline.

a. Administer shoreline environments and regulations to avoid and minimize damage to the unique character and ecology of shorelines of statewide significance.

KT: What "regulations" are being referred to? What is the meaning of "administer shoreline environments?" These terms are not defined.

b. Where natural resources of statewide importance are being diminished over time by human activities, restoration of those resources should be facilitated.

KT: Comments:

- The term "natural resources of statewide importance" is not defined.
- The term "diminished" is not defined.
- The term "facilitated" is not define. Who should "facilitate" and how? Does this mean the County will step in? Is the County going to pay for "facilitation" and "restoration"?

c. In order to reduce adverse impacts to the environment while accommodating future growth, new intensive development activities should upgrade and redevelop those areas where intensive development already occurs, rather than allowing high intensity uses, such as shellfish aquaculture, to extend into low intensity use or underdeveloped areas.

JV: The phrase "rather than allowing high intensity uses to extend into low intensive use" seems to be applicable to commercial aquaculture, which is a high intensity use introduced in an area of low intensity (i.e., residential) use.

PT: Insert "such as shellfish aquaculture."

3. Policy SH-3 Result in the long term over short term benefit.

a. Preserve sufficient shorelands and submerged lands to accommodate current and projected demand for economic resources, such as shellfish beds and navigable harbors.

PT/KT: This item should be deleted as it is nonsensical under "Shorelines of Statewide Significance."

- The term "demand for economic resources" is not defined.
- The term "sufficient," is not defined.
- The term "Shellfish beds" is not defined as to natural shellfish beds, commercial shellfish beds and recreational shellfish beds.
- The public is not required to "preserve" land for economic use.
- We question if new "navigable harbors" would be allowed on "Shorelines of Statewide Significance." The only marine "Shorelines of Statewide Significance" in Thurston County are Puget Sound itself and the tideland/shorelands of Nisqually Reach.
- Is Thurston County contemplating a new "navigable harbor" in Nisqually Reach or the middle of South Puget Sound? The public has a right to know.

~~b.~~ Severely limit a~~A~~ctions that would convert resources into irreversible uses or detrimentally alter natural conditions that are characteristic of shorelines of statewide significance. ~~should be severely limited.~~

KT: Comments

- Please define "resources."
- Please define and/or give examples of "irreversible uses."
- One example of "irreversible uses" is geoduck aquaculture, because the tideland is "clear-cut" at harvest.
- Please tell us if industrial/commercial aquaculture is allowed on "Shorelines of Statewide Significance", because again, the only marine "Shorelines of Statewide Significance are Puget Sound itself and Nisqually Reach.

c. Evaluate the short-term economic gain or convenience of developments in relationship to long-term and potentially costly impairments to the natural environment.

PT/KT: Please define terms and concepts:

- Give a specific example of "short-term economic gain"
- Define "short term economic gain" and explain how it is measured.
- Define "convenience of developments?"
- There appears to be a specific idea of what this item is about, but the meaning is obscure. Please explain.
- One example we can think of is geoduck aquaculture, which has a short-term economic gain for a few companies with potentially costly clean-up and restoration efforts if the geoduck market collapses.

d. Actively promote aesthetic considerations when contemplating new development, redevelopment of existing facilities, or for the general enhancement of shoreline areas.

JV: SMP Emphasis here is to "actively promote aesthetic considerations when contemplating new development…, etc.)

PT/KT: Please define "existing facilities."

e. Actively support programs which recognize the stewardship role of shoreline residential owners and promote their voluntary management of their shorelines.

PT/KT: We agree with Thurston County Shoreline Stakeholder's Coalition that thousands of home owners are on their properties for the long-term and support sound ecological practices.

4. Policy SH-4 Protect the resources and ecology of the shoreline.

a. Projects ~~should~~ shall be required to consider incremental and cumulative impacts while ensuring no net loss of shoreline ecosystem processes and functions.

PT: Define "projects" or type of projects. Point to information that qualifies which projects "are required to consider incremental and cumulative impacts, etc."

PT: **Cumulative impact analyses require a baseline and proper monitoring. There is no indication of any funding or internal staffing for either of these activities. Regulations that cannot be implement make no sense.**

KT: "No net loss" is simply maintaining the status quo and is a dishonest concept when officials promote taxpayer funded restoration projects to offset impacts by specific individuals or other entities.

JV: The concept that should be used is "net gain" rather than "no net loss."

b. In order to ensure the long-term protection of ecological resources of statewide importance, activities impacting anadromous fish habitats, forage fish spawning and rearing areas, shellfish beds and other unique environments should be severely limited.

PT/KT: NEW/REWORD to: Ensure the long-term protection of ecological resources of statewide importance, such as anadromous fish habitats, forage fish spawning and rearing areas, natural shellfish beds, bird nesting and migration area, eelgrass, tideland sea life, and unique environments.

PT: Section 4-b is not broad enough.

- Use the inserted NEW replacement wording.
- Distinguish "shellfish beds" as "natural shellfish beds." Commercial shellfish beds are not unique.

KT: Commercial shellfish beds should not be given protection in law. Commercial shellfish beds cannot logically or honestly be labeled as "unique environments."

JV: Zangle Cove should be treated as a "unique environment."

c. Public access should be limited improvements would result in a loss of shoreline ecological functions, such as in priority or sensitive habitats.

PT/KT: The meaning of the entire item is incomprehensible.

- Define the term "public access."
- The term "improvements" appears to be an error in word choice.

d. PT/KT: NEW: Limit commercial access where such access, such as shellfish industry tractors, barges, workers, PVC tubes, nets, plastic bags, etc. would result in a loss of shoreline ecological functions, such as in priority or sensitive habitats.

5. Policy SH-5 Increase public access to publicly owned areas of the shorelines.

a. Preserve and encourage public access with special scenic or cultural qualities.

b. Partner with other agencies and entities to ~~Give~~ prioritize~~y~~ ~~to~~ developing unpaved, pervious paths and trails to shoreline areas and linear access along the shorelines, where appropriate.

KT: Define term "appropriate" in the context of this policy.

c. Locate development, including parking, as far inland from the OHWM as is feasible so that access is enhanced.

d. NEW (PT): Support as feasible the potential enhancement of existing publicly owned and publicly assessable areas of the shorelines.

e. NEW (PT): Partner with other entities as feasible to increase public access to publicly owned areas of shorelines.

6. Policy SH-6 Increase recreational opportunities for the public in the shoreline.

a. Public access and recreation requirements should take into account the activities of state agencies and the interests of the citizens of the state to visit public shorelines.

PT/KT: Using state owned tidelands for commercial industrial aquaculture is not in the interest of public access and recreation or the interests of citizens of the state to visit public shorelines.

b. Plan for and encourage development of facilities for recreational use of the shorelines, but reserve areas for lodging and related facilities on uplands well away from the shoreline, with provisions for non-motorized access to the shorelines.
KT: What exactly is this policy about?

- Is it referring to public or private facilities?
- What is meant by "facilities for recreation use"? Give examples.
- What type of "lodging" is meant?
- What is being referred to as "lodging and related facilities on uplands?" (public or private hotels, private homes, retirement communities, shops, gas stations, etc)
- The term "well-away" from the shoreline is so ill-defined and meaningless, that is subject to contention.

19.300.105 Critical Areas and Ecological Protection

Goal: Protect and conserve shoreline natural resources, including protection of critical areas (Title 24 TCC, as referenced in 19.400.115), while accommodating reasonable and appropriate uses which will assure, at a minimum, no net loss to

shoreline ecological functions and processes.

KT: "No Net Loss" is a concept that maintains the status quo with the undefined hope of not going backwards. The concept of "Net Gain" should be used instead and well-defined as to meaning so that stakeholders understand that the goal is to not only protect our shoreline but to restore it. Stakeholders, such as environmental organizations, should be made fully aware that their efforts are meant to balance out impacts to Puget Sound under No Net Loss, not to make significant headway in the recovery of Puget Sound.

JV: "Net Gain" should be used rather than "No Net Loss."

A. Policy SH-7 Protect and conserve shoreline areas that are ecologically intact and minimally developed or degraded. Develop incentives and regulations for privately owned shorelines that will protect and conserve these areas while allowing reasonable and appropriate development.

KT: Define "reasonable and appropriate development." Is this referring to tideland or upland areas or both? We can reasonably say that almost all upland areas on the marine shoreline and lake shoreline have already been developed in terms of private homes. So, what is being referred to as "reasonable and appropriate development and who decides the meaning of the term? If this policy refers to tideland areas, then the term "protect and conserve" is not compatible with "reasonable and appropriate development."

B. Policy SH-8 Recognize that nearly all shorelines, even substantially developed or degraded areas, retain important ecological functions.

C. Policy SH-9 Utilize transfer of development rights as allowed by Chapter 20.62 TCC, or as now or hereafter amended, as an option to protect ecological functions.

JV: This is the transfer of developments (TDR) section of the county code – this concept alarms me especially when coupled with a "no net loss" philosophy.

KT: The policy is further alarming because it appears to say than any amendment now or after the fact will apply. What is the point of having a policy if it can be changed willy-nilly and who is able to effect that change?

D. Policy SH-10 Permitted uses and developments should be designed and conducted in a manner that protects the current ecological condition, and prevents or mitigates adverse impacts. Mitigation measures shall be applied in the following sequence of steps listed in order of priority:

1. Avoid the impact altogether by not taking a certain action or parts of an action;
2. Minimize impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;
3. Rectify the impact by repairing, rehabilitating or restoring the affected environment;
4. Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action;
5. Compensate for the impact by replacing, enhancing, or providing substitute

resources or environments, including utilization of the in-lieu-fee process where appropriate; and

JV: This provision extends the "no net loss" philosophy beyond the impacted area to create an "offset" practice that seems to be a slippery slope.

KT: Who administers the ILF process, what is definition of "where appropriate," and who decides appropriateness?

KT: The true meaning of this provision is that an individual, individual company or entity may benefit financially or otherwise from an allowed impact in one area to be offset by a restoration project in another area or by paying a fee. This means that benefit to that one individual or entity is being funded by taxpayers.

6. Monitor the impact and the mitigation projects and take appropriate corrective measures.

JV: This provision needs to be significantly strengthened with far more specificity. Who will monitor? What are the consequences/penalties for non-compliance?

KT: Specifically, which state or county department will be responsible for monitoring, who do they report to, how will citizens make reports, will the state or county be responsible for addressing and remedying complaints of non-compliance rather than leaving it up to citizens to bring lawsuits—a costly and disruptive process.

PT: I agree with the above. Further, it would be important to have a baseline measurement of the area before impacts and mitigations occur. Monitoring without a good baseline would not be meaningful or effective.

E. Policy SH-11 Shoreline ecological functions that should be protected include, but are not limited to:

1. Habitat (space or conditions for reproduction; resting, hiding and migration; and food production and delivery);
2. Water quality maintenance; and
3. Water quantity maintenance.
4. NEW (PT): Species that are present in the project area.
5. NEW (PT): Adjacent areas that provide primary and secondary ecological functions.

F. Policy SH-12 Shoreline processes, both freshwater and marine, that should be protected to support the above functions include, but are not limited to the delivery, loss and movement of:

KT: This Policy need re-wording as it is contradictory. "Toxins" and "Pathogens" belong in a different paragraph because they do not need protection, but rather protected against. Also, "Sediments" can contain contaminants and "Nutrients" can be beneficial or harmful, depending on what they are. So, we are not "protecting" all of these.

1. Sediment,
2. Water,

3. Nutrients,
4. Toxins,
5. Pathogens, and
6. Large woody material.
7. NEW(PT): Resident species and their interactions.
8. NEW(PT): Migratory species and their interactions.
9. NEW(PT): Shoreline structure

G. Policy SH-13 In assessing the potential for new uses and developments to impact ecological functions and processes, the following ~~should~~ will be taken into account:

1. On-site and off-site impacts;
2. Immediate and long-term impacts;
3. Cumulative impacts, from both current and reasonably foreseeable future actions, resulting from the project; and
4. Any mitigation measures or beneficial effects of established regulatory programs to offset impacts.

5. NEW (PT): The availability of baseline measurements of ecological functions and processes.

KT: Who or what Thurston County Department makes the assessment of immediate and long-term impacts, cumulative impacts, mitigations, etc.

KT: Change the phrase "should be taken into account" to "will be taken into account." Under Policy SH-13 as written, there is no obligation for anything to actually be taken into account and no indication of who is responsible for taking these items into account.

H. Policy SH-14 Critical areas in the shoreline jurisdiction shall be protected in a manner that results in no net loss to shoreline ecological functions. Pursuant to RCW 36.70A.030(5) and 24.01.020 TCC, critical areas include:

JV: The concept "no net loss to shoreline ecological function" should be replaced by the concept of "net gain" to shoreline ecological function."

KT: Since the wording in the SMP Update will impact our shorelines for perhaps 20-50 years into the future, the concept of "no net loss" is weak and cowardly. It promotes the status quo by allowing individuals and/or entities to benefit financially from impacts to the shoreline.

KT: Since the wording in the SMP Update will impact our shorelines for perhaps 20-50 years into the future, the concept of "no net loss" is weak and cowardly.

- It promotes the status quo by allowing individuals and/or entities to benefit financially from impacts to one area and have their impacts compensated for by taxpayer funded restoration projects in another area.
- This mitigation offset was described by Brad Murphy, Thurston County Planner, at the public comment meetings.
- Tax-payers have the right to know that their dollars are not actually going toward "Net gain" for Puget Sound but are simply compensating for someone else's

impacts, including entities which are benefitting financially from their impacts.

1. Critical Aquifer Recharge Areas
2. Fish and Wildlife Habitat Conservation Areas

PT: What are the current shoreline areas designated as "Fish and Wildlife Habitat Conservation Areas"?

- RCW 36.70A.030(5) and WAC 365-190-130 require counties to establish these areas.
- Certainly, most of Thurston County tidelands would fall into the definition of this type of area due to the presence of threatened, endangered, or sensitive species exist.
- See WAC section (2) and (3) which requires use of best available science.

3. Frequently Flooded Areas
4. Geologically Hazardous Areas
5. Wetlands

19.300.110 Vegetation Conservation

Goal: Conserve, protect and restore native shoreline vegetation to provide for ecological and habitat functions as well as human health and safety. These functions include, but are not limited to, variable shading of the nearshore, food and shelter for terrestrial and aquatic organisms, and slope/soil stabilization.

A. Policy SH-15 Preserve native plant communities on marine, river, lake and wetland shorelines. In order to maintain shoreline ecological functions and processes, development along the shoreline should result in minimal direct, indirect, or cumulative impacts. This includes:

PT: This section should include the shoreline tidal areas. There are native kelp, eelgrass, and other plant communities on tidelands that provide critical ecological functions and processes. These shoreline plant communities are also affected by changes to landside plant communities.

1. Keeping overhanging vegetation intact along the shoreline edge to provide shading and other ecological functions;
2. Preserving established areas of native plants and minimizing clearing and grading near bluff edges and other erosion or landslide-prone areas in order to maintain slope stability and prevent excess surface erosion and stormwater runoff; and
3. Designing and placing structures and associated development in areas that avoid disturbance of established native plants, especially trees and shrubs; and
4. Removal of noxious weeds in accordance with WAC 16-750-020.

B. Policy SH-16 Shoreline landowners are encouraged to preserve and enhance native woody vegetation and native groundcovers to stabilize soils and provide habitat. When shoreline uses or modifications require a planting plan, maintaining native plant communities, replacing noxious weeds and avoiding installation of ornamental

plants are preferred. Unless approved by the Director or their designee, non-native vegetation is prohibited within critical area, their buffers, and associated setbacks.

PT: Since the goal of this policy is to protect and preserve shoreline ecological functions, it should also apply to shorelines and tidelands.

JV: "Unless approved by the Director or their designee, non-native vegetation is prohibited." This seems extreme. Would prefer that it read "native plants are strongly preferred."

KT: Most shoreline properties have been established as residential properties for decades. Will the monitors required in 19.300.105 D-6 also be the "vegetation monitors?" This could be interpreted as an "ivory-tower" ignorance toward shoreline property owners, most of whom are sincerely interested in the protection of the shoreline and the tideland.

C. Policy SH-17 Maintaining native or ecologically functional vegetation is preferred over clearing to provide views or lawns. Limited and selective clearing may be allowed when slope stability and ecological functions are not compromised. Limited trimming and pruning is preferred over removal of native vegetation.

KT: Will the monitors required in 19.300.105 D-6 also be the "vegetation monitors?" How will this prohibition be enforced? There is something irrational and vindictive, possibly motivated by cultural envy, about a prohibition related to properties that have been established as residential properties for decades.

19.300.115 Water Quality and Quantity

Goal: Provide regulations and voluntary incentives to encourage practices which protect water quality and reduce stormwater runoff and erosion in order to protect against adverse impacts to the public health, to the land and its vegetation and wildlife, and to the waters of the state and its aquatic life.

Original Wording A. Policy SH-18 Shoreline use and development should minimize impacts that contaminate surface or ground water, cause adverse effects on shoreline ecological functions, or impact aesthetic qualities and recreational opportunities, including healthy shellfish harvest.

A. Policy SH-18 Shoreline and tideland use and development, including use by aquaculture, should minimize impacts that contaminate surface or ground water, cause adverse effects on shoreline ecological functions, or impact aesthetic qualities and recreational opportunities, including, but not limited to, ~~healthy~~ recreational shellfish harvest, recreational fishing, bird and wildlife viewing,, swimming, and boating.

KT: REWORD LAST SENTENCE TO READ; "...recreational opportunities such as recreational shellfish harvest, recreational fishing, bird and wildlife viewing, swimming, and recreational boating and all types of navigation."

KT: There must be a distinction defined related to recreation harvest of native shellfish and commercial/industrial harvest of planted shellfish. Mention of commercial shellfish should be stricken.

PT: Should read: "Shoreline and tideland use and development, including use by aquaculture..." Shorelines are used from the waterward side as well as the upland side.

PT: What is the definition of "healthy shellfish harvest"? Does this relate to the previous clause on "recreational opportunities"? If so, it should be clarified. It is probably not needed here at all. Recommend striking ", including healthy shellfish harvest."

B. Policy SH-19 Ensure mutual consistency with other regulations that address water quality and stormwater quantity, including standards as provided for in TCC Title 15.05 (Thurston County Storm Water Standards) and Chapter 173-201A WAC (Water Quality Standards).

KT: Define and address hazardous waste drained on the shoreline from roads and storm water drains.

C. Policy SH-20 Utilize pervious materials and other appropriate low impact development techniques where soils and geologic conditions are suitable and where such practices could reduce stormwater runoff.

D. Policy SH-21 All shoreline use and development shall be conducted in accordance with Chapter 24.20 TCC (Frequently Flooded Areas). The subdivision of land should not be established when it would be reasonably foreseeable that the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway. When evaluating alternate flood control measures or floodplain restoration opportunities, consider the removal or relocation of structures in flood-prone areas.

E. NEW: Policy SH-22. Commercial development of tidelands should not degrade aquatic water quality through siltation, release of toxics, disturbance and distribution of organic matter due to installation of structures or dredging

PT: There needs to be a policy statement related to water quality and commercial development of the tidelands. Commercial development of tidelands should not degrade aquatic water quality through siltation, release of toxics, disturbance and distribution of organic matter due to installation of structures or dredging, and so forth. The previous policies in the section assume water quality is only affected by upland activities which leaves a large gap.

19.300.120 Economic Development

Goal: Provide for the location and design of industries, transportation, port

and tourist facilities, commerce and other developments that are particularly dependent upon a shoreline location and/or use, when the shoreline can accommodate such development.

PT: The use of the phrase "when the Shoreline can accommodate such development" in this goal as stated conflicts with previous goal statements. Replace "when the shoreline can accommodate such development." With "when such development represents no net loss of ecological function and processes."

KT: The use of the phrase "**when** the Shoreline can accommodate such development" also indicates that "High Intensity" development is allowed on Natural and Residential shorelines.

KT: Policy SH-22 and SH-23 as stated for all shoreline environments are in contradiction to and obfuscate the long-held goals of the original SMP, in which, this new goal for "economic development" was ONLY for the URBAN SHORELINE ENVIRONMENT. To understand clearly how this rule has been dramatically re-invented, please see inserts below from the 1990 SMP.

In Chapter 19.200.105 Shoreline Environment Designations, the SMP update claims that "Thurston County does not have any "High Intensity" shorelines within its jurisdiction, presumably because the City of Olympia is authoring its own SMP update.

So, if Thurston County does not have any "High Intensity" shoreline areas then **this Goal related to "High Intensity" economic development should be stricken.**

This Policy Goal allows for "High Intensity" shoreline use elsewhere in Thurston County. If it is the goal of Thurston County to allow and/or encourage "High Intensity" use in the Natural, Rural Conservancy, Urban Conservancy and Shoreline Residential shorelines, then the County should be explicit about that.

This Goal should be stricken. Goals for the individual Shoreline Environmental Designations should be stated under each shoreline designation, as the goals are unique to the designation.

PT/KT: Below are the economic "Goal Statements" for each shoreline designation from the 1990 SMP. The economic goals for B., C., and D. are NOT the same as goals in the "urban" ("high intensity") shoreline environment. In the Natural Environment Economic Development IS NOT A GOAL. The definition for the Urban (High Intensity) Environment is the definition that is being used in the current SMP Update for ALL the shoreline environments, including the "Natural Environment". We do not agree that "high intensity" economic development is appropriate for any shoreline environment other than "Urban/High Intensity."

1990 Shoreline Master Plan Thurston County, Section Two, Generals Goals and Policies, VII. Shoreline Environments (Please read this section in its entirety to understand the Purposes, Definitions and Goal Statements of each of the Shoreline Environments. In the current SMP update, these are all lumped

together.

A. Natural Environment, Goal Statement 1: Economic Development. Economic development is not a goal of the Natural Environment.
B. Conservancy Environment, Goal Statement 1: Economic Development. The goal for this element it to reach a high level of renewable resource utilization on a sustained yield basis.
C. Rural Environment, Goal Statement 1: Economic Development. Available resources should be utilized consistent with the definition and purpose of the Rural Environment.
D. Suburban Environment, Goal Statement 1: Economic Development. Available resources should be utilized consistent with the purpose and definition of this environment.
E. Urban Environment, Goal Statement 1: Economic Development. The goal of this element is to utilize most efficiently the limited shoreline for industry, transportation facilities, commercial and other developments that are particularly dependent upon their location on, or use of, the shoreline.

A. Policy SH-22 Accommodate and promote, in priority order, water-dependent, water-related and water-enjoyment economic development. Such development should occur in those areas already partially developed with similar uses consistent with this Program, areas already zoned for such uses consistent with the Thurston County Comprehensive Plan, or areas appropriate for water-oriented recreation.

PT: We question the "priority order" of water-dependent, water-related, water-enjoyment economic development. Where, specifically, did this come from and/or who determined this priority?

KT: This may be a useful practice for upland development, but it is not useful for shoreline development. **We do not believe the saltwater Shorelines of Statewide Significance, should allow commercial aquaculture. Current commercial aquaculture installations on any Shorelines of Statewide Significance should be phased out. Commercial aquaculture is not consistent with protection of the most sensitive areas of tidelands. It is not consistent with saving salmon and orcas.**

JV: The existing use of our shorelands in Zangle Cove is for residential and recreation use – not for commercial use.

B. Policy SH-23 Water-oriented economic development, such as those aquaculture activities encouraged under the Washington Shellfish Initiative, should be encouraged and shall be carried out in such a way as to minimize adverse effects and mitigate unavoidable adverse impacts to achieve no net loss of shoreline ecological functions.

PT: The Washington Shellfish Initiative is a political initiative and not law. It is inappropriate to include references to the WSI in the SMP. This policy statement should be deleted.

JV: Remove the words "should be encouraged." Change to "Should be permitted only after careful review…"

JV: "No net loss of shoreline ecological functions" should be change to "net gain of shoreline ecological functions" with full definition of the meaning of "net gain."

19.300.125 Historic, Archeological, Cultural, Scientific and Educational Resources

Goal: Protect shoreline features of historic, archaeological, cultural, scientific and educational value or significance through coordination and consultation with the appropriate local, state and federal authorities, affected Indian tribes, and property owners.

JV: "Property owners" are included in this section. As property owners, we are seen as equal stakeholders in the process, along with government entities and tribes. This is justification for inclusion on the STAG or Regulatory Committee.

PT: How does this goal translate into regulatory action? There does not seem to be any implementation of this goal in subsequent chapters. There needs to be a definition of "coordination and consultation". How are disputes resolved related to value or significance?

A. Policy SH-24 Prevent damage or destruction of historic, archaeological, cultural, scientific and educational (HASCE) sites through coordinated identification, protection and management with the appropriate local, state and federal authorities and registrars, affected Indian tribes, and property owners.

PT: How does this goal translate into regulatory action? There does not seem to be any implementation of this goal in subsequent chapters. There needs to be a definition of "coordination and consultation". How are disputes resolved related to value or significance?

B. Policy SH-25 Provide opportunities for education and appreciation related to HASCE features where appropriate and where maximum protection of the resource can be achieved.

PT: What is the definition of "maximum protection"?

19.300.130 Shoreline Use and Site Planning

Goal: Preserve and develop shorelines in a manner that allows for an orderly balance of uses by considering the public and private use, along with the development of shorelines and adjacent land areas with respect to the general

distribution, location and extent of such uses and development.

PT/KT: Of the 13 Policies listed under this heading, 8 Policies, well over half, are for the benefit or related to one industry—shellfish aquaculture industry. This is not appropriate. We question if this SMP update gives such preference/benefit to any other commercial industry and if not, where should they go to get inline? The obvious preference/benefit to the shellfish industry appears biased, especially as the other 5 polices are restrictive of upland use, and none of the policies speaks to recreational use of the shorelines.

PT/KT: This goal is vague and contradictory and in conflict with previous goals. You can preserve, or you can develop, but you can't do both. What is the definition of "orderly balance of uses"? The sentence has no meaning.

PT/KT: The Goal of this policy speaks of the "orderly balance of uses." But the only specific uses mentioned are single family residential use (SH-27), non-forming structures (SH-38) and shellfish aquaculture, (SH-30, SH-31, SH-32, SH-33, SH-34, SH-35, SH-36, Sh-37) It begins to look significantly unbalanced.

A. Policy SH-26 For shoreline use and development activities, including plats and subdivisions at full build-out, employ innovative development features to achieve no net loss of ecological functions, such as sustainable and low impact development practices where appropriate.

JV: "No net loss" should be replaced with "Net Gain" and with full definition of "Net Gain."

PT/KT: Since most upland parcels on the shorelines of Thurston County are single-family homes which have existed for decades, we question what this Policy is about. If it is talking about inland "plats and subdivisions," that are not on the shoreline itself, the policy should state that explicitly.

PT/KT: There needs to be a definition of "sustainable and low impact development practices". What characterizes these types of development?

B. Policy SH-27 Give preference to water-dependent uses and single-family residential uses that are consistent with preservation of shoreline ecological functions and processes. Secondary preference should be given to water-related and water-enjoyment uses. Non-water-oriented uses should be limited to those locations where the above-described uses are inappropriate or where non-water-oriented uses demonstrably contribute to the objectives of the Act. For use preference within shorelines of statewide significance, see Section 19.300.100(B) ~~above~~.

JV: Preference is to "water-dependent uses and single-family residential uses…"

PT: Why are water-enjoyment uses secondary? The recreational use of aquatic waters has a high economic value and attraction to more people in Puget Sound.

C. Policy SH-28 Designate and maintain appropriate areas for protecting and restoring shoreline ecological functions and processes to control pollution and prevent damage to the shoreline environment and/or public health.

JV: Questions

- Who designates "appropriate area for protecting and restoring shoreline ecological functions, etc. and on what basis?

- Who maintains "appropriate areas for protecting and restoring shoreline ecological functions," etc.?
- Does this apply to public land/tidelands only?
- Is private property subject to designation?

PT: Water and tides to not stop at arbitrary boundaries. How will cumulative and secondary impacts be accounted for in this policy?

D. Policy SH-29 Through appropriate site planning and use of the most current, accurate and complete scientific and technical information available, shoreline use and development shall be located and designed to avoid the need for shoreline stabilization or actions that would result in a net loss of shoreline ecological functions.

PT: According to recent studies, the ability to determine and monitor for loss of shoreline ecological functions requires detailed analysis of existing ecological functions (a baseline), and regular monitoring. As Thurston County has acknowledged in testimony, it does not know how many aquaculture operations are currently active, they have no ability or resource to monitor activities. How will this policy be implemented? Baseline analysis must be required.

KT: Shoreline stabilization" and "Shoreline ecological functions" are very different concepts. The term "Shoreline stabilization" is explanatory. "Shoreline ecological function" is vague and needs to be defined.

E. Policy SH-30 Aquaculture is of statewide interest. Properly managed, it can result in long-term, over short-term, benefit and can protect the resources and ecology of the shoreline. Aquaculture is dependent on the use of the water area and, when consistent with the control of pollution and prevention of damage to the environment, is a preferred use of the water area.

JV: Property managed, it (aquaculture) can result in long-term, over short-term benefit and can protect the resources and ecology of the shoreline." I don't believe this is a scientifically defensible position.

JV: "Aquaculture…is a preferred use…" Should read: "Aquaculture…is a **permitted** use…"

KT: Please cite where these statements come from--WAC's, RCW's, etc. The statement that "Aquaculture is of statewide interest" is readily found in documents put out by the shellfish industry. It sounds like a case of "if you say it often enough, it becomes true." This is a strategy of politicians and should not be a strategy for creating common-sense rules related to protection of State shorelines.

PT: In addition to Jean's comments, I would like to understand the basis in law for the statement that "Aquaculture is of statewide interest." I would like to see the science behind the statement that it can provide long term benefits. Current practices have only been in use for a short period of time. The economic benefits of aquaculture in Thurston County are of minimal economic benefit (about $20M a year for geoduck farming, according to industry estimates. This is about the economic impact of 4 MacDonald's restaurants. According to Earth Economics the recreational value of the tidelands is far higher. I see no basis for this being a part of the SMP policy structure.

F. Policy SH-31 Potential locations for aquaculture activities are relatively restricted by water

quality, temperature, dissolved oxygen content, currents, adjacent land use, wind protection, commercial navigation, and salinity. The technology associated with some forms of aquaculture is still experimental and in formative states. Therefore, some latitude should be given when implementing the regulations of this section, provided that potential impacts on existing uses and shoreline ecological functions and processes should be given due consideration. However, experimental aquaculture projects in water bodies should include conditions for adaptive management. Experimental aquaculture means an aquaculture activity that uses methods or technologies that are unprecedented or unproven in Washington.

DELETE ENTIRE POLICY: WHY IS THE COUNTY SO BEHOLDEN TO ONE TINY INDUSTRY? What does this industry have on Thurston County? The ordinary person, especially the land owner who is highly regulated, sees this as a political scam

PT: These facts are an argument for less flexibility, more caution, and more monitoring, not less. Experimental aquaculture technology using technologies that are "unprecedented or unproven" is an argument for caution as unexpected impacts can be devastating on endangered and threatened species. This policy statement has no place in the SMP.

JV: The term "adjacent land use" should be defined. Which "adjacent lands" cause restriction for aquaculture?

KT: **This Policy should be stricken as it is counter to the goals of the SMP. This policy is a disaster waiting to happen.** Please recall the 2015 Seattle Shellfish disastrous use of plastic cups as wild-life exclusion devices next to Tolmie Park. The owners of Seattle Shellfish only cleaned up this mess (thousands of pieces of plastic shards from the cups) when he was reported by a neighbor to the Thurston County Health Department. Thurston County should assess if this is still a problem two years later. This was "experimental technology" if you wish to call it that, but it should have been obvious to the operator that flimsy clear plastic cups, the type that are a dime a dozen at the grocery store, are not appropriate to be used to protect geoduck seeds on Puget Sound tidelands, with tides, waves and current. "Due Consideration" is obviously not something that can be counted on to be performed in thought or deed by a shellfish industry operator. The County must be liable for the permit that it gives to the operator, and so it must have a record of the method used and would wisely be cautious about "experimental methods." Permission to "experiment" on our "fragile tidelands" should NOT be granted by law. Somebody needs to wake up here.

G. Policy SH-32 Aquaculture activities should be located, designed and operated in a manner that supports long-term beneficial use of the shoreline and protects and maintains shoreline ecological functions and processes.

JV: "Long-term beneficial use of the shoreline" should be defined. Does it mean "public benefit" or "private economic gain?"

PT: This policy is contradictory. Aquaculture by its nature changes and disrupts the shoreline ecological functions and processes. **This should be changed, or the entire policy eliminated.**

KT: The phrase "maintains shoreline ecological functions and processes" should be defined.

H. Policy SH-33 Aquaculture should not be permitted where it would result in a net loss of shoreline ecological functions and processes, adversely impact eelgrass and macroalgae, or significantly conflict with navigation and other water-dependent uses. Aquaculture is not

required to protect state-listed noxious weed species when control methods are conducted within applicable agency standards. In general, the following preferences apply when considering new aquaculture activities:

PT: In above sections kelp is included as well as eelgrass. This should be consistent.

PT: In addition to water-dependent uses this should also include water-related and water-enjoyment uses.

PT: Why is the sentence starting "Aquaculture is not required to protect state-listed noxious ..." in this policy? That would be regulatory in nature, and best left to state agencies, not local specification.

PT/KT: Comments:

- What are "applicable agency standards?"
- Who defines "applicable agency standards?
- What agency oversees the use of pesticides in Puget Sound and lakes?
- How will the County monitor use of pesticides and who will monitor?
- This policy gives County permission to the Shellfish Industry to spray pesticides on Puget Sound waters. Does this include Imidacloprid, the bee-killing pesticide banned in other countries?
- The phrase "Aquaculture is not required to protect state-listed noxious weed species" is covert way of saying that the Shellfish industry can spray whatever it wants on weeds and critters (ex. Native burrowing shrimp).
- This type of phrasing is dishonest. The County should say directly what it means. Otherwise, it is obvious the County is attempting to hide the truth.

1. Projects that are not likely to negatively impact critical saltwater habitats.

KT: Change to "**Project that will not negatively impact critical saltwater habitat.**" Science should be applied here, not guesswork based on "not likely." Who decides what is "not likely?"

2. Projects that involve ~~little or~~ no substrate modification.

KT: This would rule out geoduck operations.

PT: Delete "little or"

3. Projects that involve little or no supplemental food sources, pesticides, herbicides or antibiotic application.

KT: Any project that involves supplemental food sources, pesticides, herbicides or antibiotics applications should be banned. We are in the 21st century guys. We've used enough of this stuff to fill every human being to the brim. We don't need any more. Operators who are not smart enough to figure out how to grow their product without pesticides, herbicides and antibiotics should find another job. They are helping to ruin our planet and the County should reject this. The County and the State should be ashamed to even consider this in their rules that will be in effect for the next 25-40 years.

Supplemental food sources, pesticides, herbicides, anti-biotics must be banned from use in Thurston County waterways.

I. Policy SH-34 Aquaculture facilities should be designed and located to avoid:

A. the spread of disease to native aquatic life;

PT: Due to the sensitive nature of shorelines and tidelands, aquaculture facilities should be located in upland facilities with appropriate water quality controls.

B. the establishment of new non-native species, which cause significant ecological impacts; and

KT: Non-native species should be banned. Any operator who inadvertently introduces non-native species should have permit revoked.

PT: The introduction and establishment of non-native species is not allowed.

KT: The term "significant ecological impact" should be defined.

KT: How is "significant ecological impact" determined in a permit process and who monitors "significant ecological impact?"

C. significant impact to the aesthetic qualities of the shoreline.

KT: Remove the word "significant." The County cannot assume to be arbiters of significance of aesthetic impact, especially when they are charging property owners the highest of property taxes because of aesthetics.

JV: Who decides what is a "significant impact to the aesthetic qualities of the shoreline? How is this determined?

J. Policy SH-35 Upland uses and modifications should be properly managed to avoid degradation of water quality of existing shellfish areas.

KT: The term "Existing shellfish areas" must be defined. Does it mean "native shellfish areas" or "commercial/industrial shellfish areas."

KT: The term "properly managed" must be defined. There are already rules in place for sewer systems and septic systems for upland properties. What else is required here? This policy should be restated if the meaning is for taxpayers to subsidize a single industry. That would be precedent setting for other industrial uses to take priority over family homes and properties

PT: This is far too broad. This policy could lead to a cessation of all residential and commercial development activity in Thurston County. Where is this policy required by the SMA or relevant RCWs and WACs? This looks like a lobbyist's dream to transfer water quality recovery costs to the public. This policy should be deleted.

K. Policy SH-36 Planting and harvesting by boat shall be preferred over low-tide harvest methods where feasible.

PT: This is regulation and not policy. It does not belong in this section. It also looks like the work of a lobbyist and is not appropriate here.

JV: Should read "Planting and harvesting by boat shall be required..." It already says, "where feasible."

PT: Harvesting by boat shall take place only during daylight hours when the operation is within 2,500 feet of a residence or residential neighborhood.

L. Policy SH-37 Non-commercial ~~and~~ or small-scale aquaculture projects should be encouraged through the shoreline exemption process [Section 19.500.100(C)].

KT: "Non-commercial and small-scale aquaculture projects" are not the same. All commercial aquaculture operations, big or small, must be required to go through the same permitting process. They should NOT BE EXEMPT FROM PERMITTING." This policy is a "slippery slope", no doubt purposefully promoted by the shellfish industry, to slip through an exemption clause for commercial shellfish aquaculture permits.

PT: It would appear that this policy and other policies in this section related to shellfish aquaculture are politically motivated policies from the commercial aquaculture industry and/or their representatives, proposed as a means to avoid permitting requirements. Any such policy should be eliminated from the Draft SMP Update.

M. Policy SH-38 In order to facilitate more conforming uses in the shoreline environment provide an administrative Type I permit option to permit reconstruction or remodels of non-conforming structures that propose to make the structures and uses more conforming using innovative design techniques and/or by moving structures further landward of critical areas, their buffers and setbacks or, to the maximum extent possible, remove the structures completely from critical areas, their buffers, and setbacks.

KT: Sounds like war on the single-family dwelling. It conflicts with giving preference to single family dwellings. What is the basis for this type of permit? If it is a current policy, where specifically is it defined. Or is this intended to be a new policy, and if so who is responsible for defining it?

JV: "...to the maximum extent possible, remove the structures completely from critical areas, their butters, and setbacks." The strength of this statement is of real concern.

PT: Since geoduck PVC plastic and netting is recognized in regulation as a "structure" they should be included in the category of "non-conforming" and subject to the same regulations

19.300.135 Public Access and Recreation

Goal: Provide physical and visual public access opportunities and space for

diverse forms of water-oriented recreation in such a way that private property rights, public safety, and shoreline ecological functions and processes are balanced and protected in accordance with existing laws and statutes.

JV: Change "...processes are protected..." to "...processes are **balanced and protected**..."

A. Policy SH-39 Protect the public's opportunity to enjoy the physical and visual qualities of the shoreline by balancing shoreline use and development in such a way that minimizes interference with the public's use or enjoyment of the water. This may be achieved through regulatory provisions, incentives or other cooperative agreements.

KT: Industrial/commercial aquaculture interferes with the public's use and enjoyment of the water.

KT: A portion of the verbiage from policy SH-39 comes from the 1990 SMP. However, in the 1990 document this verbiage was part of the over-all policy statement regarding the SMP, the "Bigger-Picture" as it were. It was not limited to public access and recreation. It was part of a larger statement regarding the management of the Shorelines.

So, although they used some of the words from the 1990 SMP, the authors of the Draft SMP Update have taken this verbiage out of context and changed the meaning.

While the original version placed an emphasis on preserving the public's rights, the new policy places emphasis on "balancing shoreline use and development" and "minimizing" interference with the public's rights." Since this is a change in the over-arching goals of the SMP, it needs to be specifically clarified as to intent.

You can see the words that were taken out of context from the following:

1990 SMP, Section Two, General Goals and Policies, III Policies:
"To implement this document, the public's opportunity to enjoy the physical and aesthetic qualities of natural Shorelines of the State and Region shall be preserved to the greatest extent feasible consistent with the overall best interest of the people generally. To this end, uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment or are unique to or dependent upon use of the State's shoreline. Alterations of the natural condition of the shorelines, in those limited instances when authorized, shall be given priority for single-family residences, ports, shoreline recreational uses including but not limited to parks, marinas, piers and other improvements facilitating public access to shorelines of the Region; industrial and commercial developments which are particularly dependent on their location on, or use of, the shorelines of the Region; and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the Region. Permitted uses of the Shorelines of the State and Region shall be designed and conducted in a manner to minimize, to the extent feasible, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water.

B. Policy SH-40 Evaluate site-appropriate types and methods of required public access when

reviewing all public shoreline development projects and private subdivision of land into more than four parcels. Based on project-specific circumstances, this may include physical or visual access on or off site.

KT: What specifically is this referring to. The language in this policy is vague and ill-defined.

PT: This should extend to require access buffers in commercial shellfish areas.

C. Policy SH-41 Acquire, maintain and improve diverse physical and visual shoreline access through public and private efforts. This should be accomplished in a comprehensive and prioritized manner through the use of existing plans and programs, including those that address population growth and shoreline access demands such as the Thurston County Comprehensive Plan, the Thurston County Parks, Recreation, Trails and Natural Resource Preserve Plan (2013) Plan, and other port and state park plans.

KT: What specifically does this policy mean. The language in this policy is general, vague and ill-defined.

KT: What is meant by "comprehensive and prioritized manner?" This is general, vague and ill-defined.

D. Policy SH- 42 Publically owned, undeveloped road-ends, tax-title lands and rights-of-way adjacent to salt and freshwater shorelines should be evaluated for use as public access points. These lands may be developed for access by a community organization, consistent with Chapter 13.56 TCC as now or hereafter amended.

KT: "Publically" is misspelled. There is a fair amount of mis-spelling in this document that could be easily remedied by using the spell-checker function in Microsoft Word.

KT: This sounds nice, but the first step is a list of such "publicly owned, undeveloped road-ends, tax-title lands and rights-of-way.".

E. Policy SH-43 Use shoreline public access points to enhance the public's understanding and appreciation of shoreline ecology, cultural history, maritime heritage, and location specific rules and boundaries by incorporating educational and interpretive signage and other tools into public access facilities.

F. Policy SH-44 Encourage linkage of shoreline parks, upland recreation opportunities and water-oriented opportunities.

G. Policy SH-45 Encourage the acquisition of public shoreline recreational lands through a variety of means including fee purchase, acquisition of easements, options, development rights, and Conservation Futures.

H. Policy SH-46 Encourage coordination between public agencies, land owners, non-profit organizations, land trusts, private developers, and others in their plans and activities to provide a wide variety of recreational opportunities on public shorelines.

19.300.140 Restoration and Enhancement

Goal: Re-establish, rehabilitate and/or otherwise improve impaired shoreline ecological functions and processes through voluntary and incentive-based public and private programs and actions that are consistent with the *Shoreline Restoration Plan* (Appendix C). (Note: this section does not address required mitigation sequencing related to specific development proposals; see Section 19.400.110(A) for mitigation standards.)

KT: In many instances, it would be far more effective and less costly to simply not degrade the shoreline, particularly the tidelands, in the first place. To this end, the permitting of geoduck aquaculture and other forms of commercial industrial aquaculture that uses some 43,560 PVC pipes per acre, about 7 miles of PVC weighing some 16 tons, many of which *escape from their location, or otherwise use plastic nets and bags should be banned.*

A. Policy SH-447 Integrate and facilitate voluntary and incentive-based cooperative restoration and enhancement programs between local, state, and federal public agencies, tribes, non-profit organizations, and landowners to address shorelines with impaired ecological functions and/or processes.

KT: We agree that we should embark on restoration and enhancement programs for our shorelines. But if this is an aspect of the "no net loss of ecological function" or even an adjunct to the "no net loss" policy, it is critical that those participating in these programs should be advised of this policy and what it means—that their efforts are in effect making up for impacts of others who impact for financial gain.

PT: All shorelines restored under an incentive program should be placed into conservation status and any development of the tidelands should be prohibited.

B. Policy SH-458 Identify restoration opportunities through sources such as the *Thurston County Shoreline Master Program Update Inventory and Characterization Report*, salmon recovery plans, local watershed plans, Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), and the Salmon Recovery Lead Entity Habitat Work Schedule, and authorize, coordinate and facilitate appropriate publicly and privately initiated restoration projects. This shall be accomplished through the *Shoreline Restoration Plan* (Appendix C), which addresses the following:

KT: We agree that we should embark on restoration and enhancement programs for our shorelines. But if this is an aspect of the "no net loss of ecological function" or even an adjunct to the "no net loss" policy, it is critical that those participating in these programs should be advised of this policy and what it means—that their efforts are in effect making up for impacts of others who may impact for financial gain. If it is not part of the "no net loss" policy, then where does it fit into the scheme of "no net loss" policy?

1. Identification of degraded areas and sites with potential for ecological restoration;
2. Restoration goals and priorities;
3. Existing and on-going projects and programs;
4. Additional projects and programs to achieve the restoration goals;
5. Funding sources, timelines and benchmarks for implementation; and

6. Monitoring effectiveness of restoration projects.

C. Test Policy SH-~~46~~9 Encourage and facilitate restoration and enhancement projects for Priority Habitats and Species. (Washington Department of Fish and Wildlife, PHS Program).

KT: This is a well-meaning goal that is contradicted by allowing industrial shellfish aquaculture on the tidelands using approximately 7 miles/16 tons of PVC and plastic netting to create a monoculture. Citizens who aware of the contradictions of the County policies are less likely to support restoration projects, as restoration projects often use taxpayer money.

D. Policy SH-~~47~~50 Shoreline ecosystem protection and restoration projects shall be prioritized, located and designed utilizing the most current, accurate and complete scientific and technical information available to promote resiliency of habitats and species.

PT: Define "resiliency of habitats and species". What is the relevant section of SMA, RCWs, WACs, or TCCs? How does this relate to no net loss of ecological functions and processes?

19.300.145 Transportation and Utilities

Goal: Plan, locate and design transportation systems and essential utility facilities in shoreline areas where they will have the least possible adverse effect on shoreline ecological functions and/or processes and existing or planned water-dependent uses.

A. Policy SH-~~48~~51 Plan, locate and design proposed transportation, parking facilities, and utility facilities where routes will avoid a net loss of shoreline ecological functions or will not adversely impact existing or planned water-dependent uses.

B. Policy SH-~~49~~52 Parking facilities in shorelines are not a preferred use. Such facilities ~~shall~~ should only be allowed as necessary to support an authorized use and only when environmental and visual impacts are avoided and minimized.

KT: This Policy is not clearly written. Define "Parking facilities" and "in shorelines."

C. Policy SH-~~50~~53 New or expanded transportation routes and essential utility facilities ~~shall~~ that cannot be located outside of shoreline jurisdiction should, to the extent feasible:

1. Be located in areas that do not require shoreline stabilization, dredging, extensive cut/fill and other forms of shoreline alteration;
2. Be limited to local access and public shoreline access routes;
3. Be located in existing rights of way and corridors; and
4. ~~Not be built within shoreline jurisdiction when other options are available~~.

D. SH-~~51~~54 Transportation and utility projects ~~shall~~ should ~~be consistent with and~~ incorporate ~~the~~ public access ~~policies and plans of this Program~~.

E. E. Policy SH-~~52~~55 When feasible, roads built within shoreline jurisdiction should ~~P~~provide for alternate modes of travel, including pedestrian, bicycle and public transportation, where appropriate.

F. Policy SH-~~53~~56 Maintenance of existing transportation corridors and utility facilities ~~shall~~ should be carried out in a manner that:

1. will avoid a net loss of shoreline ecological functions; ~~and~~
2. mitigates for unavoidable impacts; and
3. where feasible and appropriate, improves shoreline ecological functions.

KT: Define what types of "existing transportation corridors and utility facilities" that "improve shoreline ecological functions." Give an example, as this seems completely contradictory. Maybe the writer has something in his/her mind, but the reader is not a "mind reader."

KT: How or in what manner will "transportation corridors and utility facilities that cause impacts to the shoreline be mitigated? This is another case of contradictory policy that needs explanation. Looks like somebody just threw this in there

~~Unavoidable adverse impacts shall be mitigated.~~

C. South Puget Sound Policies

Goal: Work with the Alliance for a Healthy South Sound (AHSS) to incorporate the South Sound Strategy as a way to protect and conserve shoreline natural resources, including protection of critical areas (Title 24 TCC), while accommodating reasonable and appropriate shoreline development uses which will assure, at a minimum, no net loss to shoreline ecological functions and processes.

1. Policy SH-~~54~~57 Thurston County recognizes that South Puget Sound includes ~~a~~ unique and significant marine and freshwater resources. As such, Thurston County should work to minimize use conflicts, exercise responsibility toward the South Sound's resources, and require commitment to water-quality, and water-quantity preservation.

PT: There are many aspects to protecting the marine resource. Water quality is an important aspect, but it is one of many. Protection of endangered, threatened and sensitive species, preservation of native tideland vegetation, preservation of tideland structure, and so forth, should be added to this section.

2. Policy SH-~~55~~58 In planning for the future development of South Puget Sound, the statewide interest should be protected over the local interest.

KT: What specifically is the meaning of "statewide interest vs. local interest?

3. Policy SH-~~56~~59 The Alliance for a Health South Sound (AHSS) is a regional organization comprised of Thurston, Kitsap, Pierce and Mason County governments, and the Squaxin Island, Nisqually, and Puyallup tribes. The AHSS has been recognized by the State, including the Puget Sound Partnership, and the counties as having an important role in protecting, enhancing, and restoring the resources of South Puget Sound. As such, the AHSS has developed the South Sound Strategy, incorporated herein by reference, which should be consulted for guidance when reviewing new shoreline projects in South Puget Sound.

   PT: The AHSS lacks representation from mid-sound, upper-sound, and island counties. Puget Sound is connected across all of these areas. Additionally, AHSS lacks representation of environmental organizations, citizen groups, recreational groups, shoreline property owners, and other stakeholders. It is an inappropriate resource for policy guidance.

   KT: The AHSS may be a reputable organization, but it does not seem wise to name any non-governmental organization in a set of rules that may be in effect for 30-40 year

4. Policy SH-~~57~~60 The public interest in South Puget Sound concerns the natural character and the future development. The scope of the public interest concerning the future development of South Puget Sound includes all residents of the state, tribes, the four county governments, and federal- and State-owned lands.

   PT: The scope of public interest far exceeds this defined group. This policy should be more expansive and inclusive, or eliminated.

   KT/PT: Comment:

   - "Natural character" of what?
   - "Future development" of what?
   - What specific policy are you attempting to convey?
   - This "policy" appears to be an opinion regarding public interest rather than a policy.
   - Are you using the term "public interest" to describe a generic group of people that include "all residents of the state, tribes, the four county governments, and federal and State-owned lands."? If so, the "federal and State-owned lands" are not people.

   OR

   Are you trying to say that the public is interested in "all residents of the state, tribes, the four county governments, and federal and State-owned lands," in which case "federal and State-owned lands" works, but nothing else does in the sentence?

   Policy SH-57 is both ill-defined and contradictory. It says that "the public interest in South Puget Sound concerns the natural character and the future development." **This is not a policy, but an ill-defined opinion.**

   If the County is trying to say its policy is to preserve the natural character of the shoreline related to future development then it cannot, at the same time, promote policies that encourage industrial activity on the tidelands that use approximately 7 miles/16 tons of PVC along with plastic netting per acre of tideland along with dredging of the entire acre at harvest.

   We request that this "policy" be clarified. There must be consistency of policy statements and assertions of "concern" if the County wants this Draft SMP Update to be accepted as credible.

5/15 Public Comment received during Public communicati

Chapter 19.400 General Regulations

19.400.100 Existing Development

When discussing lawfully established, existing development the term nonconforming is often used to describe a use or structure that was in compliance with codes at the time it was developed (or was developed before adoption of an applicable code) but no longer meets code requirements because of code updates. Nonconforming is not the same as illegal and is essentially "grandfathered" in relation to this Program. However, the term nonconforming is widely used in Thurston County Code and to maintain consistency "nonconforming" is the term used in this Program. Allowances to maintain nonconforming structures and uses are included in this Program and are described below.

KT: Non-conforming, as a term, has a negative connotation. It will be much more likely to be abused though misunderstanding on the part of Thurston County Staff than the term "grandfathered." If "non-conforming" means "grandfathered," then the term "grandfathered" should be used in order to retain a clear and unequivocal meaning. Residential structures which have been "conforming" to this date, should be "grandfathered." Just because a term, such as "non-confirming," is widely used, doesn't guarantee that it is widely understood. In fact, based on the above description that it means ""essentially "grandfathered" in relation to this Program", you have made the meaning complicated and subject to confusion. If you must put the work "essentially" in front of the phrase, then it is not unequivocal. It is questionable. Why not just be clear and straightforward and use the term "grandfatherered?"

A. Existing Uses

1. Lawfully established uses occurring as of the effective date of this Program, which do not meet the standards of this Program, shall be considered nonconforming to this Program,

PT: This is a massive impact on shoreline homeowners. According to comments at the Planning Commission by a real estate professional, this will require disclosure on all property transactions. There must be a way of grandfathering current conforming lawfully established uses.

PT: This is extremely harsh to existing homeowners who have met all current laws related to uses. According to real estate professionals it will be necessary to disclosing the non-conforming status of a property in a sale transaction. If a property is legally conforming prior to the adoption of this Program, it should continue in that status after adoption. The ECY SMP handbook has examples of "grandfather" clauses.

PT: Whatever conforming status is assigned to shore lands should be applied to development in tidelands.

KT: It does appear to be legally presumptuous to define uses that have been legally conforming and with the flick of a pen, make them "non-conforming", however that term is interpreted by the current staff at Thurston County.

KT: Non-conforming language should not be applied to residential structures. Residential structures, which have been "conforming" to this date, should be "grandfathered."

2. All lawfully established uses, both conforming and nonconforming, may continue and may be, maintained, expanded, or modified consistent with the Act and this Program.

3. Any change in use shall conform to the standards of this Program and may require a Conditional Use Permit (CUP) in accordance with the findings in Section 19.500.100(D). A CUP may be granted only if no reasonable alternative use meeting the standards is practical, and the proposed use will be at least as consistent with the policies and provisions of this Program, the Act, and the uses in the area as the pre-existing use. Conditions may be imposed that are necessary to assure compliance with the above findings and with the requirements of this Program and the Act, to assure that the use will not become a nuisance or a hazard, and to assure that the use will not result in a net loss of the ecological function of the shoreline.

4. If a use is discontinued for twelve consecutive months or for twelve months during any two-year period, any subsequent use, if allowed, shall comply with the Act and this Program.

PT: Why is this necessary? There are many cases where a house is vacant for a much longer period of time, or a planned land use takes a longer period to develop. This requirement would cast a large number of properties into a different use status. This point should be deleted.

KT: On almost all shorelines, other than ports and parks, residential dwellings at this point are considered legally conforming. This sudden "conforming" to "non-conforming" definition places a burden on these property owners in terms of updating their homes, home additions, re-models, rebuilding after fire or other natural disaster. If these strictures are placed on upland shoreline property owners, strictures should also be placed on tideland property owners. Aquaculture installations can readily be considered a nuisance and a hazard to recreational water users.

B. Existing Structures

1. Lawfully constructed structures

   a. Legally established structures occurring as of the effective date of this Program, which do not meet the standards of this Program, shall be considered nonconforming to this Program, to include appurtenances as defined in 19.100.150.

   b. All legally established structures may continue and may be, remodeled, repaired or maintained in accordance with the Act, this Program, and Chapter 24.50 TCC.

   c. For structures located partially within the shoreline buffer or setback, alterations shall be limited to the addition of height up to 35 feet above finished grade and landward expansion into areas outside the shoreline setback.

   d. For structures located entirely within the shoreline buffer or setbacks, alterations shall be allowed for the addition of height up to 35 feet above finished grade or landward expansion, up to 500 square feet (1,000 square feet total if adding second floor up to 35 feet high), on the upland side of the structure, or both.

e. Interior and exterior remodels and the addition of upper stories are permitted. Except as provided above, such additions shall not extend beyond the existing or approved building footprint.

f. Any expansion of nonconforming structures that further encroach on the buffer or setback towards the Ordinary High Water Mark or expansion on either side of the existing structure shall require a shoreline variance.

eg. In the event that a legally existing structure is damaged or destroyed by fire, explosion or other casualty, it may be reconstructed to configurations existing immediately prior to the time the structure was damaged or destroyed, provided the application is made for the necessary permits within twenty-four months of the date the damage or destruction occurred, and the restoration is completed within two years of permit issuance or the conclusion of any appeal on the permit.

KT: The devastation of losing a home by fire or other disaster is multiplied by this restriction. Even if there is insurance for the disaster, rebuilding in enormously expensive. This restriction should be increased time wise to an over-all 10 year period.

PT: Fire disrupts human lives and financial resources. It may take years to fully recover and perform reconstruction. There should be no limit to the time required to apply for permits or complete reconstruction. This requirement only serves to increase the suffering of those who lose a home fire.

~~d~~h. Any legally existing structure that is relocated must be brought in to conformance with the Act and this Program.

2. Existing Appurtenances to Single-Family Residences. Those legally existing appurtenances that are common to existing single-family residences that do not meet the standards of the code shall be considered nonconforming to this Program. Such appurtenances may include garages and sheds, but shall not include bulkheads, overwater structures or other shoreline modifications.

PT: Again, this is incredibly harsh to homeowners who are legally conforming. See the points above. Existing appurtenances should be grandfathered into the new Program.

PT: Why is there an exclusion of bulkheads, overwater structures and other shoreline modifications? Shoreline and tideland modifications are likely to have an increased level of impact to ecological conditions and processes. Why would they be excluded?

KT: Why is there a distinction between "garages and sheds" and "shoreline modifications"?

3. Vegetation conservation standards of this Program shall not apply retroactively in a way which requires lawfully existing uses and developments, including residential landscaping and gardens, to be removed, except as required as mitigation for new and expanded development.

KT: "..except as required as mitigation for new and expanded development." What is the specific meaning of this related to any additions to residential homes?

PT: See the notes above regarding renovations and additions to existing property and structures.

4. Structures, improvements, docks, fills or developments lawfully placed in or over water prior to December 4, 1969 shall be considered non-conforming, but may continue in accordance with RCW 90.58.270. New in or overwater structures are prohibited.

PT: This section refers to existing "structures, improvements, docks, fills or developments lawfully placed in or over water prior to December 4, 1969 …". The following sentence should be amended to "New **in or** over water structures are prohibited."

KT: New Aquaculture "structures" should be prohibited as well. Judge Bjorgen, in his 2011 rules, defines geoduck aquaculture PVC pipes (43,000 per acre, totally approximately 7 miles and 16 tons of PVC) as "structures."

KT: Such structures should be grandfathered rather than "non-conforming" since to this time such structures have been legally conforming.

C. Existing Lots

1. An undeveloped lot, tract, parcel, site, or division of land located landward of the OHWM that was created or established in accordance with local and state subdivision requirements prior to the effective date of this Program or the Act, but which does not conform to the present lot size standards, may be developed if permitted by other land use regulations so long as such development conforms to all other requirements of this Program or the Act.

PT: Why does this item only include land located landward of OHWM? Many shoreline properties include both shorelands and tidelands. It makes no sense to exclude tidelands from this item as they are more ecologically sensitive.

2. This section does not modify the rules regarding the development of plats under RCW 58.17.170 as now or hereafter amended.

19.400.105 Proposed Development

A. Location

1. New development shall be located and designed to avoid or, if that is not possible, to minimize as much as possible the need for new and maintenance dredging.

PT: How is it possible to predict "future shoreline stabilization" needs? A new home or other structure may require shoreline stabilization due to natural events that are out of the control of the owner of the structure and which are not predictable. Examples include tidal erosion, earthquake, and other natural events.

KT: "Down-current properties" should include tideland properties, which are impacted by dredging on tidelands utilized by geoduck operations. Silt and sediments from such dredging should not be allowed

KT: Geoduck aquaculture includes "dredging" and should be avoided.

2. New development shall be located and designed to avoid the need for future shoreline stabilization for the life of the structure. Likewise, any new development which would require shoreline stabilization which causes significant impacts to adjacent or down-current properties shall not be allowed.

3. New development on lots constrained by depth, topography or critical areas shall be located to minimize, to the extent feasible, the need for shoreline stabilization.

PT: See the comment on (2) above. "Steep slopes" is not defined.

4. New development on steep slopes or bluffs shall be set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure, as demonstrated by a geotechnical analysis.

5. Subdivision shall be planned to avoid the need for shoreline stabilization for newly created lots, utilizing geotechnical analysis where applicable.

6. Non-water-oriented facilities and accessory structures, except for preferred shoreline uses, such as single-family residences and single family residential appurtenances when consistent with buffer provisions in Chapter 19.400 of this program, must be located landward of buffers and adjacent water-oriented uses, or outside shoreline jurisdiction, unless no other location is feasible.

B Standards for Work Waterward of OHWM

PT: This section is woefully inadequate to address standards for work waterward of OHWM. Numerous items should be added including tideland sediment disruption, threatened and endangered species protections, siltation in water, impacts on kelp and macroalgae, restrictions on barge mooring and tideland stranding, and so forth.

1. Water-dependent in-water structures, activities, and uses are not subject to the shoreline buffers established in this Program.

PT/KT: Why are water-dependent in-water structures, activities, and uses" not subject to any buffers? What is the basis for this item? Shorelines are critical ecological areas. Where is this item required or recommended by the ECY SMP handbook? Where is this required by current Washington RCWs and WACs (please cite relevant regulations)? This item should be deleted.

KT: What restrictions ARE applicable to water-dependent in-water structures, activities and uses? There is a clear need to establish common-sense restrictions for tideland modifications and activities.

2. Projects involving in-water work must obtain all applicable state and federal permits or approvals, including(but not limited to) those from the U.S. Army Corps of Engineers, Ecology, Washington Department of Fish and Wildlife (WDFW), and/or Washington Department of Natural Resources.

3. Projects involving in-water work must comply with timing restrictions as set forth by state and federal project approvals.

PT: This needs more definitions. What timing restrictions would apply? Also, why would this item be called out when other regulations would specify this?

KT: Please provide said "timing restrictions as set forth by state and federal project approvals." This statement is too non-specific to be understood.

4. Protection of bank and vegetation.

   a. Alteration or disturbance of the bank and bank vegetation must be limited to that necessary to perform the in-water work.

      KT: There is no definition of "in-water work" in Chapter 1. This is an ambiguous term. What would be an example of "alternation or disturbance of the bank and bank vegetation" related to "in-water work?"

   b. All disturbed areas must be restored and protected from erosion using vegetation or other means.

      KT: There is no definition of "disturbed areas." What constitutes a "disturbance" or "alteration"? This is ambiguous terminology.

      PT: This is so vague as to be meaningless.

5. If at any time, water quality problems develop as a result of in-water work, immediate notification must be made to any appropriate state or federal agency, e.g., Ecology, WDFW, National Marine Fisheries Service, U.S. Fish and Wildlife Service, etc. Affected tribes shall also be notified.

KT: Same objection: the term "water quality problems" is an ambiguous and meaningless term. What is the definition of "water quality problems" and what specific problems are being referred to? If the County is going to use ambiguous terms such as this, the term would definitely apply to commercial/industry aquaculture. The mantra of "shellfish clean the water" does not work for a CAFO operation such as a geoduck farm which plants some 129,000 geoduck seeds in a confined acre of tideland. (A concentrated animal feeding operation (**CAFO**), as defined by the United States Department of Agriculture (USDA) is an animal feeding operation (AFO)—a farm in which animals are raised in confinement—that has over 1000 "animal units" confined for over 45 days a year)

PT: This section is vague as to the meaning of "problems". What water quality problems does this encompass? The release of silt due to planting and harvest activities?

19.400.110 Mitigation

A. Mitigation Sequencing

1. Permitted uses and developments shall be designed and conducted in a manner that protects the current ecological condition, and prevents or mitigates adverse impacts. Mitigation measures shall be applied in the following sequence of steps, listed in order of priority:

   a. Avoid the impact altogether by not taking a certain action or parts of an action;

   KT: Why has this never been considered for industrial shellfish aquaculture? We do not know of a single permit that has been denied for industrial aquaculture. If this is a priority, where is the backbone of county officials to utilize the priority that is top on the list? Why should anyone believe authorities who do not follow with action their own priorities?

   b. Minimize impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;

   c. Rectify the impact by repairing, rehabilitating or restoring the affected environment;

   KT: Who will restore and who will pay for it? Taypayers (as in the case of restoration in Puget Sound) or the party who caused the impact? Maybe a fund should be set up for restoration projects related industrial aquaculture on our shorelines and the industry required to pay a substantial restoration fee in advance of their project being permitted.

   d. Reduce or eliminate the impact over time by preservation and maintenance operations;

   KT: "Preservation" would be an aspect of item (a), "Avoid the impact altogether." "Maintenance" is an ill-defined term that could mean anything. "Maintenance" must be defined.

   e. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments, including utilization of the in-lieu-fee process where appropriate; and

   KT: Who pays compensation? This must be clarified and defined. Generally, it is the tax-payers who end up paying for impacts through restoration projects. This is unethical.

   f. Monitor the impact and the mitigation projects and take appropriate corrective measures.

   PT: Appropriate mitigation sequencing should vary by shoreline designation. It would be different for intensive development areas compared to conservancy areas. There may be sensitive areas where protection of the ecological condition is paramount, and no mitigation would be adequate. Other designated areas may allow for various levels of mitigation. This document should be restructured to take into account various designations of shorelines

   KT: County personnel have stated that they do no monitor shoreline aquaculture installations (from personal conversation in Stakeholder meeting with Mike McKain. He stated that County personnel only go out to the site if there is an "incident" report. Specifically, who will monitor "impact and the mitigation projects and take appropriate corrective measures"? Unless this is a specified activity of county personnel, it is

meaningless.

KT: All the "mitigation measures" are ambiguous and unclear. #e, for example, apparently means that impacts to one area can be mitigated by restoration in another area. This means that financial benefits to one individual or entity related to impacts in one area are compensated by taxpayer money in restoration elsewhere.

KT: Another example of the ambiguity: #f: What are "appropriate corrective measures?" This term is not defined in Chapter 100.

KT: #f: What is the meaning of "monitor?" Which agency or department is responsible for monitoring and how many County employees have a job description which includes "monitoring the impact and the mitigation projects?" When we have called the County or DNR or any other Washington State Agency regarding such things as illegal mooring of barges in public waters, literally no agency and certainly not the County want to listen or deal with it.

KT: This entire paragraph is truly "...a tale told by an idiot, full of sound and fury, signifying nothing." (Shakespeare, d. 1616)

2. Application of the mitigation sequence shall achieve no net loss of ecological functions for each new development and shall not result in required mitigation in excess of that necessary to assure that development will result in no net loss of shoreline ecological functions and not have a significant adverse impact on other functions fostered by the policy of the Act or this Program.

PT: This section should emphasize the protection of ecological functions. Change "shall not result in required mitigation in excess of that necessary ..." to "shall not result in required mitigation less that that necessary ...".

KT: Which type of "no-net-loss" is being referred to? Programmatic no-net-loss or Project no-net-loss. This paragraph should be re-worded. It is unclear.

KT: Specifically, how does the County measure "no net loss". This paragraph puts into some kind of legal language the fact that "no net loss" policy prohibits mitigation beyond the strict meaning of "no net loss." In other words, it makes legal the idea that the County has no legal intention of any kind of supporting a "net gain" to the shorelines of the county in terms of ecological function. The insertion by Brad Murphy of the term "net gain" into one of his presentations, we believe, only came as a result of citizens pointing out the fallacies of the "no net loss" policy. It was a face saving measure, nothing else and the paragraph above confirms that.

B. Mitigation Options

1. After mitigation sequencing is applied in accordance with Section 19.400.110(A) Appendix B, *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities*, shall be utilized for compensatory mitigation options.

PT: This sentence is nonsense. Where is Appendix B?

KT: Since the County has chosen not to provide us with a copy of Appendix B to date, it is impossible to comment on this.

2. Site selection for compensatory mitigation shall consider factors to determine the most ecologically suitable potential mitigation site. References for consideration when determining appropriate site selection may include the *Thurston County In-lieu-fee Program Instrument, Appendix H, Watershed Approach to Mitigation*, Ecology's *Watershed Characterization and Land Use Planning*, and Ecology's *Selecting Mitigation Sites Using a Watershed Approach* (Western Washington), or other current resources informing mitigation decisions.

PT: Compensatory mitigation should explicitly exclude unrelated voluntary efforts by shoreline owners, environmental and conservation groups, or other efforts unrelated to the development.

(KT: read this: http://www.ecy.wa.gov/mitigation/landscapeplan.html)

3. Proposals that use ratios different from those prescribed in this Program, that seek to obtain alternative buffers [Section 19.400.120(C)], or that include larger modifications in a buffer [Section 19.400.120(D)] may be approved if justified in a Shoreline Mitigation Plan consistent with Section 19.700.140. Where applicable, a Shoreline Variance may be required in accordance with Section 19.500.100(E).
PT: Change "may be required" to "are required".

4. Activities not listed in Appendix B that result in adverse impacts to shoreline ecological functions shall also be subject to compensatory mitigation requirements.

PT: See comment on (2) above.

5. When compensatory mitigation becomes necessary on a site where documented restoration activities have occurred within the previous three years, but after the effective date of this Program, such documented restoration may be utilized as mitigation to offset new development impacts, provided the restoration was voluntary and not required as mitigation for prior development impacts. Mitigation credit for prior restoration activities shall be determined upon application for the impacting project, and shall, at a minimum, be commensurate with the proposed level of impact unless additional compensatory mitigation is provided.

PT: This provision, combined with the programmatic no net loss provisions, sets up the potential for an unscrupulous developer to game the system and engage in progressive destruction of ecological functions. Consider this scenario:

Property owner A engages in restoration activity to improve ecological function.

Property owner B wishes to engage in in-water development and uses the restoration performed on Property A as part of a programmatic no net loss argument. Property B is developed.

Property owner A one year later wants to develop an in-water project and uses the previous restoration as mitigation.

The result is two ecologically degraded properties with a resulting defeat of the concept of no net loss. An unscrupulous operator could degrade many shoreline areas in a round-robin attack

using this provision.

This provision should be eliminated. Alternatively, restoration efforts should be banked to the individual property and in-lieu fees used to compensate for the restoration effort effectively providing an incentive for restoration without concomitant degradation of ecological functions and processes. Such restoration would not be a component of a programmatic no net loss strategy.

C. Mitigation Compliance

1. Unless otherwise specified, mitigation shall take place prior to final project inspection to provide assurance that it will be completed and to mitigate for temporal loss of shoreline functions.

2. Thurston County shall require monitoring reports on an annual basis, or an agreed upon monitoring schedule, for a minimum of five years and up to ten years, or until mitigation success is demonstrated through meeting all final performance standards for at least two consecutive monitoring reports. The mitigation plan shall provide specific criteria for monitoring the mitigation project. Results and additional conditions shall be electronically tagged to the parcel for future reference.

   KT: Specifically, who (agency/department/personnel) does the actual monitoring and which department is responsible for writing the annual/scheduled monitoring reports. Please provide examples of "monitoring reports" from the last 10 years.

3. Mitigation requirements shall run with the parcel, and notice of such requirements shall be recorded as a Notice to Title. Mitigation as conditioned under project approval shall be maintained in perpetuity, except where authorized through review of an alternative mitigation plan.

   KT: Which department/personnel are responsible for review of alternative mitigation plan and authorization of said plan. Please provide County in-house rules related to this.

4. In the event that a subsequent landowner applies for additional permits, the electronic permit database will be queried for past mitigation requirements. If such mitigation is no longer in place or functioning, it shall be reinstalled prior to permit issuance.

   KT: Please provide links to the electronic permit database

5. Mitigation enforcement shall occur under the authority of Chapter 19.500, Permit Provisions, Review and Enforcement, of this Program.

19.400.115 Critical Areas

A Incorporation of Title 24 TCC

The following sections of Title 24 TCC, Critical Areas Ordinance, dated July 24, 2012, are incorporated herein by this reference, and provided in Appendix E for reference purposes only, except as supplemented or modified under Sections 19.400.115(B) - 19.400.115(G):

KT: http://www.co.thurston.wa.us/planning/critical_areas/adopted-ordinance/full-ordinance-unsigned-20120724.pdf. I don't believe the County has provided Appendix E.

1. Standards for Existing Development (24.50), as applicable and consistent with Chapter 19.500 of this Master Program

2. Critical Area Tracts and Delineations (24.65.040)

3. Administrative Procedures (24.05)

4. Critical Area Determinations (24.05.070)

5. Critical Aquifer Recharge Areas (24.10)

6. Geologically Hazardous Areas (24.15)

7. Frequently Flooded Areas (24.20)

8. Fish and Wildlife Habitat Conservation Areas (24.25)

9. Wetlands (24.30)

10. Definitions (24.03), except where conflict exists, then the definitions in this Program shall govern.

B. Frequently Flooded Areas

Encroachments, including new construction, substantial improvements, fill and other development, are prohibited within designated floodways, unless otherwise authorized by Chapter 24.20 TCC. Before any development activities are permitted within the floodplain, compliance with Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) protection standards for critical habitats for listed species shall be demonstrated through submittal of a Habitat Management Plan prepared by a qualified wildlife biologist.

Table 24.20-1 TCC, identifies the land uses and activities that are allowable in frequently flooded areas (i.e., one-hundred-year floodplains, one-hundred-year flood zone (one percent flood zone), floodways, high ground water hazard areas/restricted development zones, channel migration hazard areas, and coastal flood hazard areas) and one-hundred-year channel migration hazard areas. All land uses and activities not allowed by or not mentioned in Table 24.20-1, except water dependent uses allowed under this Program, are prohibited within the flood hazard and channel migration hazard areas regulated by this section, except as otherwise provided in Chapter 24.01 TCC.

Also see Section 19.400.150 (Flood Hazard Reduction Measures) for additional regulations governing uses and modifications in floodways, floodplains, high groundwater areas and one-hundred-year channel migration hazard area zones.

C. Critical Freshwater Habitats

Critical freshwater habitats includes those portions of streams, rivers, wetlands, lakes and their associated channel migration zones and floodplains that provide habitat for priority species at any stage in their life cycles, and provide critical ecosystem-wide processes, as established in WAC 173-26-221(2)(c)(iv) and 24.25.005 TCC. Specific standards follow.

1. Lakes over 20 acres.

   a. Vegetation buffers shall be retained for each shoreline environment designation as specified in Section 19.400.120 (Vegetation Conservation Buffers) below.
   b. Where a lot cannot accommodate required buffers due to size, shape or topography, the Alternatives for New Development [Section 19.400.120(C)(1)] and Alternatives for Existing Development [Section 19.400.120(C)(2)], shall apply.
   c. The specific Shoreline Use and Modification Development Standards of the Program shall apply (Chapter 19.600).

2. Streams and rivers over 20 cubic feet per second (cfs) mean annual flow as determined by the Department of Ecology.

   a. A 250-foot vegetation buffer and an additional 15-foot building setback [Section 19.400.120 (B)(4)] shall be maintained from the OHWM of all Type S and Type F (greater than 20 feet in width) streams (24.25.020 TCC). Additional critical area buffers and setbacks may apply where flood hazard areas, geologically hazardous areas, or wetlands are present (see Chapter 24.15.015 and Tables 24.25-1 and 24.30-1 TCC).
   b. Where a lot cannot accommodate required buffers due to size, shape or topography, the Alternatives for New Development [Section 19.400.120(C)(1)] and Alternatives for Existing Development [Section 19.400.120.(C)(2)], shall apply.
   c. The specific Shoreline Use and Modification Development Standards of the Program shall apply (Chapter 19.600).

3. The subdivision of land shall not be established when it would be reasonably foreseeable that the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway. When evaluating alternate flood control measures or floodplain restoration opportunities, the removal or relocation of structures in flood-prone areas shall be given consideration.

D. Critical Saltwater Habitats

1. Critical saltwater habitats require a higher level of protection due to the important ecological functions they provide. Non-residential docks, bulkheads, bridges, fill, floats, jetties, utility crossings and other human-made structures shall not intrude into or over critical saltwater habitats except in the following circumstances, and only when the applicable use or modification standards are also met (Chapter 19.600).

   KT: "Other human-made structures" should include "structures" (as defined in 2011 by Judge Bjorgen) that are made up of approximately 7 miles of PVC pipe weighing approximately 16 ton per acre, i.e., geoduck industrial aquaculture operations.

a. The public's need for such an action or structure is clearly demonstrated, and the proposal is consistent with protection of the public trust.

KT: The "public" does not "need" industrial shellfish aquaculture" and "public trust" is lost when the County colludes with the industrial aquaculture operators to fill our tidelands with miles/tons of PVC pipe along with dredging methods for harvest and tractors on the tidelands.

b. Avoidance of impacts to critical saltwater habitats by an alternative alignment or location is not feasible or would result in unreasonable and disproportionate cost to accomplish the same general purpose. A cost analysis may be required to assist with the feasibility determination.

c. The project, along with any required mitigation, will result in no net loss of ecological functions associated with critical saltwater habitat.

KT: Is this "no net loss" on a project basis or a program basis? This needs to be specified. We submit the same critique of the faulty "no net loss" policy that we have stated in several places elsewhere.

d. The project is consistent with the State's interest in resource protection and species recovery.

KT: What is the State's definition of "resource protection" and "species recovery." These terms are not defined in Chapter 100.

e. Marine riparian habitat zone shall be maintained as described in Section 24.25.050TCC.

2. When a habitat survey (see Section 19.700.145, Biological and Habitat Surveys) is required pursuant to the applicable use or modification section, the *Thurston County Shoreline Master Program Update Inventory and Characterization* report shall be consulted as a basis for existing conditions, along with appropriate field verification. See the applicable sections for specific measures necessary for minimization and mitigation of impacts to critical saltwater habitats.

3. Critical saltwater habitats include (see Chapter 19.150, Definitions, for more detail):

a. Kelp beds
b. Eelgrass beds
c. Spawning and holding areas for forage fish, such as herring, smelt and sand lance
d. Shellfish beds (subsistence, commercial and recreational)

KT: Shellfish beds should be distinguished as to "natural shellfish beds" and "commercial/industrial shellfish beds." They are not the same thing and it is insupportable to lump them together. Commercial/industrial shellfish beds are not natural, they are not a "critical habitat" and replace critical habitat. Commercial/industrial shellfish beds are changing the nature of the tidelands especially since in different phases of the operations the area is a monoculture, the area contains up to 7 miles/16 tons of PVC plastics (obviously not natural to the habitat) and is dredged at harvest. This "lumping together" to confuse the issue is the type of language being used by the current administration in Washington DC to re-define normal meanings of language. This is the type of thing that that is both insidious and unconscionable and when it is inserted into a document such as this, it is a clear indication that rational thought has been lost.

e. Mudflats
f. Intertidal habitats with vascular plants
g. Areas with which priority species have a primary association

E. Geologically Hazardous Areas

Channel migration zones shall be classified as landslide hazard areas, and may be either high geologic hazard or low geologic hazard depending on the site characteristics outlined in TCC 24.20. Channel migration zone maps can be found in Appendix D of this Program.

F. Wetlands

1. Consistent with WAC 173-22-035 and TCC 24.30.020, wetlands in shoreline jurisdiction shall be delineated using the procedure outlined in the approved federal wetland delineation manual and applicable regional supplements.,

2. A wetland buffer may not be reduced through averaging more than 25 percent of the standard buffer width applied per TCC 24.30.045. Buffer reduction is allowed only when following the steps described in TCC 24.30.050.

3. The County may require an increase in buffer width, as specified in TCC 24.30.055, as necessary to protect wetland area, their functions, and their buffers.

G. Fish and Wildlife Habitat Conservation Areas

1. All typed waters, defined by WAC 222-16-030 with 20 cubic feet per second (cfs) or over 20 cfs mean annual flow, and their buffers are regulated by this Program and other provisions of Chapter 24.25. TCC. All stream types under 20 cfs mean annual flow are regulated under Chapter 24.25 TCC.

2. Important animal and plant species, their habitats of primary association, and other important habitats protected by this Program are included in Chapter 24.25.065 TCC.

19.400.120 Vegetation Conservation Buffers

A General Regulations

1. Vegetation conservation buffers provide a means to conserve, protect and restore shoreline vegetation in order to provide for ecological and habitat functions as well as human health and safety. Buffers shall consist of a non-clearing area established to protect the integrity, functions and values of the affected critical area or shoreline, but may also be modified and reduced to accommodate allowed uses when consistent with the Act and this Program. The standards below provide a flexible approach to maximize both ecological functions and water-dependent uses.

2. Vegetation conservation standards shall not be applied retroactively in a way which requires lawfully existing uses and developments (as of the effective date of this Program), including residential landscaping and gardens, to be removed, except when required as mitigation for new or expanded development.

KT: The exception "when required as mitigation for new or expanded development" requires elaboration. Does this mean that if I build a room on to the back of my house then I no longer have retroactive protection for my existing vegetation and plantings?

3. In order to implement this Program's policies for preservation of native plant communities on marine, river, lake, and wetland shorelines, mitigation sequencing shall be applied during site planning for uses and activities within the shoreline jurisdiction so that the design and location of the structure or development minimizes native vegetation removal. Development or uses that require vegetation clearing shall be designed to avoid the following in the order indicated below, with a. being the most desirable vegetation to retain:

   a. Native trees,
   b. Other native vegetation,
   c. Non-native trees, and
   d. Other non-native vegetation.

B. Buffer Widths

1. Standard Buffer. Each shoreline environment designation shall have a starting, or standard, buffer as measured landward from the OHWM. This buffer shall be adhered to unless otherwise allowed as described in the Reduced Standard Buffer provisions below or other critical area buffers are required. The Standard Buffers for each environment designation are as follows:

		Marine		Freshwater Lakes	
a.	Shoreline Residential:	~~85 feet~~	50 feet	~~75 feet~~	50 feet
b.	Urban Conservancy:	~~250 feet~~	125 feet	~~100feet~~	125 feet
c.	Rural Conservancy:	~~250 feet~~	150 feet	~~125feet~~	150 feet
d.	Natural:	~~250 feet~~	200 feet	~~250feet~~	200 feet

   e. The Standard Buffer for shoreline jurisdictional freshwater streams and rivers is 250 feet.
   f. Buffer widths for all other streams, including Type F streams less than 20 feet wide and Type Np and Ns streams are in Table 24.25-1 TCC.

2. Reduced Standard Buffer. Utilizing the *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B) to achieve no net loss of shoreline ecological functions, the Standard Buffer may be reduced to the Reduced Standard Buffer as specified below. Mitigation options shall be reviewed and approved by the County for applicability to the project site commensurate with project impacts. The *Shoreline Restoration Plan* (Appendix C) shall serve as an initial review source. The Reduced Standard Buffers for each environment designation are as follows:

   a. Shoreline Residential: ~~60 feet marine~~, 50 feet ~~freshwater~~ (no reduction without Type III variance)
   b. Urban Conservancy: ~~100~~ 90 feet; 75 feet where a net gain in shoreline ecological functions can be achieved. Applications for reductions below 90 feet shall include information documenting: a) mitigation necessary to achieve no net loss of shoreline ecological functions for the reduced 90-foot buffer; b) additional mitigation necessary to achieve no net loss for any reduction below 75 feet; and c) additional actions proposed to achieve a net gain in shoreline ecological functions. Proposed restoration activities shall not include projects previously identified for public funding, except that public-private partnerships may be utilized. A minimum five-year monitoring plan shall be required to

demonstrate project success, in accordance with Section 19.400.110(C), Mitigation Compliance.

c. Rural Conservancy: ~~150 feet marine, 100 feet freshwater~~ 110 feet
KT: The term "Net Gain" is not defined in Chapter 100

d. Natural: ~~200~~ 150 feet

e. Shoreline jurisdictional freshwater streams and rivers: buffers may be reduced pursuant to the standards in Section 19.400.120(C) below.

3. Additional Standards for Applying the Reduced Standard Buffer, in a through e above, within the Rural Conservancy and Natural designations and shorelines of statewide significance. Buffers may be reduced for single-family residences and water-oriented uses in the Rural Conservancy designation, Natural designation, and shorelines of statewide significance only under the following circumstances with appropriate mitigation:

a. The lot is physically constrained by slopes, wetlands or other natural features such that the Standard Buffer cannot be met; or

b. The lot is legally constrained by its size or shape, such that it would not support a home and garage with a footprint of at least 1,200 square feet if placed at or above the Standard Buffer.

4. An additional 15-foot building setback shall be maintained beyond the outer boundary of the buffer. This building setback may be reduced provided that the resulting setback is protective of existing vegetation within the buffer. The building setback is to protect the buffer during construction and is no longer required after construction is completed.

5. Buffer widths may be increased in situations where steep slopes, the presence of important habitat or species, landslide hazard areas, marine bluffs, areas of inadequate vegetation to protect water quality, or other hazards are identified during project review.

C. Constrained Lot and Infill Provisions

1. Alternatives for New Development. New single-family and water-dependent development may qualify for an alternative buffer if the following apply:

a. Infill Provision. For new construction on a vacant parcel adjoined by existing homes on both sides, the Reduced Standard Buffer may be administratively reduced by up to 10% in compliance with Section 19.400.135 (View Blockage). This shall be a Type I administrative review process. The *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B) shall apply to such reductions.

b. Constrained Lot Provisions.

i. Legally platted lots with a depth that would not allow for compliance with the Reduced Standard Buffer. Proposals to reduce the buffer below the Reduced Standard Buffer shall require a Shoreline Mitigation Plan (Section 19.700.140), starting with review of existing conditions as presented in the *Thurston County Shoreline Master Program Update Inventory and Characterization* report and supplemented with appropriate field verification.

ii. If the development requires less than a 25% reduction of the Reduced Standard Buffer, or any amount of buffer reduction within the Shoreline Residential designation, a Type II Administrative Variance shall be required. If the development is not within the Shoreline Residential designation and requires

greater than a 25% reduction of the Reduced Standard Buffer, a Type III Variance shall be required.

c. Water-dependent development. Buffers may be modified and reduced to accommodate water-dependent uses when consistent with the Act and this Master Program, and when conducted so that no net loss of critical areas or shoreline ecological functions occurs. Any loss of critical areas or shoreline ecological functions will require mitigation pursuant to the *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B)

2. Alternatives for Existing Development.

a. Expansion of development outside of the Standard Buffer width. Expansion of existing development landward, outside the Standard Buffer shall be permitted, provided all other applicable provisions are met.

b. Expansion of development within the Standard Buffer width. Structures in existence on the effective date of this Program that do not meet the setback or buffer requirements of this Program may be remodeled or reconstructed provided that the new construction or related activity does not exceed the standard height limit of 35 feet, remains in the existing footprint and does not further intrude into the Standard Buffer.

c. Expansion of development below the Standard Buffer width. Expansion of existing development below the Standard Buffer shall not occur further waterward of the existing structure. Any expansion below the Standard Buffer shall require a Shoreline Mitigation Plan (see Section 19.700.140). Expansion within the Standard Buffer shall require a Type II Administrative Variance. Expansion within the Reduced Standard Buffer shall require a Type III Variance.

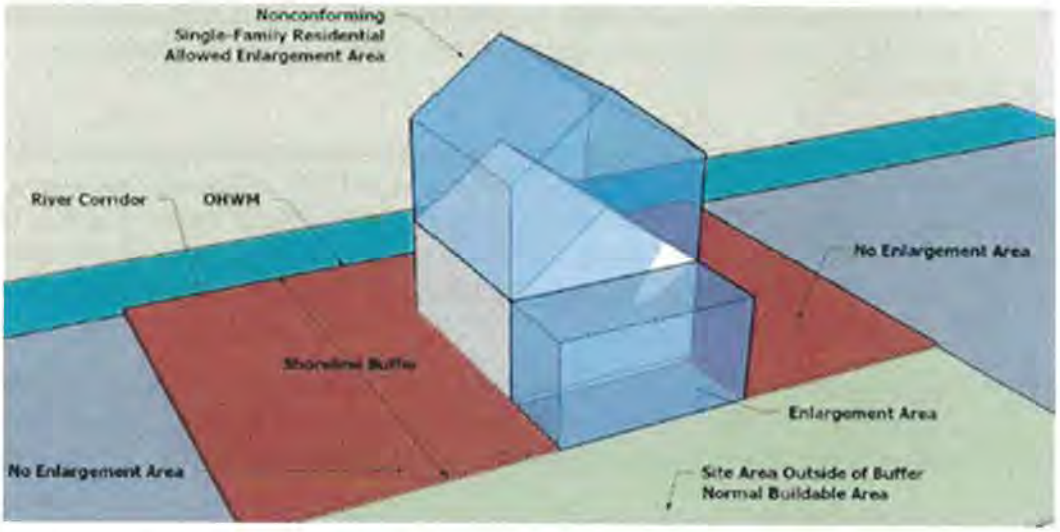


Figure 19.400.120 (C)(1) Allowed Expansion of Nonconforming Structures.

D. Other Uses and Modifications in Buffers

1. In order to accommodate water-enjoyment uses and development within the buffer, the following standards shall apply:

a. Trails. Trails shall be limited to four feet in width, except where demonstrated necessary for a water-dependent use. Disturbance to soil, hydrological character, trees, shrubs, snags and important wildlife habitat shall be minimized. Pervious surfaces shall be utilized except where determined infeasible. Refer to Chapters 24.25.267 & 24.25.270 TCC for specifics on trail location, design, construction, and maintenance.

i. Trails should be kept outside of all critical area buffers. If allowed, trails should only be located in the outer 25% of the buffer and follow mitigation sequencing in accordance with Section 19.400.110(A).

ii. Trails that meet the definition of water-oriented use may be located within shoreline buffers when it can be demonstrated that buffer impacts are limited through mitigation sequencing in accordance with Section 19.400.110(A). Compensatory mitigation for unavoidable impacts will be required.

b. Decks and Viewing Platforms. Decks and viewing platforms may be permitted, but shall be limited to one hundred square feet in size, unless demonstrated that a larger structure will not result in a net loss of shoreline ecological function through submittal of a Shoreline Mitigation Plan (Section 19.700.140). The structure shall be no closer than 25 feet from the ordinary high water mark (OHMW). Viewing platforms shall not have roofs, except where otherwise permitted through the view blockage standards (Section 19.400.135) and be no higher than 3 feet above grade. Creosote and pentachlorophenol should not be utilized in construction materials for decks, viewing platforms or boardwalks.

c. Beach Stairs. Beach stairs are permitted, subject to the exemption provisions in Section 19.500.100(C)(3). Beach stairs placed below the OHWM will normally require a shoreline permit from Thurston County, and Hydraulic Project Approval (HPA) from WDFW. Beach stairs with stair towers shall require an SDP where exemption provisions are not met. A joint-use beach stair structure used by more than one property owner is encouraged.

d. Boat Launches and Railways. Boat launches and marine railways, when consistent with requirements in Section 19.600.160(C)(6) of this program, may be permitted, provided all applicable provisions are met to avoid net loss of shoreline functions.

e. Water-Oriented Storage Structure. One water-oriented storage structure to house boats and related equipment may be allowed within the buffer provided:

i. The structure is no closer than 25 feet from ordinary high water mark as determined by the Department;

ii. Mitigation will be required for buffer impacts due to placement of the storage structure within the buffer area;

iii. The structure's width shall be no greater than 25 feet or 25% of the lot width, whichever is less;

iv. Side yard setbacks shall be 10 feet for docks and storage structure.
v. The highest point of the structure shall not be greater than 12 feet above grade, and shall also comply with the View Blockage provisions of this program;
vi. The overall size shall not exceed 200 square feet.
vii. Allowance of a storage structure within a buffer shall not justify the need for shoreline armoring to protect the structure.
viii. Storage structures shall be prohibited in the Natural environment.

f. In no case shall non-water-oriented uses and activities be allowed below the Standard Buffer width. This includes swimming pools, sport courts, or fields.

2. Hand removal or spot-spraying of invasive or noxious weeds is permitted within Vegetation Conservation Buffers.

KT: "Spot spraying" is not defined as to allowable substances. Are we talking about "vinegar" or about "Round-up" or about "Imidacloprid", etc? This item requires much more specificity.

3. Standards for View Thinning

a. View thinning activities shall be limited to 30% of the total buffer length in the Shoreline Residential designation, and shall retain a minimum of 50% of the live crown;
b. View thinning activities shall be limited to 25% of the total buffer length in the Urban Conservancy and Rural Conservancy designations, and shall retain a minimum of 50% of the live crown;
c. No tree removal is allowed in the Natural designation for view enhancement; however, limited tree limbing may be allowed upon review and approval by the Department.
d. View thinning within the limited areas specified above shall generally be limited to tree limbing (see below, Figure 19.400.120(D)(1)). Where tree removal is demonstrated to be necessary, replanting of native trees shall occur at a 3:1 ratio (planted: removed) within the buffer area. Monitoring and maintenance of the plantings may be required by the Department.
e. Topping of trees is prohibited, except where demonstrated necessary for safety.
f. See the Forest Practices/Timber Harvest standards (Section 19.600.145) for hazard tree removal requirements.
g. An advance site visit may be required by the Department of ~~Resource Stewardship~~ Community Planning and Economic Development in order to confirm the proposed thinning is consistent with this section and critical area protection standards. Site visit request applications may be obtained on-line or in person at Thurston County's permit assistance center. The County may also utilize site photographs in lieu of a site visit where sufficient detail is available to make a determination on consistency with thinning standards.

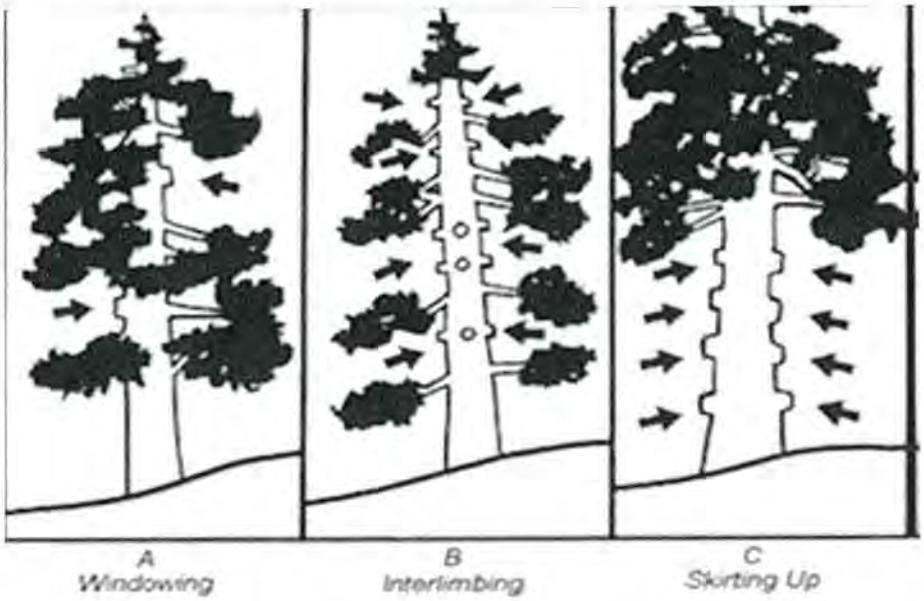


Figure 19.400.120 (D)(1) Alternative Pruning Techniques: Conifers

19.400.125 Water Quality and Quantity

New development shall provide stormwater management facilities designed, constructed and maintained in accordance with the current stormwater management standards, including but not limited to the following:

a. Chapter 2 of Volume I of the Thurston County Drainage Design and Erosion Control Manual (DDECM, dated December 31, 2016, or as amended) to determine which of the 11 Core Requirements apply to projects,

b. Chapter 3 of Volume I to determine what submittals will be required, what submittals shall contain and what site investigations, studies, and mapping will be required,

c. Chapter 4 of Volume I to determine what Best Management Practices (BMP's) should be applied to meet the requirements for on-site low impact development (LID) measures, flow control, and runoff treatment,

d. Guidance material in Volume II of the DDECM to prepare a Construction Stormwater Pollution Prevention Plan (Temporary Erosion and Sediment Control Plan) for the proposed project,

e. Information in Volume III that provides guidance on hydrologic modeling, conveyance system design, and establishing design infiltration rates for infiltration ponds,

f. And Volume V of the DDECM to site and design appropriate BMP's, paying particular attention to minimum required setbacks.

19.400.130 Historic, Archeological, Cultural, Scientific and Educational Resources (HASCE)

A. Applicability and Other Regulations

1. This section applies to archaeological and historic resources either recorded by the Department of Archaeology and Historic Preservation (DAHP), Thurston County Historic Commission (per Section 2.106.010 TCC), local jurisdictions or applicable tribal data bases or predictive models.

2. HASCE sites shall comply with the Governor's Executive Order 05-05, Section 2.106 TCC (Historic Commission), Chapter 25-48 WAC (Archaeological Excavation and Removal Permit), Chapter 27.44 RCW (Indian graves and records), and Chapter 27.53 RCW (Archaeological sites and resources).

B. Known or Potential HASCE Sites

1. Tribal Historic Preservation Officers (THPOs) for tribes with jurisdiction will be provided the opportunity to review and comment on all development proposals in the Thurston County shoreline jurisdiction, both terrestrial and aquatic, in order to ensure all known or potential archaeological sites, Traditional Cultural Properties and Traditional Cultural Landscapes are acknowledged, properly surveyed and adequately protected.

2. If archaeological resources are known in advance, developers and property owners must notify Thurston County, the Department of Archaeology and Historic Preservation, and applicable tribes.

3. Sites with known or potential archaeological resources, as determined pursuant to the resources listed at the beginning of this section, shall require a site inspection by a professional archaeologist in coordination with the affected tribe(s). The THPO shall be provided the opportunity to evaluate and comment on cultural resources evaluations conducted by the professional archaeologist.

4. Work on sites with identified archaeological resources shall not start until authorized by the Department of Archaeology and Historic Preservation through an Archaeological Excavation and Removal Permit, which may condition development permits.

C. Discovered HASCE sites

1. If archaeological resources are uncovered during excavation, developers and property owners must immediately stop work and notify Thurston County, the Office of Archaeology and Historic Preservation and affected Indian tribes.

2. Uncovered sites shall require a site inspection by a professional archaeologist in coordination with the affected tribe(s). Tribal Historic Preservation Officers shall be provided the opportunity to evaluate and comment on cultural resources evaluations conducted by the professional archaeologist.

3. Work shall not re-commence until authorized by the Office of Archaeology and Historic Preservation through an Archaeological Excavation and Removal Permit, which may condition development permits.

19.400.135 View Blockage

A. In order to protect water views, all principal buildings shall be so located as to maintain the minimum shoreline structure setback line. The shoreline structure setback line shall be determined as follows. Variances for reduced buffers may be needed along with mitigation per Section 19.400.120:

1. No Adjacent Principal Buildings. Where there are no adjacent principal buildings, the shoreline structure setback line shall be the buffer and setback specified elsewhere in this Program. See Figure 19.400.135(A)(1).

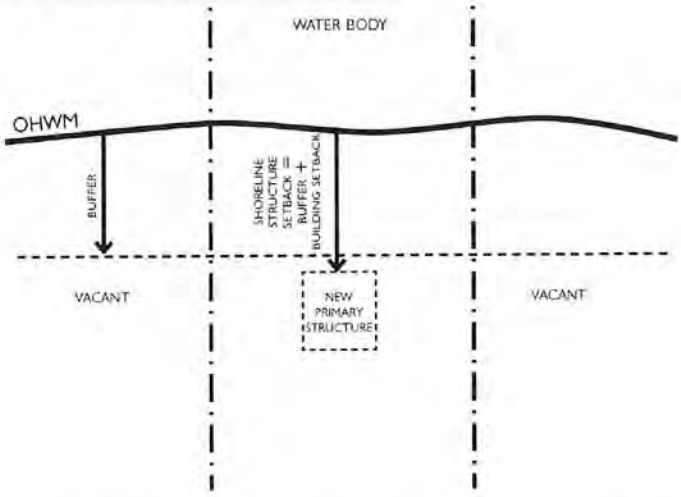


Figure 19.400.135 (A)(1) Buffer and shoreline structure setback with no adjacent primary structure. *(Note that in all figures the "square" includes all patios, decks, etc. – see principle building definition in Chapter 100)*

2. Adjacent Principal Building on One Side. Where there is an adjacent principal building on one side, the shoreline structure setback line shall be a distance no less than that of the adjacent principal building to the shoreline or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figures 19.400.135(A)(2)(a) and 19.400.135.(A)(2)(b).

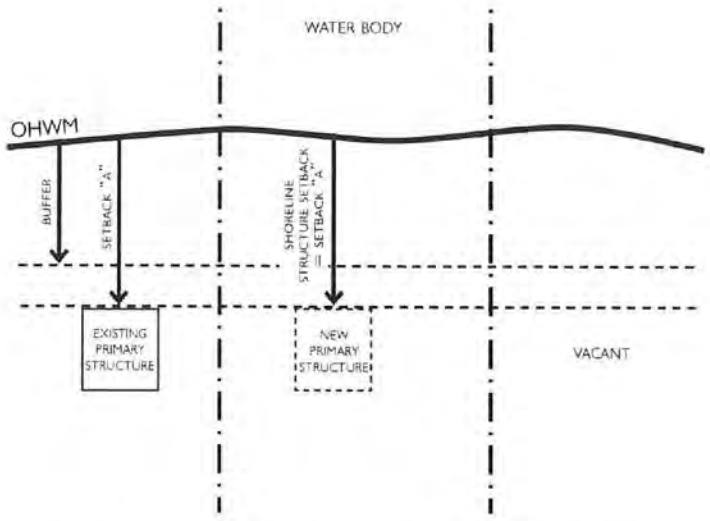


Figure 19.400.135(A)(2)(a) Buffer and shoreline structure setback with adjacent primary structure landward of buffer on one side.

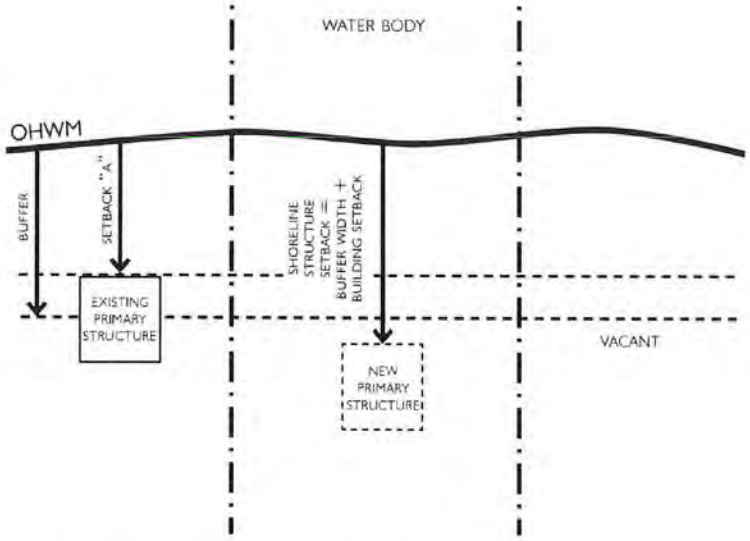


Figure 19.400.135(A)(2)(b) Buffer and shoreline structure setback with adjacent non-conforming primary structure within buffer on one side.

3. Adjacent Principal Buildings on Both Sides on a Regular Shoreline. Where there are adjacent principal buildings on both sides of the proposed structure on a regular shoreline, the shoreline structure setback line shall be determined by a line drawn

between the building line of the adjacent principal buildings or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figure 19.400.135(A)(3).

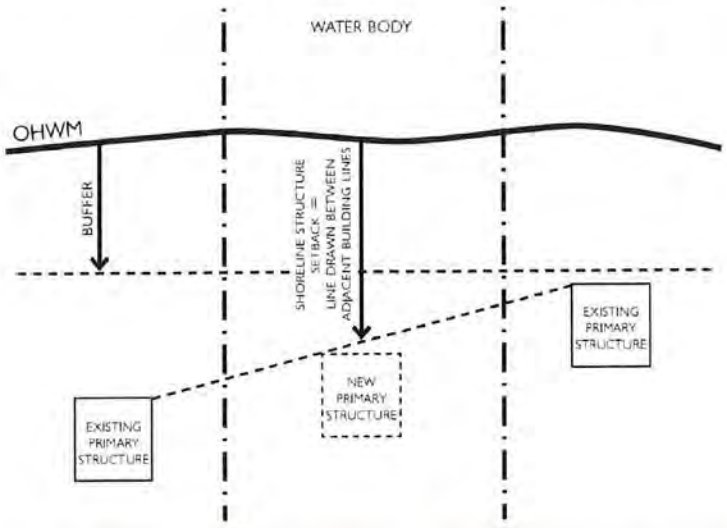


Figure 19.400.135(A)(3) Buffer and shoreline structure setback on a regular shoreline with adjacent primary structures on both sides.

KT: This diagram doesn't make sense. If the structure is outside of the buffer, why would it have to be moved back to conform to another structure?

4. Adjacent Principal Buildings on Both Sides on an Irregular Shoreline. Where there are two adjacent principal structures on a shoreline which forms a cove or peninsula, the shoreline structure setback line shall be determined by averaging the setback lines of the two adjacent principal buildings or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figure 19.400.135(A)(4).

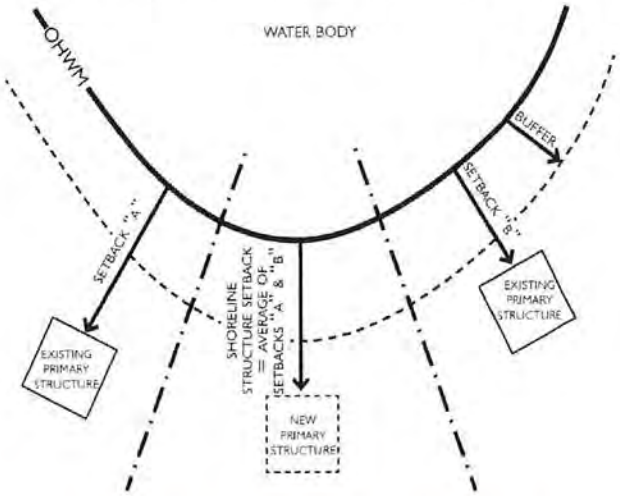


Figure 19.400.135(A)(4) Buffer and shoreline structure setback on an irregular shoreline with adjacent primary structures on both sides.

5. Consideration of existing mitigating circumstances. The shoreline structure setback line may be administratively waived where an elevation survey demonstrates that due to a difference in topography or a vegetation survey demonstrates that due to the presence of significant view blocking vegetation on or adjacent to the common border of the two parcels, the proposed principle building will not result in any view blockage to adjacent principle buildings. In such cases, the buffer and setback specified elsewhere in this Program shall apply.

B. Accessory structures. Accessory structures as defined for the purposes of view blockage may be sited within the shoreline structure setback area provided that they do not substantially obstruct the view of adjacent principal buildings and comply with applicable buffer provisions.

C. Appeal procedure. Determinations of shoreline structure setback lines are classified as Type I decisions under Title 20.TCC and may be subject to appeal as provided therein.

D. Variance (administrative) procedure.

1. An applicant aggrieved by the strict application of this chapter may seek a conditional waiver from the director. Such a waiver shall be a Type II administrative decision. A conditional waiver may be granted after the applicant demonstrates the following:

   a. The hardship which serves as the basis for granting the conditional waiver is specifically related to the property of the applicant and does not apply generally to other property in the vicinity;
   b. The hardship which serves as the basis for granting the conditional waiver is specifically related to the property of the applicant and does not apply generally to other property in the vicinity;
   c. The hardship which results from the application of the requirements of this chapter is not a result of the applicant's own actions;
   d. The conditional waiver, if granted, will be in harmony with the general purpose and intent of the Act and this Program in preserving the views of the adjacent shoreline residences; and
   e. In balancing the interest of the applicant with adjacent neighbors, if more harm will be done by granting the conditional waiver than would be done by denying it, the conditional waiver shall be denied.

2. The applicant seeking a conditional waiver of the strict application of this chapter may file an application with the Department accompanied by an application fee per the Thurston County Land Use Fee Schedule.

19.400.140 Bulk and Dimension Standards

A. The standards in Table 19.400.140 (A) below shall apply to all shoreline use and development activities except where specifically modified in this Master Program.

Table 19.400.140(A) Development Standards

Standard	Mining	Shoreline Residential	Urban Conservancy	Rural Conservancy	Natural	Aquatic
Lot Width (feet)	40-60 [1]	40-80 [2]	60	100	140	Not Applicable
Shoreline Buffers	See Section 19.400.120(B) of this Master Program					
Side Setbacks (feet)	5	5[3]	5[3]	5[3]	5[3]	5[3]
Maximum Hard Surface Area (percentage of lot area)	[4]	[4]	[4]	[4]	[4]	Not Applicable
Maximum Building Height (feet)[5]	35	35	35	35	35	35

Notes:

1. 40-foot lot width for single-family residential uses. 60-foot lot width for multifamily and non-residential uses.
2. 40-foot lot width for lots in Limited Areas of Intensive Rural Development or Urban Growth Areas. 80-foot lot width for all other Shoreline Residential lots.
3. Buildings housing animals, a minimum 35 foot side yard and 35 foot rear yard setback shall apply in accordance with TCC 20.07
4. Hard Surface thresholds for Shoreline Environmental Designations: See Section 19.400.125
5. Does not include boathouses as described above in Section 19.400.100(B)(4)

B. The maximum allowable height of structures in shoreline jurisdiction is 35 feet above finished average grade. Building heights above 35 feet, but consistent with underlying zoning allowances, require authorization via a Shoreline Variance pursuant to Section 19.500.100(E) of this Master Program.

C. No new lots shall be created that are non-conforming. All new subdivided shoreline lots shall be, at a minimum, a 1:2 width to depth ratio. Exceptions may be granted in cases where such ratio would negatively impact critical areas or their buffers.

19.400.145 Public Access

A. All recreational and public access facilities shall be designed, located and operated in a manner consistent with the purpose of the environment designation in which they are located.

B. Except as provided in Regulations E and F below, substantial developments or conditional uses shall provide public access where any of the following conditions are present:

1. A development or use will create increased demand for public access to the shoreline.
2. A development or use will interfere with an existing public access way.
3. New non-water-oriented uses are proposed.
4. A use or activity will interfere with public use of lands or waters subject to the Public Trust Doctrine.

C. Shoreline development by public entities, port districts, state agencies, and public utility districts shall include public access measures as part of each shoreline development project, unless such access is shown to be incompatible due to reasons of safety, security, or impact to the shoreline environment.

D. Ensure that publicly financed or subsidized shoreline erosion control measures do not restrict appropriate public access to the shoreline except where such access is determined to be infeasible because of incompatible uses, safety, security, or harm to ecological functions. See public access provisions of WAC 173-26-221 (4). Where feasible, incorporate ecological restoration and public access improvements into the project.

E. Off-site public access may be allowed where it results in an equal or greater public benefit than on-site public access, or when on-site limitations relating to security, environment, use conflict, intervening improvements, or feasibility are present. Sites on the same waterbody, or secondarily within the same watershed, are preferred. Where feasible, off-site public access should include both visual and physical elements. Off-site public access may include, but is not limited to, enhancing an adjacent public property (e.g., existing public or recreation access site, road, street, or alley abutting a body of water, or similar) in accordance with County standards; providing, improving or enhancing public access on another property under the control of the applicant/proponent; or another equivalent measure.

F. Public access shall not be required for single-family residential development of four (4) or fewer lots.

G. Public access shall not be required if an applicant/proponent demonstrates to the satisfaction of the County that one or more of the following conditions apply:

1. Unavoidable health or safety hazards to the public exist and cannot be prevented by any practical means;
2. Constitutional or other legal limitations apply;
3. Inherent security requirements of the use cannot be satisfied through the application of alternative design features or other solutions;
4. The cost of providing the access, easement or alternative amenity is unreasonably disproportionate to the total long-term cost of the proposed development;
5. Adverse environmental impacts to shoreline ecological processes and functions that cannot be mitigated will result from the public access;
6. Significant undue and unavoidable conflict between any access provisions and the proposed use and/or adjacent uses would occur and cannot be mitigated; or
7. Adequate public access already exists within a mile along the subject shoreline, and there are no gaps or enhancements required to be addressed by the individual shoreline development.

H. When provisions for public access are required as a condition of project approval, the Director shall prepare written findings demonstrating consistency with constitutional and legal practices regarding private property and the principles of nexus and proportionality.

I. Required public access sites shall be fully developed and available for public use at the time of occupancy of the shoreline development.

J. Public access provisions shall run with the land and be recorded via a legal instrument such as an easement, or as a dedication on the face of a plat or short plat. Such legal instruments shall be recorded with the County Auditor's Office prior to the time of building permit approval, occupancy or plat approval, whichever comes first (RCW 58.17.110). Future actions by the applicant's successors in interest or other parties shall not diminish the usefulness or value of required public access areas and associated improvements.

K. Maintenance of the public access facility over the life of the use or development shall be the responsibility of the owner unless otherwise accepted by a public or non-profit agency through a formal agreement recorded with the County Auditor's Office.

L. The removal of on-site native vegetation shall be limited to the minimum necessary for the recreational or public access development area, such as picnic areas, campsites, selected views, or other permitted structures or facilities.

M. Preference shall be given to activities that are consistent with approved state and local park plans for water-oriented recreational development, including but not limited to the Thurston County Comprehensive Plan, Thurston County Parks Plan, Washington State Parks CAMP plans, Thurston County Non-Motorized Plan, and other agency plans.

N. Vehicular traffic is prohibited on beaches, bars, spits and streambeds, except for permitted construction and boat launching, or in areas where it can be demonstrated that a historical use has been established.

O. Public road-ends, tax-title lands and right-of-ways adjacent to shorelines of the state shall be preserved, maintained and enhanced consistent with RCW 36.87.130. The Thurston County "Right of Way Use Permit" process in TCC) shall be utilized to open shoreline road-ends, as now or hereafter amended. Such process shall include notification of abutting property owners, and may include a neighborhood meeting or community council outreach effort in order to solicit and resolve community concerns with regard to specific proposals. The public interest in shoreline access shall be given appropriate consideration during the review process, consistent with the Act. Decisions to approve or deny opening of road-ends may be appealed in accordance with Chapter 13.80 TCC.

P. Trail access shall be provided to link upland facilities to the beach area where feasible and where impacts to ecological functions can be adequately mitigated.

Q. When applicable, recreational and public access development shall make adequate provisions for the following. These requirements may be waived for opening of public road ends, tax title lands, and right-of-ways as described in N above, except where determined necessary through the public review process:

1. Vehicular parking and pedestrian access;
2. Proper wastewater and solid waste disposal methods;
3. Security and fire protection;
4. The prevention of overflow and trespass onto adjacent properties, including, but not limited to, landscaping, fencing, and posting of property; and
5. Screening of such development from adjacent private property to prevent noise and light impacts.
6. Compliance with the Americans with Disabilities Act (ADA), including being barrier-free and accessible for physically disabled uses where feasible.

R. Shoreline trails and pathways shall be located, designed, and constructed to avoid and minimize bank instability.

S. Project-specific public access standards are contained in the following Shoreline Use and Modification Development Standards sections (Chapter 19.600):

1. Barrier Structures and other In-Stream Structures (Section 19.600.120)
2. Boating Facilities (Section 19.600.125)
3. Commercial Development (Section 19.600.130)
4. Fill (Section 19.600.140)

5. Industrial Development (Section 19.600.150)
6. Residential Development (Section 19.600.170)
7. Shoreline Stabilization (Section 19.600.175)

19.400.150 Flood Hazard Reduction Measures

A. Environment Designations Permit Requirements

CUP is required for installation of flood hazard reduction measures in all environment designations.

B. Development Standards

1. Development in floodplains shall not significantly or cumulatively increase flood hazard and shall follow the criteria in Chapter 14.38 TCC.

2. New structural flood hazard reduction measures in shoreline jurisdiction are allowed only when a scientific and engineering analysis documents all of the following:

    a. They are necessary to protect existing development;
    b. Nonstructural measures are not feasible;
    c. Impacts on ecological functions and priority species and habitats can be successfully mitigated so as to assure no net loss; and
    d. Appropriate vegetation conservation actions are followed.

3. The following uses and activities may be appropriate and/or necessary within the channel migration zone (see Appendix D, Channel Migration Zone Maps) or floodway, provided that they provide appropriate protection of ecological functions and do not exacerbate flood risk onsite or in nearby areas:

    a. Actions that protect or restore the ecosystem-wide processes or ecological functions.
    b. Forest practices in compliance with the Washington State Forest Practices Act and its implementing rules.
    c. Existing and ongoing agricultural practices, provided that no new restrictions to channel movement occur.
    d. Mining when conducted in a manner consistent with WAC 173-26-241(3)(h) and this Program.
    e. Bridges, utility lines, and other public utility and transportation structures where no other feasible alternative exists or the alternative would result in unreasonable and disproportionate cost. Where such structures are allowed, mitigation shall address impacted functions and processes in the affected section of watershed or drift cell.
    f. Repair and maintenance of an existing legal use.
    g. Modifications or additions to an existing legal use, provided that channel migration is not further limited.
    h. Development in designated UGAs where existing structures prevent active channel movement and flooding.
    i. Measures to reduce shoreline erosion, provided that it is demonstrated that the erosion rate exceeds that which would normally occur in a natural condition, that the measure does not interfere with fluvial hydrological and geomorphological processes normally

acting in natural conditions, and that the measure includes appropriate mitigation of impacts to ecological functions associated with the river or stream.

j. Development with the primary purpose of protecting or restoring ecological functions and ecosystem-wide processes.

Applicants for shoreline development or modification may submit a site-specific channel migration zone study if they do not agree with the mapping in Appendix D.

4. Structural flood hazard reduction measures shall be consistent with the County's adopted Hazard Mitigation Plan that evaluates cumulative impacts to the watershed system.

5. New structural flood hazard reduction measures shall be situated landward of associated wetlands and designated vegetation conservation areas, unless actions are intended to increase ecological functions or if it is determined through a geotechnical analysis that no other alternative to reduce flood hazard to existing development is feasible. Mitigation may be required for impacts to critical areas.

6. New structural flood hazard reduction measures on public lands or funded by the public shall provide or improve public access pathways unless such improvements would cause unavoidable health or safety hazards, significant ecological impacts, unavoidable conflict with the proposed use, or a cost that is disproportionate and unreasonable to the total long-term cost of the development.

7. The removal of gravel for flood management purposes may be permitted only if a biological and geomorphological study shows that extraction:

   a. Has a long-term benefit to flood hazard reduction,
   b. Results in not net loss of ecological functions, and
   c. Is part of a comprehensive flood management solution.

19.400.155 Restoration and Enhancement

A. Environment Designations Permit Requirements

Restoration and enhancement uses and developments are permitted as an SDP, or may be exempt from an SDP if criteria in Section 19.500.100(C) are met, for all environment designations, provided the project's primary purpose is the restoration of the natural character and ecological functions of the shoreline, as determined by the Department.

B. Development Standards

1. Restoration and enhancement shall be carried out in accordance with an approved shoreline restoration plan that uses the best available scientific and technical information, and implemented using best management practices (BMPs).

2. All shoreline restoration and enhancement projects shall protect the integrity of adjacent natural resources, including aquatic habitats and water quality, and shall not result in significant adverse changes to sediment transport, ecological processes, properties, or habitat.

3. Long-term maintenance and monitoring shall be arranged by the project applicant and included in restoration or enhancement proposals. Monitoring shall occur for a minimum of five years,

except the term may be reduced if all final performance standards have been met for at least two consecutive monitoring reports, demonstrating project success.

4. Shoreline restoration and enhancement shall not significantly interfere with the normal public use of the navigable waters of the state or tribal resources without appropriate mitigation. For projects on state-owned aquatic lands, prior to the solicitation of permits from regulatory agencies, project proponents must coordinate with the Washington Department of Natural Resources to ensure the project will be appropriately located. Affected tribes shall also be notified.

5 Applicants in the County's UGAs seeking to perform restoration projects that may shift the OHWM landward of the pre-project location, are advised to work with the County to assess whether and how the non-restoration-related elements of the project may be allowed relief under RCW 90.58.580.

6/5/19 written comments received during public communicat

Planning Commissioners

You are invited

What is a Geoduck farm really like? Come and see one!

Patrick and Kathryn will provide you with an opportunity to see a newly planted geoduck operation with all of the PVC plastic, netting, and rebar that is involved. You will be able to see firsthand the impact on Zangle Cove, a Chinook salmon migration area. Family members are welcome. Refreshments will be served.

When

Saturday June 8th starting at 3:15pm. We plan to be on the beach for low tide.

Where

Patrick and Kathryn's house at 7700 Earling Street NE in Boston Harbor. This is the green house at the corner of 77th Avenue NE and Earling Street NE.

What to wear

For those who would like we will walk down to the beach (very short path) and across the cove to an area adjacent to the geoduck operation. It is sandy/muddy on the beach so wear boots or sandals that you don't mind getting muddy and wet. We usually go barefoot once we get down on the sand. We will get to cross the shallow stream which has interesting critters darting about. The path down to the beach is clear, but you will need foot protection as we walk down the path to the tidelands and on the return. Be aware of the weather. It may be cool or even rainy. We can wash the mud off outside at the house.

RSVP

Call or email to let us know that you are coming. Phone is 360.357.9082. Or email patrick.townsend@townsendsecurity.com

Chapter 19.400 General Regulations

19.400.100 Existing Development

When discussing lawfully established, existing development the term nonconforming is often used to describe a use or structure that was in compliance with codes at the time it was developed (or was developed before adoption of an applicable code) but no longer meets code requirements because of code updates. Nonconforming is not the same as illegal and is essentially "grandfathered" in relation to this Program. However, the term nonconforming is widely used in Thurston County Code and to maintain consistency "nonconforming" is the term used in this Program. Allowances to maintain nonconforming structures and uses are included in this Program and are described below.

KT: Non-conforming, as a term, has a negative connotation. It will be much more likely to be abused though misunderstanding on the part of Thurston County Staff than the term "grandfathered." If "non-conforming" means "grandfathered," then the term "grandfathered" should be used in order to retain a clear and unequivocal meaning. Residential structures which have been "conforming" to this date, should be "grandfathered." Just because a term, such as "non-confirming," is widely used, doesn't guarantee that it is widely understood. In fact, based on the above description that it means ""essentially "grandfathered" in relation to this Program", you have made the meaning complicated and subject to confusion. If you must put the work "essentially" in front of the phrase, then it is not unequivocal. It is questionable. Why not just be clear and straightforward and use the term "grandfatherered?"

A. Existing Uses

1. Lawfully established uses occurring as of the effective date of this Program, which do not meet the standards of this Program, shall be considered nonconforming to this Program,

PT: This is a massive impact on shoreline homeowners. According to comments at the Planning Commission by a real estate professional, this will require disclosure on all property transactions. There must be a way of grandfathering current conforming lawfully established uses.

PT: This is extremely harsh to existing homeowners who have met all current laws related to uses. According to real estate professionals it will be necessary to disclosing the non-conforming status of a property in a sale transaction. If a property is legally conforming prior to the adoption of this Program, it should continue in that status after adoption. The ECY SMP handbook has examples of "grandfather" clauses.

PT: Whatever conforming status is assigned to shore lands should be applied to development in tidelands.

KT: It does appear to be legally presumptuous to define uses that have been legally conforming and with the flick of a pen, make them "non-conforming", however that term is interpreted by the current staff at Thurston County.

KT: Non-conforming language should not be applied to residential structures. Residential structures, which have been "conforming" to this date, should be "grandfathered."

2. All lawfully established uses, both conforming and nonconforming, may continue and may be, maintained, expanded, or modified consistent with the Act and this Program.

3. Any change in use shall conform to the standards of this Program and may require a Conditional Use Permit (CUP) in accordance with the findings in Section 19.500.100(D). A CUP may be granted only if no reasonable alternative use meeting the standards is practical, and the proposed use will be at least as consistent with the policies and provisions of this Program, the Act, and the uses in the area as the pre-existing use. Conditions may be imposed that are necessary to assure compliance with the above findings and with the requirements of this Program and the Act, to assure that the use will not become a nuisance or a hazard, and to assure that the use will not result in a net loss of the ecological function of the shoreline.

4. If a use is discontinued for twelve consecutive months or for twelve months during any two-year period, any subsequent use, if allowed, shall comply with the Act and this Program.

PT: Why is this necessary? There are many cases where a house is vacant for a much longer period of time, or a planned land use takes a longer period to develop. This requirement would cast a large number of properties into a different use status. This point should be deleted.

KT: On almost all shorelines, other than ports and parks, residential dwellings at this point are considered legally conforming. This sudden "conforming" to "non-conforming" definition places a burden on these property owners in terms of updating their homes, home additions, re-models, rebuilding after fire or other natural disaster. If these strictures are placed on upland shoreline property owners, strictures should also be placed on tideland property owners. Aquaculture installations can readily be considered a nuisance and a hazard to recreational water users.

B. Existing Structures

1. Lawfully constructed structures

   a. Legally established structures occurring as of the effective date of this Program, which do not meet the standards of this Program, shall be considered nonconforming to this Program, to include appurtenances as defined in 19.100.150.

   b. All legally established structures may continue and may be, remodeled, repaired or maintained in accordance with the Act, this Program, and Chapter 24.50 TCC.

   c. For structures located partially within the shoreline buffer or setback, alterations shall be limited to the addition of height up to 35 feet above finished grade and landward expansion into areas outside the shoreline setback.

   d. For structures located entirely within the shoreline buffer or setbacks, alterations shall be allowed for the addition of height up to 35 feet above finished grade or landward expansion, up to 500 square feet (1,000 square feet total if adding second floor up to 35 feet high), on the upland side of the structure, or both.

e. Interior and exterior remodels and the addition of upper stories are permitted. Except as provided above, such additions shall not extend beyond the existing or approved building footprint.

f. Any expansion of nonconforming structures that further encroach on the buffer or setback towards the Ordinary High Water Mark or expansion on either side of the existing structure shall require a shoreline variance.

~~e~~g. In the event that a legally existing structure is damaged or destroyed by fire, explosion or other casualty, it may be reconstructed to configurations existing immediately prior to the time the structure was damaged or destroyed, provided the application is made for the necessary permits within twenty-four months of the date the damage or destruction occurred, and the restoration is completed within two years of permit issuance or the conclusion of any appeal on the permit.

KT: The devastation of losing a home by fire or other disaster is multiplied by this restriction. Even if there is insurance for the disaster, rebuilding in enormously expensive. This restriction should be increased time wise to an over-all 10 year period.

PT: Fire disrupts human lives and financial resources. It may take years to fully recover and perform reconstruction. There should be no limit to the time required to apply for permits or complete reconstruction. This requirement only serves to increase the suffering of those who lose a home fire.

~~d~~h. Any legally existing structure that is relocated must be brought in to conformance with the Act and this Program.

2. Existing Appurtenances to Single-Family Residences. Those legally existing appurtenances that are common to existing single-family residences that do not meet the standards of the code shall be considered nonconforming to this Program. Such appurtenances may include garages and sheds, but shall not include bulkheads, overwater structures or other shoreline modifications.

PT: Again, this is incredibly harsh to homeowners who are legally conforming. See the points above. Existing appurtenances should be grandfathered into the new Program.

PT: Why is there an exclusion of bulkheads, overwater structures and other shoreline modifications? Shoreline and tideland modifications are likely to have an increased level of impact to ecological conditions and processes. Why would they be excluded?

KT: Why is there a distinction between "garages and sheds" and "shoreline modifications"?

3. Vegetation conservation standards of this Program shall not apply retroactively in a way which requires lawfully existing uses and developments, including residential landscaping and gardens, to be removed, except as required as mitigation for new and expanded development.

KT: "..except as required as mitigation for new and expanded development." What is the specific meaning of this related to any additions to residential homes?

PT: See the notes above regarding renovations and additions to existing property and structures.

4. Structures, improvements, docks, fills or developments lawfully placed in or over water prior to December 4, 1969 shall be considered non-conforming, but may continue in accordance with RCW 90.58.270. New in or overwater structures are prohibited.

PT: This section refers to existing "structures, improvements, docks, fills or developments lawfully placed in or over water prior to December 4, 1969 ...". The following sentence should be amended to "New **in or** over water structures are prohibited."

KT: New Aquaculture "structures" should be prohibited as well. Judge Bjorgen, in his 2011 rules, defines geoduck aquaculture PVC pipes (43,000 per acre, totally approximately 7 miles and 16 tons of PVC) as "structures."

KT: Such structures should be grandfathered rather than "non-conforming" since to this time such structures have been legally conforming.

C. Existing Lots

1. An undeveloped lot, tract, parcel, site, or division of land located landward of the OHWM that was created or established in accordance with local and state subdivision requirements prior to the effective date of this Program or the Act, but which does not conform to the present lot size standards, may be developed if permitted by other land use regulations so long as such development conforms to all other requirements of this Program or the Act.

PT: Why does this item only include land located landward of OHWM? Many shoreline properties include both shorelands and tidelands. It makes no sense to exclude tidelands from this item as they are more ecologically sensitive.

2. This section does not modify the rules regarding the development of plats under RCW 58.17.170 as now or hereafter amended.

19.400.105 Proposed Development

A. Location

1. New development shall be located and designed to avoid or, if that is not possible, to minimize as much as possible the need for new and maintenance dredging.

PT: How is it possible to predict "future shoreline stabilization" needs? A new home or other structure may require shoreline stabilization due to natural events that are out of the control of the owner of the structure and which are not predictable. Examples include tidal erosion, earthquake, and other natural events.

KT: "Down-current properties" should include tideland properties, which are impacted by dredging on tidelands utilized by geoduck operations. Silt and sediments from such dredging should not be allowed

KT: Geoduck aquaculture includes "dredging" and should be avoided.

2. New development shall be located and designed to avoid the need for future shoreline stabilization for the life of the structure. Likewise, any new development which would require shoreline stabilization which causes significant impacts to adjacent or down-current properties shall not be allowed.

3. New development on lots constrained by depth, topography or critical areas shall be located to minimize, to the extent feasible, the need for shoreline stabilization.

PT: See the comment on (2) above. "Steep slopes" is not defined.

4. New development on steep slopes or bluffs shall be set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure, as demonstrated by a geotechnical analysis.

5. Subdivision shall be planned to avoid the need for shoreline stabilization for newly created lots, utilizing geotechnical analysis where applicable.

6. Non-water-oriented facilities and accessory structures, except for preferred shoreline uses, such as single-family residences and single family residential appurtenances when consistent with buffer provisions in Chapter 19.400 of this program, must be located landward of buffers and adjacent water-oriented uses, or outside shoreline jurisdiction, unless no other location is feasible.

B Standards for Work Waterward of OHWM

PT: This section is woefully inadequate to address standards for work waterward of OHWM. Numerous items should be added including tideland sediment disruption, threatened and endangered species protections, siltation in water, impacts on kelp and macroalgae, restrictions on barge mooring and tideland stranding, and so forth.

1. Water-dependent in-water structures, activities, and uses are not subject to the shoreline buffers established in this Program.

PT/KT: Why are water-dependent in-water structures, activities, and uses" not subject to any buffers? What is the basis for this item? Shorelines are critical ecological areas. Where is this item required or recommended by the ECY SMP handbook? Where is this required by current Washington RCWs and WACs (please cite relevant regulations)? This item should be deleted.

KT: What restrictions ARE applicable to water-dependent in-water structures, activities and uses? There is a clear need to establish common-sense restrictions for tideland modifications and activities.

2. Projects involving in-water work must obtain all applicable state and federal permits or approvals, including(but not limited to) those from the U.S. Army Corps of Engineers, Ecology, Washington Department of Fish and Wildlife (WDFW), and/or Washington Department of Natural Resources.

3. Projects involving in-water work must comply with timing restrictions as set forth by state and federal project approvals.

PT: This needs more definitions. What timing restrictions would apply? Also, why would this item be called out when other regulations would specify this?

KT: Please provide said "timing restrictions as set forth by state and federal project approvals." This statement is too non-specific to be understood.

4. Protection of bank and vegetation.

   a. Alteration or disturbance of the bank and bank vegetation must be limited to that necessary to perform the in-water work.

      KT: There is no definition of "in-water work" in Chapter 1. This is an ambiguous term. What would be an example of "alternation or disturbance of the bank and bank vegetation" related to "in-water work?"

   b. All disturbed areas must be restored and protected from erosion using vegetation or other means.

      KT: There is no definition of "disturbed areas." What constitutes a "disturbance" or "alteration"? This is ambiguous terminology.

      PT: This is so vague as to be meaningless.

5. If at any time, water quality problems develop as a result of in-water work, immediate notification must be made to any appropriate state or federal agency, e.g., Ecology, WDFW, National Marine Fisheries Service, U.S. Fish and Wildlife Service, etc. Affected tribes shall also be notified.

KT: Same objection: the term "water quality problems" is an ambiguous and meaningless term. What is the definition of "water quality problems" and what specific problems are being referred to? If the County is going to use ambiguous terms such as this, the term would definitely apply to commercial/industry aquaculture. The mantra of "shellfish clean the water" does not work for a CAFO operation such as a geoduck farm which plants some 129,000 geoduck seeds in a confined acre of tideland. (A concentrated animal feeding operation (**CAFO**), as defined by the United States Department of Agriculture (USDA) is an animal feeding operation (AFO)—a farm in which animals are raised in confinement—that has over 1000 "animal units" confined for over 45 days a year)

PT: This section is vague as to the meaning of "problems". What water quality problems does this encompass? The release of silt due to planting and harvest activities?

19.400.110 Mitigation

A. Mitigation Sequencing

1. Permitted uses and developments shall be designed and conducted in a manner that protects the current ecological condition, and prevents or mitigates adverse impacts. Mitigation measures shall be applied in the following sequence of steps, listed in order of priority:

   a. Avoid the impact altogether by not taking a certain action or parts of an action;

   KT: Why has this never been considered for industrial shellfish aquaculture? We do not know of a single permit that has been denied for industrial aquaculture. If this is a priority, where is the backbone of county officials to utilize the priority that is top on the list? Why should anyone believe authorities who do not follow with action their own priorities?

   b. Minimize impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;

   c. Rectify the impact by repairing, rehabilitating or restoring the affected environment;

   KT: Who will restore and who will pay for it? Taypayers (as in the case of restoration in Puget Sound) or the party who caused the impact? Maybe a fund should be set up for restoration projects related industrial aquaculture on our shorelines and the industry required to pay a substantial restoration fee in advance of their project being permitted.

   d. Reduce or eliminate the impact over time by preservation and maintenance operations;

   KT: "Preservation" would be an aspect of item (a), "Avoid the impact altogether." "Maintenance" is an ill-defined term that could mean anything. "Maintenance" must be defined.

   e. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments, including utilization of the in-lieu-fee process where appropriate; and

   KT: Who pays compensation? This must be clarified and defined. Generally, it is the tax-payers who end up paying for impacts through restoration projects. This is unethical.

   f. Monitor the impact and the mitigation projects and take appropriate corrective measures.

   PT: Appropriate mitigation sequencing should vary by shoreline designation. It would be different for intensive development areas compared to conservancy areas. There may be sensitive areas where protection of the ecological condition is paramount, and no mitigation would be adequate. Other designated areas may allow for various levels of mitigation. This document should be restructured to take into account various designations of shorelines

   KT: County personnel have stated that they do no monitor shoreline aquaculture installations (from personal conversation in Stakeholder meeting with Mike McKain. He stated that County personnel only go out to the site if there is an "incident" report. Specifically, who will monitor "impact and the mitigation projects and take appropriate corrective measures"? Unless this is a specified activity of county personnel, it is

meaningless.

KT: All the "mitigation measures" are ambiguous and unclear. #e. for example, apparently means that impacts to one area can be mitigated by restoration in another area. This means that financial benefits to one individual or entity related to impacts in one area are compensated by taxpayer money in restoration elsewhere.

KT: Another example of the ambiguity: #f: What are "appropriate corrective measures?" This term is not defined in Chapter 100.

KT: #f: What is the meaning of "monitor?" Which agency or department is responsible for monitoring and how many County employees have a job description which includes "monitoring the impact and the mitigation projects?" When we have called the County or DNR or any other Washington State Agency regarding such things as illegal mooring of barges in public waters, literally no agency and certainly not the County want to listen or deal with it.

KT: This entire paragraph is truly "...a tale told by an idiot, full of sound and fury, signifying nothing." (Shakespeare, d. 1616)

2. Application of the mitigation sequence shall achieve no net loss of ecological functions for each new development and shall not result in required mitigation in excess of that necessary to assure that development will result in no net loss of shoreline ecological functions and not have a significant adverse impact on other functions fostered by the policy of the Act or this Program.

PT: This section should emphasize the protection of ecological functions. Change "shall not result in required mitigation in excess of that necessary ..." to "shall not result in required mitigation less that that necessary ...".

KT: Which type of "no-net-loss" is being referred to? Programmatic no-net-loss or Project no-net-loss. This paragraph should be re-worded. It is unclear.

KT: Specifically, how does the County measure "no net loss". This paragraph puts into some kind of legal language the fact that "no net loss" policy prohibits mitigation beyond the strict meaning of "no net loss." In other words, it makes legal the idea that the County has no legal intention of any kind of supporting a "net gain" to the shorelines of the county in terms of ecological function. The insertion by Brad Murphy of the term "net gain" into one of his presentations, we believe, only came as a result of citizens pointing out the fallacies of the "no net loss" policy. It was a face saving measure, nothing else and the paragraph above confirms that.

B. Mitigation Options

1. After mitigation sequencing is applied in accordance with Section 19.400.110(A) Appendix B, *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities*, shall be utilized for compensatory mitigation options.

PT: This sentence is nonsense. Where is Appendix B?

KT: Since the County has chosen not to provide us with a copy of Appendix B to date, it is impossible to comment on this.

2. Site selection for compensatory mitigation shall consider factors to determine the most ecologically suitable potential mitigation site. References for consideration when determining appropriate site selection may include the *Thurston County In-lieu-fee Program Instrument, Appendix H, Watershed Approach to Mitigation*, Ecology's *Watershed Characterization and Land Use Planning*, and Ecology's *Selecting Mitigation Sites Using a Watershed Approach* (Western Washington), or other current resources informing mitigation decisions.

PT: Compensatory mitigation should explicitly exclude unrelated voluntary efforts by shoreline owners, environmental and conservation groups, or other efforts unrelated to the development.

(KT: read this: http://www.ecy.wa.gov/mitigation/landscapeplan.html)

3. Proposals that use ratios different from those prescribed in this Program, that seek to obtain alternative buffers [Section 19.400.120(C)], or that include larger modifications in a buffer [Section 19.400.120(D)] may be approved if justified in a Shoreline Mitigation Plan consistent with Section 19.700.140. Where applicable, a Shoreline Variance may be required in accordance with Section 19.500.100(E).
PT: Change "may be required" to "are required".

4. Activities not listed in Appendix B that result in adverse impacts to shoreline ecological functions shall also be subject to compensatory mitigation requirements.

PT: See comment on (2) above.

5. When compensatory mitigation becomes necessary on a site where documented restoration activities have occurred within the previous three years, but after the effective date of this Program, such documented restoration may be utilized as mitigation to offset new development impacts, provided the restoration was voluntary and not required as mitigation for prior development impacts. Mitigation credit for prior restoration activities shall be determined upon application for the impacting project, and shall, at a minimum, be commensurate with the proposed level of impact unless additional compensatory mitigation is provided.

PT: This provision, combined with the programmatic no net loss provisions, sets up the potential for an unscrupulous developer to game the system and engage in progressive destruction of ecological functions. Consider this scenario:

Property owner A engages in restoration activity to improve ecological function.

Property owner B wishes to engage in in-water development and uses the restoration performed on Property A as part of a programmatic no net loss argument. Property B is developed.

Property owner A one year later wants to develop an in-water project and uses the previous restoration as mitigation.

The result is two ecologically degraded properties with a resulting defeat of the concept of no net loss. An unscrupulous operator could degrade many shoreline areas in a round-robin attack

using this provision.

This provision should be eliminated. Alternatively, restoration efforts should be banked to the individual property and in-lieu fees used to compensate for the restoration effort effectively providing an incentive for restoration without concomitant degradation of ecological functions and processes. Such restoration would not be a component of a programmatic no net loss strategy.

C. Mitigation Compliance

1. Unless otherwise specified, mitigation shall take place prior to final project inspection to provide assurance that it will be completed and to mitigate for temporal loss of shoreline functions.

2. Thurston County shall require monitoring reports on an annual basis, or an agreed upon monitoring schedule, for a minimum of five years and up to ten years, or until mitigation success is demonstrated through meeting all final performance standards for at least two consecutive monitoring reports. The mitigation plan shall provide specific criteria for monitoring the mitigation project. Results and additional conditions shall be electronically tagged to the parcel for future reference.

   KT: Specifically, who (agency/department/personnel) does the actual monitoring and which department is responsible for writing the annual/scheduled monitoring reports. Please provide examples of "monitoring reports" from the last 10 years.

3. Mitigation requirements shall run with the parcel, and notice of such requirements shall be recorded as a Notice to Title. Mitigation as conditioned under project approval shall be maintained in perpetuity, except where authorized through review of an alternative mitigation plan.

   KT: Which department/personnel are responsible for review of alternative mitigation plan and authorization of said plan. Please provide County in-house rules related to this.

4. In the event that a subsequent landowner applies for additional permits, the electronic permit database will be queried for past mitigation requirements. If such mitigation is no longer in place or functioning, it shall be reinstalled prior to permit issuance.

   KT: Please provide links to the electronic permit database

5. Mitigation enforcement shall occur under the authority of Chapter 19.500, Permit Provisions, Review and Enforcement, of this Program.

19.400.115 Critical Areas

A Incorporation of Title 24 TCC

The following sections of Title 24 TCC, Critical Areas Ordinance, dated July 24, 2012, are incorporated herein by this reference, and provided in Appendix E for reference purposes only, except as supplemented or modified under Sections 19.400.115(B) - 19.400.115(G):

KT: http://www.co.thurston.wa.us/planning/critical_areas/adopted-ordinance/full-ordinance-unsigned-20120724.pdf. I don't believe the County has provided Appendix E.

1. Standards for Existing Development (24.50), as applicable and consistent with Chapter 19.500 of this Master Program

2. Critical Area Tracts and Delineations (24.65.040)

3. Administrative Procedures (24.05)

4. Critical Area Determinations (24.05.070)

5. Critical Aquifer Recharge Areas (24.10)

6. Geologically Hazardous Areas (24.15)

7. Frequently Flooded Areas (24.20)

8. Fish and Wildlife Habitat Conservation Areas (24.25)

9. Wetlands (24.30)

10. Definitions (24.03), except where conflict exists, then the definitions in this Program shall govern.

B. Frequently Flooded Areas

Encroachments, including new construction, substantial improvements, fill and other development, are prohibited within designated floodways, unless otherwise authorized by Chapter 24.20 TCC. Before any development activities are permitted within the floodplain, compliance with Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) protection standards for critical habitats for listed species shall be demonstrated through submittal of a Habitat Management Plan prepared by a qualified wildlife biologist.

Table 24.20-1 TCC, identifies the land uses and activities that are allowable in frequently flooded areas (i.e., one-hundred-year floodplains, one-hundred-year flood zone (one percent flood zone), floodways, high ground water hazard areas/restricted development zones, channel migration hazard areas, and coastal flood hazard areas) and one-hundred-year channel migration hazard areas. All land uses and activities not allowed by or not mentioned in Table 24.20-1, except water dependent uses allowed under this Program, are prohibited within the flood hazard and channel migration hazard areas regulated by this section, except as otherwise provided in Chapter 24.01 TCC.

Also see Section 19.400.150 (Flood Hazard Reduction Measures) for additional regulations governing uses and modifications in floodways, floodplains, high groundwater areas and one-hundred-year channel migration hazard area zones.

C. Critical Freshwater Habitats

Critical freshwater habitats includes those portions of streams, rivers, wetlands, lakes and their associated channel migration zones and floodplains that provide habitat for priority species at any stage in their life cycles, and provide critical ecosystem-wide processes, as established in WAC 173-26-221(2)(c)(iv) and 24.25.005 TCC. Specific standards follow.

1. Lakes over 20 acres.

   a. Vegetation buffers shall be retained for each shoreline environment designation as specified in Section 19.400.120 (Vegetation Conservation Buffers) below.
   b. Where a lot cannot accommodate required buffers due to size, shape or topography, the Alternatives for New Development [Section 19.400.120(C)(1)] and Alternatives for Existing Development [Section 19.400.120(C)(2)], shall apply.
   c. The specific Shoreline Use and Modification Development Standards of the Program shall apply (Chapter 19.600).

2. Streams and rivers over 20 cubic feet per second (cfs) mean annual flow as determined by the Department of Ecology.

   a. A 250-foot vegetation buffer and an additional 15-foot building setback [Section 19.400.120 (B)(4)] shall be maintained from the OHWM of all Type S and Type F (greater than 20 feet in width) streams (24.25.020 TCC). Additional critical area buffers and setbacks may apply where flood hazard areas, geologically hazardous areas, or wetlands are present (see Chapter 24.15.015 and Tables 24.25-1 and 24.30-1 TCC).
   b. Where a lot cannot accommodate required buffers due to size, shape or topography, the Alternatives for New Development [Section 19.400.120(C)(1)] and Alternatives for Existing Development [Section 19.400.120.(C)(2)], shall apply.
   c. The specific Shoreline Use and Modification Development Standards of the Program shall apply (Chapter 19.600).

3. The subdivision of land shall not be established when it would be reasonably foreseeable that the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway. When evaluating alternate flood control measures or floodplain restoration opportunities, the removal or relocation of structures in flood-prone areas shall be given consideration.

D. Critical Saltwater Habitats

1. Critical saltwater habitats require a higher level of protection due to the important ecological functions they provide. Non-residential docks, bulkheads, bridges, fill, floats, jetties, utility crossings and other human-made structures shall not intrude into or over critical saltwater habitats except in the following circumstances, and only when the applicable use or modification standards are also met (Chapter 19.600).

   KT. "Other human-made structures" should include "structures" (as defined in 2011 by Judge Bjorgen) that are made up of approximately 7 miles of PVC pipe weighing approximately 16 ton per acre, i.e., geoduck industrial aquaculture operations.

a. The public's need for such an action or structure is clearly demonstrated, and the proposal is consistent with protection of the public trust.

KT: The "public" does not "need" industrial shellfish aquaculture" and "public trust" is lost when the County colludes with the industrial aquaculture operators to fill our tidelands with miles/tons of PVC pipe along with dredging methods for harvest and tractors on the tidelands.

b. Avoidance of impacts to critical saltwater habitats by an alternative alignment or location is not feasible or would result in unreasonable and disproportionate cost to accomplish the same general purpose. A cost analysis may be required to assist with the feasibility determination.

c. The project, along with any required mitigation, will result in no net loss of ecological functions associated with critical saltwater habitat.

KT: Is this "no net loss" on a project basis or a program basis? This needs to be specified. We submit the same critique of the faulty "no net loss" policy that we have stated in several places elsewhere.

d. The project is consistent with the State's interest in resource protection and species recovery.

KT: What is the State's definition of "resource protection" and "species recovery." These terms are not defined in Chapter 100.

e. Marine riparian habitat zone shall be maintained as described in Section 24.25.050TCC.

2. When a habitat survey (see Section 19.700.145, Biological and Habitat Surveys) is required pursuant to the applicable use or modification section, the *Thurston County Shoreline Master Program Update Inventory and Characterization* report shall be consulted as a basis for existing conditions, along with appropriate field verification. See the applicable sections for specific measures necessary for minimization and mitigation of impacts to critical saltwater habitats.

3. Critical saltwater habitats include (see Chapter 19.150, Definitions, for more detail):

a. Kelp beds
b. Eelgrass beds
c. Spawning and holding areas for forage fish, such as herring, smelt and sand lance
d. Shellfish beds (subsistence, commercial and recreational)

KT: Shellfish beds should be distinguished as to "natural shellfish beds" and "commercial/industrial shellfish beds." They are not the same thing and it is insupportable to lump them together. Commercial/industrial shellfish beds are not natural, they are not a "critical habitat" and replace critical habitat. Commercial/industrial shellfish beds are changing the nature of the tidelands especially since in different phases of the operations the area is a monoculture, the area contains up to 7 miles/16 tons of PVC plastics (obviously not natural to the habitat) and is dredged at harvest. This "lumping together" to confuse the issue is the type of language being used by the current administration in Washington DC to re-define normal meanings of language. This is the type of thing that that is both insidious and unconscionable and when it is inserted into a document such as this, it is a clear indication that rational thought has been lost.

e. Mudflats
f. Intertidal habitats with vascular plants
g. Areas with which priority species have a primary association

E. Geologically Hazardous Areas

Channel migration zones shall be classified as landslide hazard areas, and may be either high geologic hazard or low geologic hazard depending on the site characteristics outlined in TCC 24.20. Channel migration zone maps can be found in Appendix D of this Program.

F. Wetlands

1. Consistent with WAC 173-22-035 and TCC 24.30.020, wetlands in shoreline jurisdiction shall be delineated using the procedure outlined in the approved federal wetland delineation manual and applicable regional supplements.,

2. A wetland buffer may not be reduced through averaging more than 25 percent of the standard buffer width applied per TCC 24.30.045. Buffer reduction is allowed only when following the steps described in TCC 24.30.050.

3. The County may require an increase in buffer width, as specified in TCC 24.30.055, as necessary to protect wetland area, their functions, and their buffers.

G. Fish and Wildlife Habitat Conservation Areas

1. All typed waters, defined by WAC 222-16-030 with 20 cubic feet per second (cfs) or over 20 cfs mean annual flow, and their buffers are regulated by this Program and other provisions of Chapter 24.25, TCC. All stream types under 20 cfs mean annual flow are regulated under Chapter 24.25 TCC.

2. Important animal and plant species, their habitats of primary association, and other important habitats protected by this Program are included in Chapter 24.25.065 TCC.

19.400.120 Vegetation Conservation Buffers

A General Regulations

1. Vegetation conservation buffers provide a means to conserve, protect and restore shoreline vegetation in order to provide for ecological and habitat functions as well as human health and safety. Buffers shall consist of a non-clearing area established to protect the integrity, functions and values of the affected critical area or shoreline, but may also be modified and reduced to accommodate allowed uses when consistent with the Act and this Program. The standards below provide a flexible approach to maximize both ecological functions and water-dependent uses.

2. Vegetation conservation standards shall not be applied retroactively in a way which requires lawfully existing uses and developments (as of the effective date of this Program), including residential landscaping and gardens, to be removed, except when required as mitigation for new or expanded development.

KT: The exception "when required as mitigation for new or expanded development" requires elaboration. Does this mean that if I build a room on to the back of my house then I no longer have retroactive protection for my existing vegetation and plantings?

3. In order to implement this Program's policies for preservation of native plant communities on marine, river, lake, and wetland shorelines, mitigation sequencing shall be applied during site planning for uses and activities within the shoreline jurisdiction so that the design and location of the structure or development minimizes native vegetation removal. Development or uses that require vegetation clearing shall be designed to avoid the following in the order indicated below, with a. being the most desirable vegetation to retain:

   a. Native trees,
   b. Other native vegetation,
   c. Non-native trees, and
   d. Other non-native vegetation.

B. Buffer Widths

1. Standard Buffer. Each shoreline environment designation shall have a starting, or standard, buffer as measured landward from the OHWM. This buffer shall be adhered to unless otherwise allowed as described in the Reduced Standard Buffer provisions below or other critical area buffers are required. The Standard Buffers for each environment designation are as follows:

		Marine		Freshwater Lakes	
a.	Shoreline Residential:	~~85 feet~~	50 feet	~~75 feet~~	50 feet
b.	Urban Conservancy:	~~250 feet~~	125 feet	~~100feet~~	125 feet
c.	Rural Conservancy:	~~250 feet~~	150 feet	~~125feet~~	150 feet
d.	Natural:	~~250 feet~~	200 feet	~~250feet~~	200 feet

   e. The Standard Buffer for shoreline jurisdictional freshwater streams and rivers is 250 feet.
   f. Buffer widths for all other streams, including Type F streams less than 20 feet wide and Type Np and Ns streams are in Table 24.25-1 TCC.

2. Reduced Standard Buffer. Utilizing the *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B) to achieve no net loss of shoreline ecological functions, the Standard Buffer may be reduced to the Reduced Standard Buffer as specified below. Mitigation options shall be reviewed and approved by the County for applicability to the project site commensurate with project impacts. The *Shoreline Restoration Plan* (Appendix C) shall serve as an initial review source. The Reduced Standard Buffers for each environment designation are as follows:

   a. Shoreline Residential: ~~60 feet marine~~, 50 feet ~~freshwater~~ (no reduction without Type III variance)
   b. Urban Conservancy: ~~100~~ 90 feet; 75 feet where a net gain in shoreline ecological functions can be achieved. Applications for reductions below 90 feet shall include information documenting: a) mitigation necessary to achieve no net loss of shoreline ecological functions for the reduced 90-foot buffer; b) additional mitigation necessary to achieve no net loss for any reduction below 75 feet; and c) additional actions proposed to achieve a net gain in shoreline ecological functions. Proposed restoration activities shall not include projects previously identified for public funding, except that public-private partnerships may be utilized. A minimum five-year monitoring plan shall be required to

demonstrate project success, in accordance with Section 19.400.110(C), Mitigation Compliance.

c. Rural Conservancy: ~~150 feet marine, 100 feet freshwater~~ 110 feet
KT: The term "Net Gain" is not defined in Chapter 100

d. Natural: ~~200~~ 150 feet

e. Shoreline jurisdictional freshwater streams and rivers: buffers may be reduced pursuant to the standards in Section 19.400.120(C) below.

3. Additional Standards for Applying the Reduced Standard Buffer, in a through e above, within the Rural Conservancy and Natural designations and shorelines of statewide significance. Buffers may be reduced for single-family residences and water-oriented uses in the Rural Conservancy designation, Natural designation, and shorelines of statewide significance only under the following circumstances with appropriate mitigation:

a. The lot is physically constrained by slopes, wetlands or other natural features such that the Standard Buffer cannot be met; or

b. The lot is legally constrained by its size or shape, such that it would not support a home and garage with a footprint of at least 1,200 square feet if placed at or above the Standard Buffer.

4. An additional 15-foot building setback shall be maintained beyond the outer boundary of the buffer. This building setback may be reduced provided that the resulting setback is protective of existing vegetation within the buffer. The building setback is to protect the buffer during construction and is no longer required after construction is completed.

5. Buffer widths may be increased in situations where steep slopes, the presence of important habitat or species, landslide hazard areas, marine bluffs, areas of inadequate vegetation to protect water quality, or other hazards are identified during project review.

C. Constrained Lot and Infill Provisions

1. Alternatives for New Development. New single-family and water-dependent development may qualify for an alternative buffer if the following apply:

a. Infill Provision. For new construction on a vacant parcel adjoined by existing homes on both sides, the Reduced Standard Buffer may be administratively reduced by up to 10% in compliance with Section 19.400.135 (View Blockage). This shall be a Type I administrative review process. The *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B) shall apply to such reductions.

b. Constrained Lot Provisions.

i. Legally platted lots with a depth that would not allow for compliance with the Reduced Standard Buffer. Proposals to reduce the buffer below the Reduced Standard Buffer shall require a Shoreline Mitigation Plan (Section 19.700.140), starting with review of existing conditions as presented in the *Thurston County Shoreline Master Program Update Inventory and Characterization* report and supplemented with appropriate field verification.

ii. If the development requires less than a 25% reduction of the Reduced Standard Buffer, or any amount of buffer reduction within the Shoreline Residential designation, a Type II Administrative Variance shall be required. If the development is not within the Shoreline Residential designation and requires

greater than a 25% reduction of the Reduced Standard Buffer, a Type III Variance shall be required.

c. Water-dependent development. Buffers may be modified and reduced to accommodate water-dependent uses when consistent with the Act and this Master Program, and when conducted so that no net loss of critical areas or shoreline ecological functions occurs. Any loss of critical areas or shoreline ecological functions will require mitigation pursuant to the *Mitigation Options to Achieve No Net Loss for New or Re-Development Activities* table (Appendix B)

2. Alternatives for Existing Development.

a. Expansion of development outside of the Standard Buffer width. Expansion of existing development landward, outside the Standard Buffer shall be permitted, provided all other applicable provisions are met.

b. Expansion of development within the Standard Buffer width. Structures in existence on the effective date of this Program that do not meet the setback or buffer requirements of this Program may be remodeled or reconstructed provided that the new construction or related activity does not exceed the standard height limit of 35 feet, remains in the existing footprint and does not further intrude into the Standard Buffer.

c. Expansion of development below the Standard Buffer width. Expansion of existing development below the Standard Buffer shall not occur further waterward of the existing structure. Any expansion below the Standard Buffer shall require a Shoreline Mitigation Plan (see Section 19.700.140). Expansion within the Standard Buffer shall require a Type II Administrative Variance. Expansion within the Reduced Standard Buffer shall require a Type III Variance.

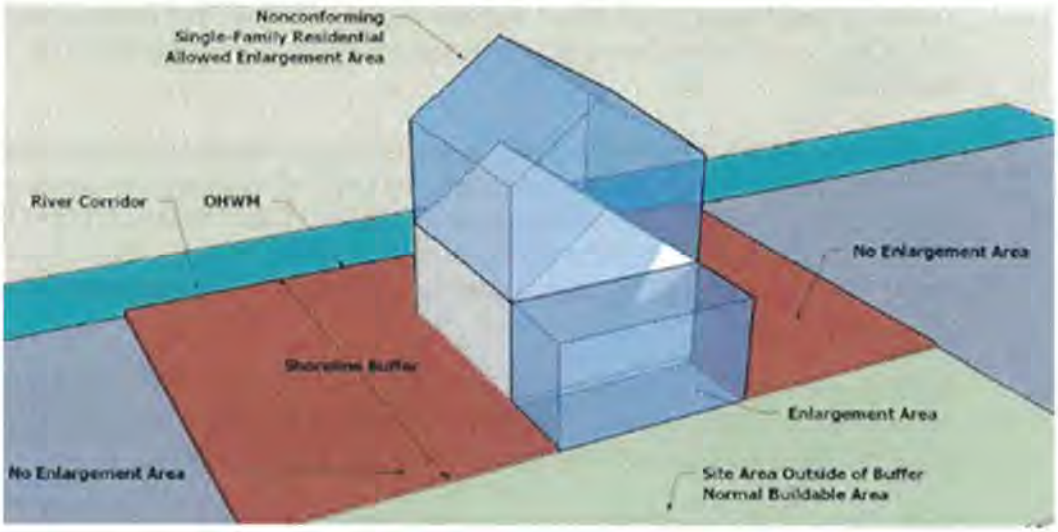


Figure 19.400.120 (C)(1) Allowed Expansion of Nonconforming Structures.

D. Other Uses and Modifications in Buffers

1. In order to accommodate water-enjoyment uses and development within the buffer, the following standards shall apply:

   a. Trails. Trails shall be limited to four feet in width, except where demonstrated necessary for a water-dependent use. Disturbance to soil, hydrological character, trees, shrubs, snags and important wildlife habitat shall be minimized. Pervious surfaces shall be utilized except where determined infeasible. Refer to Chapters 24.25.267 & 24.25.270 TCC for specifics on trail location, design, construction, and maintenance.

      i. Trails should be kept outside of all critical area buffers. If allowed, trails should only be located in the outer 25% of the buffer and follow mitigation sequencing in accordance with Section 19.400.110(A).

      ii. Trails that meet the definition of water-oriented use may be located within shoreline buffers when it can be demonstrated that buffer impacts are limited through mitigation sequencing in accordance with Section 19.400.110(A). Compensatory mitigation for unavoidable impacts will be required.

   b. Decks and Viewing Platforms. Decks and viewing platforms may be permitted, but shall be limited to one hundred square feet in size, unless demonstrated that a larger structure will not result in a net loss of shoreline ecological function through submittal of a Shoreline Mitigation Plan (Section 19.700.140). The structure shall be no closer than 25 feet from the ordinary high water mark (OHMW). Viewing platforms shall not have roofs, except where otherwise permitted through the view blockage standards (Section 19.400.135) and be no higher than 3 feet above grade. Creosote and pentachlorophenol should not be utilized in construction materials for decks, viewing platforms or boardwalks.

   c. Beach Stairs. Beach stairs are permitted, subject to the exemption provisions in Section 19.500.100(C)(3). Beach stairs placed below the OHWM will normally require a shoreline permit from Thurston County, and Hydraulic Project Approval (HPA) from WDFW. Beach stairs with stair towers shall require an SDP where exemption provisions are not met. A joint-use beach stair structure used by more than one property owner is encouraged.

   d. Boat Launches and Railways. Boat launches and marine railways, when consistent with requirements in Section 19.600.160(C)(6) of this program, may be permitted, provided all applicable provisions are met to avoid net loss of shoreline functions.

   e. Water-Oriented Storage Structure. One water-oriented storage structure to house boats and related equipment may be allowed within the buffer provided:

      i. The structure is no closer than 25 feet from ordinary high water mark as determined by the Department;

      ii. Mitigation will be required for buffer impacts due to placement of the storage structure within the buffer area;

      iii. The structure's width shall be no greater than 25 feet or 25% of the lot width, whichever is less;

iv. Side yard setbacks shall be 10 feet for docks and storage structure.
v. The highest point of the structure shall not be greater than 12 feet above grade, and shall also comply with the View Blockage provisions of this program;
vi. The overall size shall not exceed 200 square feet.
vii. Allowance of a storage structure within a buffer shall not justify the need for shoreline armoring to protect the structure.
viii. Storage structures shall be prohibited in the Natural environment.

f. In no case shall non-water-oriented uses and activities be allowed below the Standard Buffer width. This includes swimming pools, sport courts, or fields.

2. Hand removal or spot-spraying of invasive or noxious weeds is permitted within Vegetation Conservation Buffers.

KT: "Spot spraying" is not defined as to allowable substances. Are we talking about "vinegar" or about "Round-up" or about "Imidacloprid", etc? This item requires much more specificity.

3. Standards for View Thinning

a. View thinning activities shall be limited to 30% of the total buffer length in the Shoreline Residential designation, and shall retain a minimum of 50% of the live crown;
b. View thinning activities shall be limited to 25% of the total buffer length in the Urban Conservancy and Rural Conservancy designations, and shall retain a minimum of 50% of the live crown;
c. No tree removal is allowed in the Natural designation for view enhancement; however, limited tree limbing may be allowed upon review and approval by the Department.
d. View thinning within the limited areas specified above shall generally be limited to tree limbing (see below, Figure 19.400.120(D)(1)). Where tree removal is demonstrated to be necessary, replanting of native trees shall occur at a 3:1 ratio (planted: removed) within the buffer area. Monitoring and maintenance of the plantings may be required by the Department.
e. Topping of trees is prohibited, except where demonstrated necessary for safety.
f. See the Forest Practices/Timber Harvest standards (Section 19.600.145) for hazard tree removal requirements.
g. An advance site visit may be required by the Department of ~~Resource Stewardship~~ Community Planning and Economic Development in order to confirm the proposed thinning is consistent with this section and critical area protection standards. Site visit request applications may be obtained on-line or in person at Thurston County's permit assistance center. The County may also utilize site photographs in lieu of a site visit where sufficient detail is available to make a determination on consistency with thinning standards.

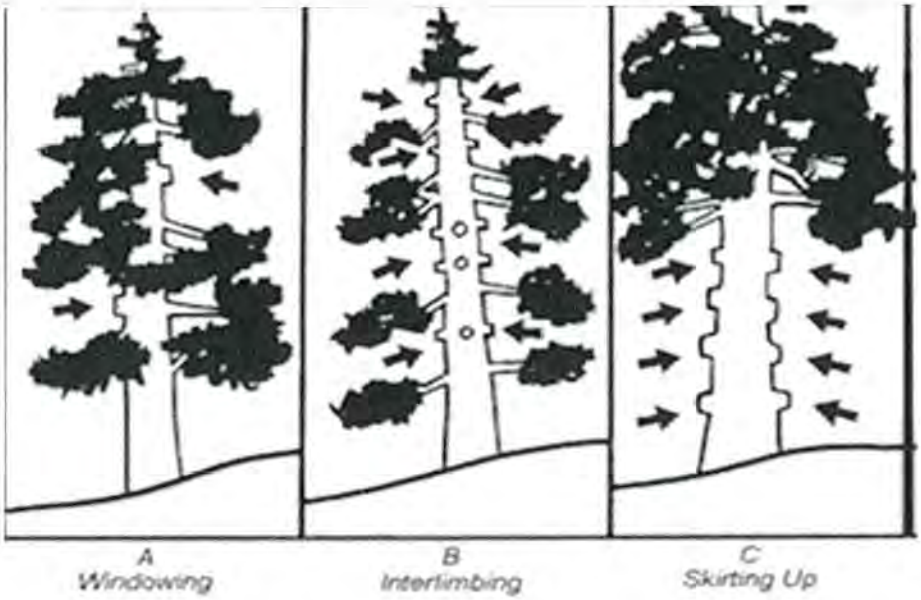


Figure 19.400.120 (D)(1) Alternative Pruning Techniques: Conifers

19.400.125 Water Quality and Quantity

New development shall provide stormwater management facilities designed, constructed and maintained in accordance with the current stormwater management standards, including but not limited to the following:

a. Chapter 2 of Volume I of the Thurston County Drainage Design and Erosion Control Manual (DDECM, dated December 31, 2016, or as amended) to determine which of the 11 Core Requirements apply to projects,

b. Chapter 3 of Volume I to determine what submittals will be required, what submittals shall contain and what site investigations, studies, and mapping will be required,

c. Chapter 4 of Volume I to determine what Best Management Practices (BMP's) should be applied to meet the requirements for on-site low impact development (LID) measures, flow control, and runoff treatment,

d. Guidance material in Volume II of the DDECM to prepare a Construction Stormwater Pollution Prevention Plan (Temporary Erosion and Sediment Control Plan) for the proposed project,

e. Information in Volume III that provides guidance on hydrologic modeling, conveyance system design, and establishing design infiltration rates for infiltration ponds,

f. And Volume V of the DDECM to site and design appropriate BMP's, paying particular attention to minimum required setbacks.

19.400.130 Historic, Archeological, Cultural, Scientific and Educational Resources (HASCE)

A. Applicability and Other Regulations

1. This section applies to archaeological and historic resources either recorded by the Department of Archaeology and Historic Preservation (DAHP), Thurston County Historic Commission (per Section 2.106.010 TCC), local jurisdictions or applicable tribal data bases or predictive models.

2. HASCE sites shall comply with the Governor's Executive Order 05-05, Section 2.106 TCC (Historic Commission), Chapter 25-48 WAC (Archaeological Excavation and Removal Permit), Chapter 27.44 RCW (Indian graves and records), and Chapter 27.53 RCW (Archaeological sites and resources).

B. Known or Potential HASCE Sites

1. Tribal Historic Preservation Officers (THPOs) for tribes with jurisdiction will be provided the opportunity to review and comment on all development proposals in the Thurston County shoreline jurisdiction, both terrestrial and aquatic, in order to ensure all known or potential archaeological sites, Traditional Cultural Properties and Traditional Cultural Landscapes are acknowledged, properly surveyed and adequately protected.

2. If archaeological resources are known in advance, developers and property owners must notify Thurston County, the Department of Archaeology and Historic Preservation, and applicable tribes.

3. Sites with known or potential archaeological resources, as determined pursuant to the resources listed at the beginning of this section, shall require a site inspection by a professional archaeologist in coordination with the affected tribe(s). The THPO shall be provided the opportunity to evaluate and comment on cultural resources evaluations conducted by the professional archaeologist.

4. Work on sites with identified archaeological resources shall not start until authorized by the Department of Archaeology and Historic Preservation through an Archaeological Excavation and Removal Permit, which may condition development permits.

C. Discovered HASCE sites

1. If archaeological resources are uncovered during excavation, developers and property owners must immediately stop work and notify Thurston County, the Office of Archaeology and Historic Preservation and affected Indian tribes.

2. Uncovered sites shall require a site inspection by a professional archaeologist in coordination with the affected tribe(s). Tribal Historic Preservation Officers shall be provided the opportunity to evaluate and comment on cultural resources evaluations conducted by the professional archaeologist.

3. Work shall not re-commence until authorized by the Office of Archaeology and Historic Preservation through an Archaeological Excavation and Removal Permit, which may condition development permits.

19.400.135 View Blockage

A. In order to protect water views, all principal buildings shall be so located as to maintain the minimum shoreline structure setback line. The shoreline structure setback line shall be determined as follows. Variances for reduced buffers may be needed along with mitigation per Section 19.400.120:

1. No Adjacent Principal Buildings. Where there are no adjacent principal buildings, the shoreline structure setback line shall be the buffer and setback specified elsewhere in this Program. See Figure 19.400.135(A)(1).

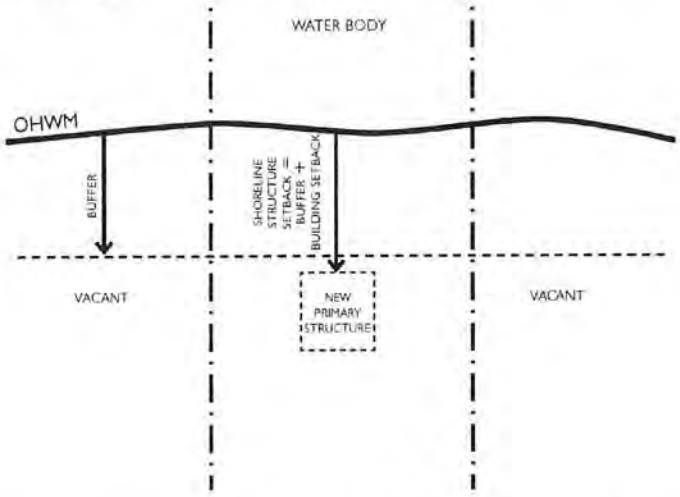


Figure 19.400.135 (A)(1) Buffer and shoreline structure setback with no adjacent primary structure. *(Note that in all figures the "square" includes all patios, decks, etc. – see principle building definition in Chapter 100)*

2. Adjacent Principal Building on One Side. Where there is an adjacent principal building on one side, the shoreline structure setback line shall be a distance no less than that of the adjacent principal building to the shoreline or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figures 19.400.135(A)(2)(a) and 19.400.135.(A)(2)(b).

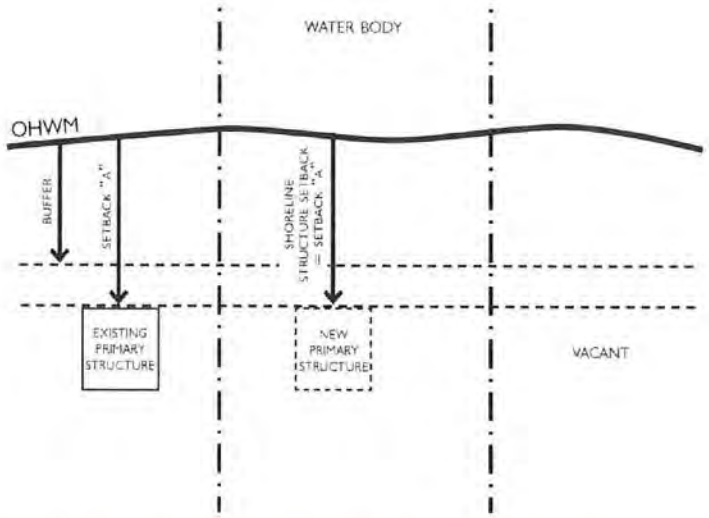


Figure 19.400.135(A)(2)(a) Buffer and shoreline structure setback with adjacent primary structure landward of buffer on one side.

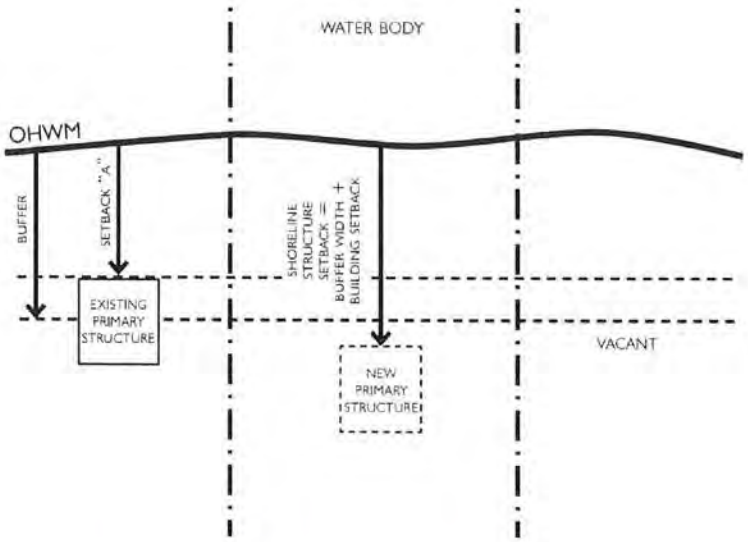


Figure 19.400.135(A)(2)(b) Buffer and shoreline structure setback with adjacent non-conforming primary structure within buffer on one side.

3. Adjacent Principal Buildings on Both Sides on a Regular Shoreline. Where there are adjacent principal buildings on both sides of the proposed structure on a regular shoreline, the shoreline structure setback line shall be determined by a line drawn

between the building line of the adjacent principal buildings or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figure 19.400.135(A)(3).

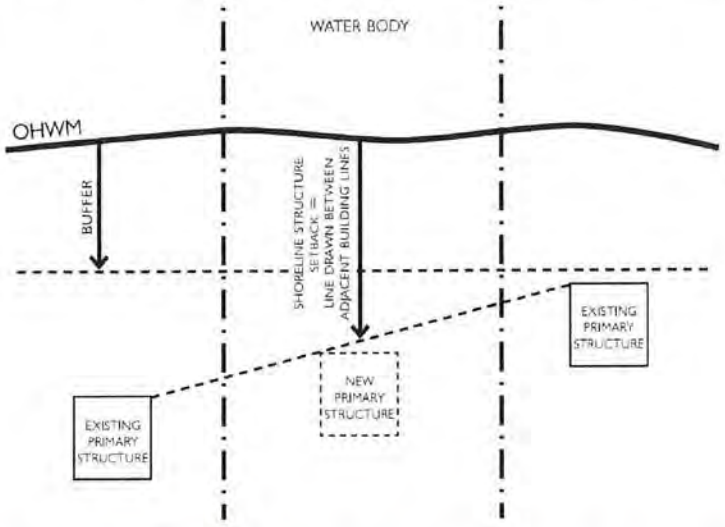


Figure 19.400.135(A)(3) Buffer and shoreline structure setback on a regular shoreline with adjacent primary structures on both sides.

KT: This diagram doesn't make sense. If the structure is outside of the buffer, why would it have to be moved back to conform to another structure?

4. Adjacent Principal Buildings on Both Sides on an Irregular Shoreline. Where there are two adjacent principal structures on a shoreline which forms a cove or peninsula, the shoreline structure setback line shall be determined by averaging the setback lines of the two adjacent principal buildings or the buffer and setback specified elsewhere in this Program, whichever is greater. See Figure 19.400.135(A)(4).

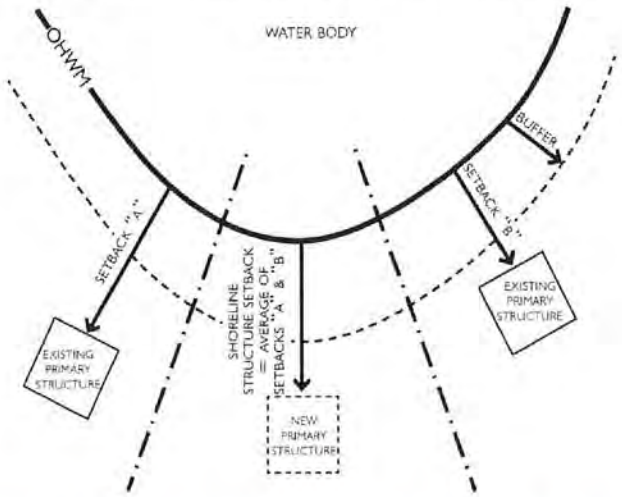


Figure 19.400.135(A)(4) Buffer and shoreline structure setback on an irregular shoreline with adjacent primary structures on both sides.

5. Consideration of existing mitigating circumstances. The shoreline structure setback line may be administratively waived where an elevation survey demonstrates that due to a difference in topography or a vegetation survey demonstrates that due to the presence of significant view blocking vegetation on or adjacent to the common border of the two parcels, the proposed principle building will not result in any view blockage to adjacent principle buildings. In such cases, the buffer and setback specified elsewhere in this Program shall apply.

B. Accessory structures. Accessory structures as defined for the purposes of view blockage may be sited within the shoreline structure setback area provided that they do not substantially obstruct the view of adjacent principal buildings and comply with applicable buffer provisions.

C. Appeal procedure. Determinations of shoreline structure setback lines are classified as Type I decisions under Title 20.TCC and may be subject to appeal as provided therein.

D. Variance (administrative) procedure.

1. An applicant aggrieved by the strict application of this chapter may seek a conditional waiver from the director. Such a waiver shall be a Type II administrative decision. A conditional waiver may be granted after the applicant demonstrates the following:

   a. The hardship which serves as the basis for granting the conditional waiver is specifically related to the property of the applicant and does not apply generally to other property in the vicinity;
   b. The hardship which serves as the basis for granting the conditional waiver is specifically related to the property of the applicant and does not apply generally to other property in the vicinity;
   c. The hardship which results from the application of the requirements of this chapter is not a result of the applicant's own actions;
   d. The conditional waiver, if granted, will be in harmony with the general purpose and intent of the Act and this Program in preserving the views of the adjacent shoreline residences; and
   e. In balancing the interest of the applicant with adjacent neighbors, if more harm will be done by granting the conditional waiver than would be done by denying it, the conditional waiver shall be denied.

2. The applicant seeking a conditional waiver of the strict application of this chapter may file an application with the Department accompanied by an application fee per the Thurston County Land Use Fee Schedule.

19.400.140 Bulk and Dimension Standards

A. The standards in Table 19.400.140 (A) below shall apply to all shoreline use and development activities except where specifically modified in this Master Program.

Table 19.400.140(A) Development Standards

Standard	Mining	Shoreline Residential	Urban Conservancy	Rural Conservancy	Natural	Aquatic
Lot Width (feet)	40-60 [1]	40-80 [2]	60	100	140	Not Applicable
Shoreline Buffers	See Section 19.400.120(B) of this Master Program					
Side Setbacks (feet)	5	5[3]	5[3]	5[3]	5[3]	5[3]
Maximum Hard Surface Area (percentage of lot area)	[4]	[4]	[4]	[4]	[4]	Not Applicable
Maximum Building Height (feet)[5]	35	35	35	35	35	35

Notes:

1. 40-foot lot width for single-family residential uses. 60-foot lot width for multifamily and non-residential uses.
2. 40-foot lot width for lots in Limited Areas of Intensive Rural Development or Urban Growth Areas. 80-foot lot width for all other Shoreline Residential lots.
3. Buildings housing animals, a minimum 35 foot side yard and 35 foot rear yard setback shall apply in accordance with TCC 20.07.
4. Hard Surface thresholds for Shoreline Environmental Designations: See Section 19.400.125
5. Does not include boathouses as described above in Section 19.400.100(B)(4)

B. The maximum allowable height of structures in shoreline jurisdiction is 35 feet above finished average grade. Building heights above 35 feet, but consistent with underlying zoning allowances, require authorization via a Shoreline Variance pursuant to Section 19.500.100(E) of this Master Program.

C. No new lots shall be created that are non-conforming. All new subdivided shoreline lots shall be, at a minimum, a 1:2 width to depth ratio. Exceptions may be granted in cases where such ratio would negatively impact critical areas or their buffers.

19.400.145 Public Access

A. All recreational and public access facilities shall be designed, located and operated in a manner consistent with the purpose of the environment designation in which they are located.

B. Except as provided in Regulations E and F below, substantial developments or conditional uses shall provide public access where any of the following conditions are present:

1. A development or use will create increased demand for public access to the shoreline.
2. A development or use will interfere with an existing public access way.
3. New non-water-oriented uses are proposed.
4. A use or activity will interfere with public use of lands or waters subject to the Public Trust Doctrine.

C. Shoreline development by public entities, port districts, state agencies, and public utility districts shall include public access measures as part of each shoreline development project, unless such access is shown to be incompatible due to reasons of safety, security, or impact to the shoreline environment.

D. Ensure that publicly financed or subsidized shoreline erosion control measures do not restrict appropriate public access to the shoreline except where such access is determined to be infeasible because of incompatible uses, safety, security, or harm to ecological functions. See public access provisions of WAC 173-26-221 (4). Where feasible, incorporate ecological restoration and public access improvements into the project.

E. Off-site public access may be allowed where it results in an equal or greater public benefit than on-site public access, or when on-site limitations relating to security, environment, use conflict, intervening improvements, or feasibility are present. Sites on the same waterbody, or secondarily within the same watershed, are preferred. Where feasible, off-site public access should include both visual and physical elements. Off-site public access may include, but is not limited to, enhancing an adjacent public property (e.g., existing public or recreation access site, road, street, or alley abutting a body of water, or similar) in accordance with County standards; providing, improving or enhancing public access on another property under the control of the applicant/proponent; or another equivalent measure.

F. Public access shall not be required for single-family residential development of four (4) or fewer lots.

G. Public access shall not be required if an applicant/proponent demonstrates to the satisfaction of the County that one or more of the following conditions apply:

1. Unavoidable health or safety hazards to the public exist and cannot be prevented by any practical means;
2. Constitutional or other legal limitations apply;
3. Inherent security requirements of the use cannot be satisfied through the application of alternative design features or other solutions;
4. The cost of providing the access, easement or alternative amenity is unreasonably disproportionate to the total long-term cost of the proposed development;
5. Adverse environmental impacts to shoreline ecological processes and functions that cannot be mitigated will result from the public access;
6. Significant undue and unavoidable conflict between any access provisions and the proposed use and/or adjacent uses would occur and cannot be mitigated; or
7. Adequate public access already exists within a mile along the subject shoreline, and there are no gaps or enhancements required to be addressed by the individual shoreline development.

H. When provisions for public access are required as a condition of project approval, the Director shall prepare written findings demonstrating consistency with constitutional and legal practices regarding private property and the principles of nexus and proportionality.

I. Required public access sites shall be fully developed and available for public use at the time of occupancy of the shoreline development.

J. Public access provisions shall run with the land and be recorded via a legal instrument such as an easement, or as a dedication on the face of a plat or short plat. Such legal instruments shall be recorded with the County Auditor's Office prior to the time of building permit approval, occupancy or plat approval, whichever comes first (RCW 58.17.110). Future actions by the applicant's successors in interest or other parties shall not diminish the usefulness or value of required public access areas and associated improvements.

K. Maintenance of the public access facility over the life of the use or development shall be the responsibility of the owner unless otherwise accepted by a public or non-profit agency through a formal agreement recorded with the County Auditor's Office.

L. The removal of on-site native vegetation shall be limited to the minimum necessary for the recreational or public access development area, such as picnic areas, campsites, selected views, or other permitted structures or facilities.

M. Preference shall be given to activities that are consistent with approved state and local park plans for water-oriented recreational development, including but not limited to the Thurston County Comprehensive Plan, Thurston County Parks Plan, Washington State Parks CAMP plans, Thurston County Non-Motorized Plan, and other agency plans.

N. Vehicular traffic is prohibited on beaches, bars, spits and streambeds, except for permitted construction and boat launching, or in areas where it can be demonstrated that a historical use has been established.

O. Public road-ends, tax-title lands and right-of-ways adjacent to shorelines of the state shall be preserved, maintained and enhanced consistent with RCW 36.87.130. The Thurston County "Right of Way Use Permit" process in TCC) shall be utilized to open shoreline road-ends, as now or hereafter amended. Such process shall include notification of abutting property owners, and may include a neighborhood meeting or community council outreach effort in order to solicit and resolve community concerns with regard to specific proposals. The public interest in shoreline access shall be given appropriate consideration during the review process, consistent with the Act. Decisions to approve or deny opening of road-ends may be appealed in accordance with Chapter 13.80 TCC.

P. Trail access shall be provided to link upland facilities to the beach area where feasible and where impacts to ecological functions can be adequately mitigated.

Q. When applicable, recreational and public access development shall make adequate provisions for the following. These requirements may be waived for opening of public road ends, tax title lands, and right-of-ways as described in N above, except where determined necessary through the public review process:

1. Vehicular parking and pedestrian access;
2. Proper wastewater and solid waste disposal methods;
3. Security and fire protection;
4. The prevention of overflow and trespass onto adjacent properties, including, but not limited to, landscaping, fencing, and posting of property; and
5. Screening of such development from adjacent private property to prevent noise and light impacts.
6. Compliance with the Americans with Disabilities Act (ADA), including being barrier-free and accessible for physically disabled uses where feasible.

R. Shoreline trails and pathways shall be located, designed, and constructed to avoid and minimize bank instability.

S. Project-specific public access standards are contained in the following Shoreline Use and Modification Development Standards sections (Chapter 19.600):

1. Barrier Structures and other In-Stream Structures (Section 19.600.120)
2. Boating Facilities (Section 19.600.125)
3. Commercial Development (Section 19.600.130)
4. Fill (Section 19.600.140)

5. Industrial Development (Section 19.600.150)
6. Residential Development (Section 19.600.170)
7. Shoreline Stabilization (Section 19.600.175)

19.400.150 Flood Hazard Reduction Measures

A. Environment Designations Permit Requirements

CUP is required for installation of flood hazard reduction measures in all environment designations.

B. Development Standards

1. Development in floodplains shall not significantly or cumulatively increase flood hazard and shall follow the criteria in Chapter 14.38 TCC.

2. New structural flood hazard reduction measures in shoreline jurisdiction are allowed only when a scientific and engineering analysis documents all of the following:

   a. They are necessary to protect existing development;
   b. Nonstructural measures are not feasible;
   c. Impacts on ecological functions and priority species and habitats can be successfully mitigated so as to assure no net loss; and
   d. Appropriate vegetation conservation actions are followed.

3. The following uses and activities may be appropriate and/or necessary within the channel migration zone (see Appendix D, Channel Migration Zone Maps) or floodway, provided that they provide appropriate protection of ecological functions and do not exacerbate flood risk onsite or in nearby areas:

   a. Actions that protect or restore the ecosystem-wide processes or ecological functions.
   b. Forest practices in compliance with the Washington State Forest Practices Act and its implementing rules.
   c. Existing and ongoing agricultural practices, provided that no new restrictions to channel movement occur.
   d. Mining when conducted in a manner consistent with WAC 173-26-241(3)(h) and this Program.
   e. Bridges, utility lines, and other public utility and transportation structures where no other feasible alternative exists or the alternative would result in unreasonable and disproportionate cost. Where such structures are allowed, mitigation shall address impacted functions and processes in the affected section of watershed or drift cell.
   f. Repair and maintenance of an existing legal use.
   g. Modifications or additions to an existing legal use, provided that channel migration is not further limited.
   h. Development in designated UGAs where existing structures prevent active channel movement and flooding.
   i. Measures to reduce shoreline erosion, provided that it is demonstrated that the erosion rate exceeds that which would normally occur in a natural condition, that the measure does not interfere with fluvial hydrological and geomorphological processes normally

acting in natural conditions, and that the measure includes appropriate mitigation of impacts to ecological functions associated with the river or stream.

j. Development with the primary purpose of protecting or restoring ecological functions and ecosystem-wide processes.

Applicants for shoreline development or modification may submit a site-specific channel migration zone study if they do not agree with the mapping in Appendix D.

4. Structural flood hazard reduction measures shall be consistent with the County's adopted Hazard Mitigation Plan that evaluates cumulative impacts to the watershed system.

5. New structural flood hazard reduction measures shall be situated landward of associated wetlands and designated vegetation conservation areas, unless actions are intended to increase ecological functions or if it is determined through a geotechnical analysis that no other alternative to reduce flood hazard to existing development is feasible. Mitigation may be required for impacts to critical areas.

6. New structural flood hazard reduction measures on public lands or funded by the public shall provide or improve public access pathways unless such improvements would cause unavoidable health or safety hazards, significant ecological impacts, unavoidable conflict with the proposed use, or a cost that is disproportionate and unreasonable to the total long-term cost of the development.

7. The removal of gravel for flood management purposes may be permitted only if a biological and geomorphological study shows that extraction:

   a. Has a long-term benefit to flood hazard reduction,
   b. Results in not net loss of ecological functions, and
   c. Is part of a comprehensive flood management solution.

19.400.155 Restoration and Enhancement

A. Environment Designations Permit Requirements

Restoration and enhancement uses and developments are permitted as an SDP, or may be exempt from an SDP if criteria in Section 19.500.100(C) are met, for all environment designations, provided the project's primary purpose is the restoration of the natural character and ecological functions of the shoreline, as determined by the Department.

B. Development Standards

1. Restoration and enhancement shall be carried out in accordance with an approved shoreline restoration plan that uses the best available scientific and technical information, and implemented using best management practices (BMPs).

2. All shoreline restoration and enhancement projects shall protect the integrity of adjacent natural resources, including aquatic habitats and water quality, and shall not result in significant adverse changes to sediment transport, ecological processes, properties, or habitat.

3. Long-term maintenance and monitoring shall be arranged by the project applicant and included in restoration or enhancement proposals. Monitoring shall occur for a minimum of five years.

except the term may be reduced if all final performance standards have been met for at least two consecutive monitoring reports, demonstrating project success.

4. Shoreline restoration and enhancement shall not significantly interfere with the normal public use of the navigable waters of the state or tribal resources without appropriate mitigation. For projects on state-owned aquatic lands, prior to the solicitation of permits from regulatory agencies, project proponents must coordinate with the Washington Department of Natural Resources to ensure the project will be appropriately located. Affected tribes shall also be notified.

5 Applicants in the County's UGAs seeking to perform restoration projects that may shift the OHWM landward of the pre-project location, are advised to work with the County to assess whether and how the non-restoration-related elements of the project may be allowed relief under RCW 90.58.580.

Thurston County Community Planning & Economic Development Department Staff

SPECIAL MEETING July 24, 2019

Aquafarms permitting

Thank you for the opportunity to give public comment on land use decisions and shoreline management – these are not easy decisions.

My husband and I live less than a mile from Tolmie State Park. This March (4 months ago) a permit was granted for a 3.6 acre geoduck farm only a 160-feet away from the public beach at Tolmie State Park. Talking with neighbors living on NE 61st who strongly opposed this proposal stated that, "Our reality is measured by the fact that 99% of opposed shellfish operations have ultimately been approved."

The proponents of this plan did what was minimally required - informing neighbors within 500 ft of the site. What did not happen was give notice to **Tolmie State Park** visitors. The permit notification was posted at an ambiguous location, hundreds of feet away from the park entrance. As a regular Tolmie walker, I noticed the posting but it's doubtful that anyone but a neighbor of the park would have seen the sign and do the research necessary to fully understand what the permit proposed. A transparent process would have given Tolmie visitors an opportunity for public comment. **Happenstance or deliberate concealment of permit information?**

I **propose 4 actions** for the Planning Commission and relevant parties before approving the permits of more commercial shellfish farms:

1. **Slow down the permitting process** to conduct a fact-finding process to determine facts from what may be savvy marketing campaigns for these permits by commercial enterprises who stand to greatly enrich themselves, likely at the cost of adding more plastic particulate matter as well as other pollutants to a fragile ecosystem.

2. **In the interest of true transparency and full disclosure, provide posting that informs users of public lands and parks** of such projects, **including the scope and potential risks and provide a comment period to the public** – not just for the immediate neighborhood with the 500 ft mandate.

3. **Conduct a thorough and unbiased study of the report completed by the Army Corp of Engineers.** Why hasn't the most recent ACOE Cumulative Impact Analysis NWP48 report of 2017 been released? Shellfish permitting provides for mesh bags and PVC tubes - who monitors and enforces the permit stipulations? For most geoduck farms, tubes are typically installed into the substrate at a density of about 1 tube per square foot or about 42,000 tubes per acre. In the case of the geoduck farm adjacent to Tolmie, there are an estimated 150,000 mesh bags in a 3.6 acre commercial bed inserted into the tide flats 160 ft from the Tolmie beach. What assurances does the public have that best practices maintaining aquafarms are enforced? Who and how often are these practices monitored? **Is the proverbial fox guarding the hen house or is there oversight provided by the Army Corp of Engineers or other appropriate agencies?**

In August 2018, there was a catastrophic Atlantic salmon net-pen spill by Cooke Aquaculture Pacific at its Cypress Island farm in the San Juan Islands- 263,000 fish were released. This non-native species are now competing for the same habitat as our native Chinook salmon which is the primary diet for J, K, and L Orca pods. While it was preventable, it was an accidental pen-collapse. **This certainly proves the point that without proper and consistent oversight, aquafarming is endangering Puget Sound.**

What are the financial and physical obligations of mitigating negative results should there be unforeseen or unexpected environment related problems? What are the cost-benefit comparisons of damaging the environment versus benefits to Washington residents sharing the Sound. In most instances 90% of the harvest of geoducks are shipped overseas. **Are we jeopardizing and cannibalizing our natural (and nonrenewable) resources to enrich a few and cater to overseas elite tastes?**

4. **Research the big picture of the cumulative effect of all these beaches being converted from their natural state to industrial geoduck operations.** Before approving more permits, an evaluation of the cumulative effects of all this nearshore habitat degradation and massive amount of PVC and high-density polyethylene plastic pollution has been reviewed. In other words, **connect the dots between commercial aquafarming and the degradation of Puget Sound.**

Make commercial geoduck farming and other similar commercial enterprises a part of Governor Inslee's orca recovery task force study. The task force is planning longer-term action recommendations for orca recovery and future sustainability. To date, no cumulative impact studies have been conducted in Washington State to evaluate aquaculture production practices and its impacts on orcas, salmon and forage fish.

There are now extreme concerns about the loss of habitat and its effect on salmon and orcas. Based on the work of the Army Corps this concern is real and undeniable when it comes to geoduck aquaculture and the loss of the natural functions of the tidelands. The unreleased version of the Army Corps Cumulative Impacts Analysis confirms this concern.

Decision-makers must face the harsh truth - conservation or commerce? If we want both, careful analysis and determinations of threats caused by aquafarming has to be integral to the permitting process of land use and shoreline management.

Nothing less than the future of salmon and orcas is at stake. PLEASE PUSH THE PAUSE BUTTON UNTIL ALL OF THE FACTS ARE IN.

We are in the midst of a crisis in Puget Sound and this is critical information. It is not possible to make a reasoned determination about shellfish farming without all of the most relevant and recent information.

PLEASE - until we know more, let's avoid doing more harm!

I would appreciate being kept abreast of your decisions.

Thank you for your consideration.

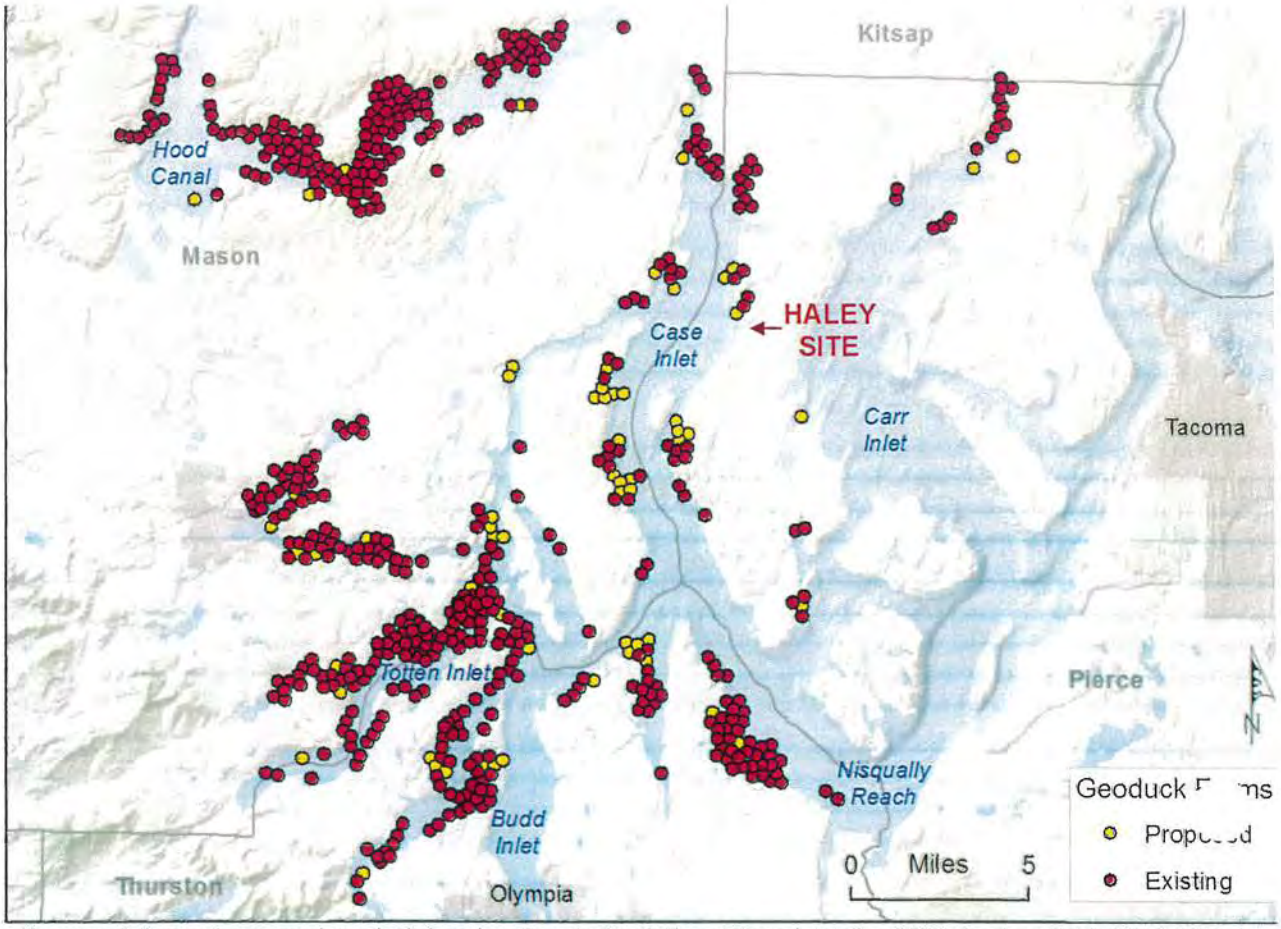
Carol Goss

Carol Goss
5729 Whispering Pines St NE
Olympia, WA 98516
cgosslink@gmail.com

(206) 251-6316

Enclosure:

Map of cumulative impacts of shellfish farms in South Sound



Known existing and proposed geoduck farm locations in South Puget Sound, totaling 625 in best-available 2012-2014 data

SMP Comment

Polly Stoker

From: Phyllis Farrell <phyllisfarrell681@hotmail.com>
Sent: Tuesday, August 20, 2019 2:21 PM
To: Patrick Townsend
Cc: Kathryn Townsend; Laura Hendricks; Kathy Knight; Anne Van Sweringen; Lois Ward; fredndanrc@aol.com; PlanningCommission
Subject: Re: Comments on proposed SMP

Thanks Patrick! I have family visiting and will be unable to attend the 8/21 meeting either.

I have already provided writtenand public comments advocating maintaining Shoreline buffers for sea level rise and " no net loss", banning or at least regulating hydraulic harvesting, and phasing out the use of the tons of PVC pipe and plastic netting used in industrial aquaculture. Your comments below should alert the Planning Commission to the problems in the permitting process language.

I am hoping our Planning Commission and staff make strong recommendations for the SMP to protect our shorelines for salmon/ Orca recovery.

Phyllis

Sent from my iPad

On Aug 20, 2019, at 11:46 AM, Patrick Townsend <patrick.townsend@townsendsecurity.com> wrote:

> Dear Planning Commissioners:
> Ave
> The proposed SMP changes the permitting type for geoduck aquaculture from the current Substantial Shoreline Development Permit (SSDP) to a Conditional User Permit (CUP). This seems extraordinarily inappropriate and misguided given that Thurston County initially determined that a SSDP permit was required for geoduck aquaculture due to the presence of plastic and net structures in the tideland. The decision by Thurston County was appealed by the shellfish industry, and the courts upheld the view of Thurston County. Thurston County expended considerable taxpayer resources developing and defending the requirement for an SSDP, and other counties followed this precedent. It appears to be an arbitrary and capricious action at this point to abandon the legal rulings, the monetary investment and all the study related to those rulings. Given the cumulative impact analysis of the Army Corps showing impacts of aquaculture on eelgrass, forage fish, and the ecosystem that includes endangered and threatened species like salmon and Southern Resident Killer Whales, it is ill-conceived that the County should arbitrarily change the regulations. The requirement for permitting is "no net loss."
>
> Please review the attached two documents from Judge Thomas R. Bjorgen and Judge Gary Tabor, who both ruled that PVC put into the tideland for geoduck farming constitutes a structure and therefore requires a shoreline

substantial development permit. The question of the discrepancy in the Draft SMP Update between permitting of geoduck aquaculture requiring a CUP and other shellfish aquaculture requiring SSDP must also be explained.

We are out of town and will not be able to attend the Planning Commission meeting on August 21, 2019. We will provide more extensive comments related to permitting for geoduck aquaculture when we return.

Thank you,

Patrick and Kathryn Townsend

Patrick Townsend
CEO

<20111028_TaylorArcadia_vs_ThursCnty_Superior_Tabor.pdf>

<20110121_ThurstonCnty_HearingExaminer_Bjorgen_Order_SDP.pdf>

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR THE COUNTY OF THURSTON

TAYLOR SHELLFISH COMPANY, INC.,	)	
Petitioners,	)	
vs.	)	
THURSTON COUNTY, et al.,	)	SUPERIOR COURT NO. 11-2-01019-5
Respondents.	)	

RULING OF THE COURT

BE IT REMEMBERED that on October 21, 2011, the above-entitled and numbered cause came on for hearing before JUDGE GARY R. TABOR, Thurston County Superior Court, Olympia, Washington.

Pamela R. Jones, Official Court Reporter
Certificate No. 2154
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For the Defendant:

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Deputy Prosecuting Attorney
2000 Lakeridge Drive SW
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October 21, 2011 Olympia, Washington

AFTERNOON SESSION

Department 4 Hon. Gary R. Tabor, Presiding

APPEARANCES:
For the Petitioners, Laura C. Kisielius, Attorney at Law; for the Respondent, Jeffrey G. Fancher, Deputy Prosecuting Attorney

Pamela R. Jones, Official Reporter

* * * * *

THE COURT: Counsel, in my time as a judge, one of my goals has been to try to do my preparation up front when matters come before me so that, if possible, I can issue a ruling after I've heard oral argument. It's come back to me that some people think, well, how can a judge just rule off the top of their head. I've spent considerable time going through the briefing and the record in this particular case to try to understand the issues. Counsels' arguments here today have been helpful to me, but I am prepared to issue a ruling.

I've somewhat jokingly said also over the years, that a judge has a pretty thankless job, because anytime a judge rules, half the room is mad at the judge. And while that's somewhat tongue in cheek, it's still obvious that somebody wins and somebody loses in issues that come before a court. That does

not mean that I don't take matters very seriously. I've also said that I have to call things the way I see them, and that does not mean that I'm taking my job less than very seriously.

While I recognize that in many cases any decision that this Court makes may be reviewed by a higher court, that does not in any way remove the responsibility from this Court to rule as I think the law and/or the facts require. I think that counsel both agree that the primary issue in this particular case boils down to definitions, and so we start out with the idea that there may be cases of substantial development requiring a specific permit process or review. I don't think anybody disagrees that this would be substantial, but the issue is, is it a development or are these three applications developments. It is only a development if the definition of "structure" applies, and so I've heard extensive argument. There's been extensive briefing about what the term "structure" means.

There has been an Attorney General's Opinion that indicated that the term "structure" did not apply to this type of situation in the opinion of the Attorney General. Well, everybody has conceded that this Court is not bound by an Attorney General's Opinion.

It doesn't mean that I shouldn't take it into account, doesn't mean that I can't agree with it, it means I don't have to. I guess I would just pose this: If the Attorney General had ruled that this was a structure, I suspect that petitioners here would be arguing that I don't have to follow the Attorney General's Opinion and they would be right. The issue is how I'm going to interpret this, because I agree that on issues of law this Court has the right to a de novo determination.

Now, by saying that, however, that does bring into play another issue. While my determination of the law can be de novo, I don't believe that I'm required here today to determine what the law is. Now, I may very well do so and give you my opinion; I'm not sure that that's required. I think what's required is whether I determine that the standard has been met and the standard is "clearly erroneous." Everybody agrees that that's the standard at least as to a portion of this. The petitioners have argued that it is clearly erroneous because it didn't follow what the law is if I accept the definition of "structure" that they pose.

By having to reach the issue of whether or not there is this clearly erroneous standard being met

here, however, I think I have to go back to what everybody has had to argue about structure. I found the hearings examiner's review of interpretation of the term "structure" extremely helpful. And by saying that, let me just stop for a moment and say one other thing.

When I was an attorney sitting on the other side of this bench, one of my pet peeves was a judge ruling on something that I'd argued and taking all day to do it, and it really frustrated me when I had to sit and listen to a judge drone on and on not knowing where the judge was going. And so one of my attempts to deal with that from the very beginning is I try not to beat around the bush too far. There is a danger to that. By telling you where I'm going, some people may not hear another word that I say if I've ruled against them. On the other hand, that's why we have a court reporter. People can go back, and I am going to tell you where I'm going and I'm going to go back and cover some of the territory that brings me there.

I'm denying the petitioner's appeal in this case because I believe that the term "structure" does apply to a situation such as this. I believe that the hearings examiner's analysis of this, including

looking at definitions of words, was clearly more in-depth and, in my opinion, appropriate than the Attorney General's Opinion. As Mr. Fancher has pointed out, the Attorney General's Opinion about the idea of structure, first of all, misinterprets the fact that there are two provisions to that definition, and secondly, only gives a few lines of analysis.

I believe, first of all, that the PVC tubes that we've talked about have been artificially built despite argument about "built" really means joined together, which I don't agree with because that's the second part of the two-part test. "Artificially built" can mean manufactured or in some other way fashioned. It is built. It's clear that that's built.

And secondly, as to "parts joined together," it seems to me that it is clear that when you take however many thousand tubes we're talking about and place them in a rather precise location in reference to one another, that is, a relative position of approximately one every square foot or slightly less than that, in the case of one of the farms, when the domain, if you will, the area of the farm is determined by those so-called juvenile clams, I found

that a little bit interesting, that term, but I understand we're talking about very small little clams that are being planted, if you will, in those tubes in the location that's allowed if the permit is issued, inside those tubes that are sunk into the sand are covered either individually or by an area netting. That is clearly, in my opinion, joined together in some definite manner. There is a relationship between the various tubes, in my opinion.

Now, having determined that I believe that's the commonsense determination of the law, I go back to the idea that I don't think I have to determine what the law is. I think what I just told you was probably dicta, because I think the real issue for me is whether or not the petitioners in this case have met their burden of proof for challenging this particular finding by, ultimately, the Board of County Commissioners, and that's clearly erroneous. "Clearly erroneous" means by definition that it's absolutely without question. There are very few issues in the law that are absolutely without question. I realize there are standards, criminal matters are beyond a reasonable doubt, most civil matters are by a preponderance of the evidence, but

an issue of saying absolutely this is what it means and no definition otherwise could be accepted is not met in this particular case.

When I look at the analysis by the hearings examiner versus the analysis by the Attorney General, and I guess I need to address the analysis that went along with the Attorney General by the Ecology saying that because of the Attorney General Opinion, the only issue for these types of projects is whether or not there is interference with normal public use of the surface waters. I don't agree with that.

But let me then go a step further in saying even if I am mistaken that Ecology's rule should be the standard, there is a troubling issue that, well, while it was addressed by the petitioners, I still think causes a problem in this particular case, and that is that Ecology in coming up with rules, while they did say that the Attorney General's Opinion should be part of those rules, they also pointed out that these rules, which they then call guidelines, don't apply to jurisdictions that have master programs already in effect that are already approved. That's the case here. And so I don't believe that those guidelines specifically apply. I believe there's a reason for that, and that is because the

local jurisdiction has been given deference about coming up with particular plans that accomplish the purposes of the Shoreline Management Act. While I recognize that there may have to be a review of a particular jurisdiction's decisions in that regard, I believe that the purposes that were cited by Mr. Fancher, both in his brief and orally here today, really go a considerable distance to say that there's a reason for allowing local jurisdictions to make decisions in cases like this.

I do not find that the County Commissioners exceeded their authority by clearly and erroneously determining that this was a substantial development. Their reliance upon the decision by the hearings examiner was within their discretion. They did not have to find for that, and so I'm upholding the decision by the Board of County Commissioners.

Now, there are several other issues that I need to address even though you know where I'm going. First of all, it my determination that I am only looking at the first issue of the four issues that were originally addressed. The parties here agree that the fourth issue about whether or not there's potential interference with normal public use of the surface waters is reserved for another day anyway.

But the second and third issues as to whether or not the method of harvest would remove some amount of sand or other minerals from the seabed, and third, that the tubes and netting would be an obstruction on the beach, are simply not ripe. Actually, I hadn't considered an argument that this was a ripeness issue, but that made absolute sense when I heard the two attorneys address it in that respect. I believe that the hearings examiner did not specifically rule on those issues two and three. As a matter of fact, he indicated that he would need more facts before he decided either issue, specifically as to number two, the removal of sand or minerals, and as to number three, there was more information that needed to be considered.

I noted, as has been pointed out here both orally and in the briefs, that there was a clear agreement by the growers that's found at record page 1181, that summary judgment is appropriate on the three grounds, but it goes on to say that if there is an issue that needs more factual determination, that there would need to be a further hearing. That was never requested, and so I'm not even going to go behind the decision by the hearings examiner and actually the decision by the Board of County Commissioners that's

specifically here for review today because those two issues are not ripe.

Now finally, in regard to telling you why I'm ruling as I've told you I am, I need to address the constitutional issues. First of all, the constitutional attack has a standard that is probably greater than any other standard I can think of, and that is, a court would have to find that the decision was arbitrary and capricious. My understanding of that standard is that I would have to find that no person in their right mind could ever rule in such a way, totally arbitrary, totally capricious. It does not concern itself with what the law says or what the facts are. It simply is a ruling without explanation. I don't find that to be the case here.

The primary argument is, again, that the County Commissioners did not address the WAC, which I pointed out is only a guideline, it is only a recommendation, and it is specifically not applicable to the County, as I understand it. And then finally, as to the whole process, I've read with interest the process that occurred in this particular case from the two meetings, the public meetings. They were public, they were open to anyone that wanted to appear, they did not concern any of these three

projects, they were informational meetings, and while the County Commissioners may have indicated that the Department could move forward as they saw fit, they did not predetermine any of these issues.

I'll also note with some interest that the petitioners were given the specific opportunity to object to the Board of County Commissioners at the time of the hearing. That's in the record, page 7 and 8. They chose not to file any objection. Now, I realize that constitutional issues didn't have to be raised with the hearing examiner or with the Board of County Commissioners, they can be raised to this Court, but there was no challenge to the Board of County Commissioners as being inappropriately comprised or that the fact that one County Commissioner had, apparently, talked with a representative of one of the petitioners; that there had been these public meetings in which, apparently, there weren't any specific invitations that went out to the petitioner parties in this particular case. But as I said, I don't find that those meetings were specifically on the issue that would later come before the Board of County Commissioners.

Let me just point out that if the petitioners had won in a hearing before -- well, let's go back.

Let's say they'd won with the Department, then there wouldn't have been a reason to complain. If they had won with the hearings examiner, there wouldn't be a reason to complain and they wouldn't be filing any review by the Board of County Commissioners. Now, I understand that the Department might, in that regard, but it simply does not appear to this Court that there was any violation of fundamental fairness or due process in the fact that a County Commission wears a number of hats at a number of different times, and the fact that they were talking with one of their Departments about issues that, while similar and in general on the same subject, they were not predetermining how they would decide a case when it came before them in their administrative review capacity or judicial capacity, if you will. And so I do not find that there was a violation of due process in this particular case.

Again, perhaps this is dicta, interesting that at one point the petitioners felt that they might not pursue requesting the permits until there had been further rulings by the state. At some point, then, they determined that they were going to go forward with objecting to having to present or request permits in this regard. Perhaps, and I don't know

and that's why this is probably dicta, they saw the writing on the wall that the Department of Ecology was actually going to formulate plans that appear to be more onerous as far as the review that would take place.

In that regard, it's interesting to this Court that the argument was that while definitions apply, and thus the petitioners should win, the plan doesn't apply because it's not in effect yet because the County has not implemented the changes and has a time period to do that. I understood that was December of this year, but I also heard that there was a one-year time period that could be set out if that's requested. In any event, this whole procedure involved whether or not a particular requirement would be placed upon the petitioners which they indicate is quite burdensome, or had the matter not come along as it did, what would have been a more burdensome or onerous process after the guidelines that have now been spoken of are implemented.

Finally, let me say that while I understand this appeal was about words, it's really interesting to me, and I asked I guess both counsel about this, the legislature, and this is a statute, 28B.20.475 at subsection (5) specifically states that they want

more study about how structures should be addressed in these types of situations. Specifically, they said the environmental effects of structures commonly used in the aquaculture industry to protect juvenile geoducks from predation. It seems to me that the idea of structure has been an issue that reasonable minds could differ on all along in this particular case, and I do not find that the Department of Ecology and their definition of "structure" is so iron clad that there is not an opportunity for reasonable minds to differ and, thus, the standard that I pointed out earlier as clearly erroneous has not been met in this particular case, and, if push comes to shove, this Court would say Ecology's definition of "structure" was not appropriate, and that the plain meaning of the term "structure" is more appropriately found in the analysis of the hearing examiner.

And so having ruled, are there any issues that I need to address that I failed to cover?

MR. FANCHER: Not from the County, Your Honor.

THE COURT: Then you will prepare findings or an order. I don't know that there have been to be findings and conclusions in that we have a record here.

MR. FANCHER: That's correct. Usually in a LUPA we just do an order very simple, either -- well, in this case it would just be denying the petition and because any review further up is a de novo anyway, so that's how it usually works.

THE COURT: All right. Then I assume that you'll need some time to prepare that. What I would suggest is if the two attorneys or the parties in this case in consultation with one another can agree as to language, that's fine, just submit that ex parte. If there needs to be a hearing based upon a disagreement about language, then you would need to note that for a presentation hearing.

MR. FANCHER: Thank you, Your Honor.

THE COURT: I appreciate the hard work on both sides in this case. We'll be in recess.

MS. KISIELIUS: Thank you, Your Honor.

(A recess was had.)

CERTIFICATE OF REPORTER

STATE OF WASHINGTON)

COUNTY OF THURSTON)

I, PAMELA R. JONES, RMR, Official Reporter of the Superior Court of the State of Washington, in and for the County of Thurston, do hereby certify:

That I was authorized to and did stenographically report the foregoing proceedings held in the above-entitled matter, as designated by counsel to be included in the transcript, and that the transcript is a true and complete record of my stenographic notes.

Dated this the 28th day of October, 2011.

PAMELA R. JONES, RMR
Official Court Reporter
Certificate No. 2154

ORDER ON CROSS-MOTIONS FOR SUMMARY JUDGMENT OF THE HEARING EXAMINER FOR THURSTON COUNTY

CASE NOS: 2010100540, 2010100420, and 2010100421 (Appeal of three administrative determinations by Resource Stewardship Department)

APPELLANTS: Taylor Shellfish Co., Inc., d/b/a Taylor Shellfish Farms; and Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood.

SUMMARY OF APPEALS: Taylor Shellfish Farms and Arcadia Point Seafood appeal determinations by the Thurston County Resource Stewardship Department that certain proposed geoduck aquaculture operations are "developments" under the state Shoreline Management Act.

SUMMARY OF ORDER:

The Department's summary judgment motion that the proposed geoduck operations are a "development" under the SMA because they involve "construction of a structure" is granted. The Appellants' summary judgment motion on the same issue is denied.

The summary judgment motions by the parties on whether the proposed operations are a "development" under the SMA because they involve "removal of any sand, gravel, or minerals" are denied due to the presence of genuine issues of material fact.

On the third ground of the administrative determinations, whether the tubes and netting serve as an obstruction on the beach, summary judgment is granted in favor of the Appellants on the issue of sediment movement: the proposed operations are not developments due to their effect on the movement of sediment. Summary judgment is not entered at this time on the other issues relating to this third ground, due to the need for further examination of the public trust doctrine and review of whether any Shoreline Hearings Board decisions address whether the "placing of obstructions" includes obstructions to marine life.

RECORD:

The procedural history of these motions is described in the Order, below. The following documents are relevant to these motions and are admitted into the record:

Exhibit 1. Appeal dated July 6, 2010 by Taylor Shellfish Co., Inc., d/b/a Taylor Shellfish Farms of the administrative determination dated June 30, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100540. This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 2. Appeal dated July 8, 2010 (stamped as received by Development Services on July 9, 2010) by Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood of the administrative determination dated July 1, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100420.
This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 3. Appeal dated July 8, 2010 (stamped as received by Development Services on July 9, 2010) by Blind Dog Enterprises LTD, d/b/a/ Arcadia Point Seafood of the administrative determination dated July 1, 2010 by the Thurston County Resource Stewardship Department relating to proposed geoduck aquaculture operation, Project No. 2010100421.
This exhibit contains the Appeal of Administrative Decision form, the Notice of Appeal of Administrative Decision, and attachments.

Exhibit 4. E-mail sent August 23, 2010 from Thomas Bjorgen to the parties.

Exhibit 5. E-mail sent August 24, 2010 from Thomas Bjorgen to the parties (Prehearing order).

Exhibit 6. E-mail sent October 26, 2010 from Thomas Bjorgen to the parties (Second prehearing order).

Exhibit 7. E-mail sent November 2, 2010 from Thomas Bjorgen to the parties (Second prehearing order supplement).

Exhibit 8. E-mail sent November 24, 2010 from Laura Kisielius to Thomas Bjorgen.

Exhibit 9. Stipulated Facts Regarding Proposed Geoduck Farm Operations, dated December 3, 2010, and accompanying e-mail sent December 3, 2010 from Laura Kisielius to Thomas Bjorgen.

Exhibit 10. E-mail sent December 8, 2010 from Thomas Bjorgen to the parties (Third prehearing order).

Exhibit 11. Appellants' Motion in Limine, dated December 8, 2010, with attachments.

Exhibit 12. Thurston County's Response to Motion in Limine, dated December 15, 2010, with attachments.

Exhibit 13. Appellants' Reply in Support of Motion in Limine, dated December 22, 2010, with attachments.

Exhibit 14. E-mail sent January 3, 2011 from Thomas Bjorgen to the parties.

Exhibit 15. E-mail sent January 3, 2011 from Jeff Fancher to Thomas Bjorgen, and e-mail sent January 4, 2011 from Laura Kisielius to Thomas Bjorgen.
Exhibit 16. E-mail sent January 6, 2011 from Thomas Bjorgen to the parties.

No testimony was taken in deciding these motions.

ORDER

A. Nature and location of the proposed geoduck operations.

The Appellants desire to establish shellfish farms on tidelands along Henderson Inlet in unincorporated Thurston County. To that end, Appellant Taylor Shellfish leased tidelands on Thurston County Assessor's Parcel No. 11905230300, known as the Lockhart property. Appellant Arcadia Point leased two tideland parcels, Assessor's Parcel No. 11905330200 (the McClure property) and Assessor's Parcel No. 11905230400 (the Thiesen property). The Lockhart and Thiesen properties are adjacent. The McClure property is approximately 1/4 mile south of the Thiesen property. Ex. 9, Stipulated Facts, Section 1.

Arcadia Point intends to use the McClure and Thiesen properties for geoduck farming. Its proposed method of operation is set out in Sections 4, 5, 8 and 9 of the Stipulated Facts at Ex. 9. In summary, the area on which the geoduck operations would be located on the McClure property is from .60 to .75 acres in size. On the Thiesen property the area is approximately 1.0 to 1.5 acres. PVC tubes four inches in diameter and ten inches in length would be pushed vertically into the beach substrate at a density not to exceed one tube per square foot. Approximately four to six inches of each tube will be exposed at the surface of the sand when the tide is out. Juvenile geoduck clams will be inserted into each tube, which will then be covered with a mesh cap secured with a rubber band. The purpose of the tubes and mesh caps is to prevent predators from killing juvenile geoducks. In 12 months or less, the mesh caps will be removed and the tubes will be covered with area netting to contain the tubes as the geoducks grow and push the tubes from the sand and to protect them from predators. The net is secured using "U" shaped rebar, which will be pushed in flush with the sand. No later than 24 months after insertion, the tubes and area netting will be removed entirely, although the netting may be installed again depending on the level of benthic predators. Between five and seven years after planting, the geoducks will be removed. Harvesting will take place by loosening the sand around the geoduck using a pressurized hose and nozzle and a vessel-mounted high volume, low pressure water pump. The clams would be extracted one at a time by hand. Ex. 9, Stipulated Facts, Sections 4, 5, 8 and 9.

Taylor Shellfish intends to use the Lockhart property for geoduck farming. The area subject top the operations would be from .12 to .9 acres in size. Its proposed method of operation is the same as that described above, with the small differences noted in Section 6 of the Stipulated Facts. These differences are not relevant to the decision of these motions.

The parties stipulate that the purpose of the area or canopy nets "can be to contain loose tubes, to prevent predators from killing juvenile geoducks, or both." Ex. 9, Section 8.

B. Procedural history.

The Appellants and the County staff disagreed whether the proposed activities constituted "development" under RCW 90.58.030 (3), part of the state Shoreline Management Act (SMA). The Appellants and the County Staff agreed that the Appellants would submit information to the County for the sole purpose of allowing the Staff to administratively determine whether the proposals were "developments" under the SMA. The Appellants submitted this information. Ex. 9, Stipulated Facts, Sections 2 and 3.

On June 30, 2010 the Resource Stewardship Department issued an administrative determination for the proposal on the Lockhart property, found at Ex. 1. On July 1, 2010 the Department issued administrative determinations for the proposals on the Thiesen and McClure properties, found, respectively, at Ex. 2 and 3.

Each of these administrative determinations concluded that the proposed activities constituted "development" under the SMA.[1] Each determination rested on the same four grounds:

1. The placement of tubes and netting on the beach constitutes construction of a structure.

2. The method of harvest will remove some amount of sand and other minerals from the seabed.

3. The tubes and netting serve as an obstruction on the beach.

4. The tubes and netting, even though temporary, will potentially interfere with the normal public use of the surface waters, particularly during low tides.

See Ex. 1, 2 and 3.

On July 6, 2010 Taylor Shellfish Farms appealed the Department's determination relating to the proposed operations on the Lockhart property.
On July 9, 2010 Arcadia Point Seafood appealed the administrative determinations relating to the proposed operations on the Thiesen and McClure properties.

On December 3, 2010 the parties submitted a set of stipulated facts, found at Ex. 9.

On December 8, 2010 the Appellants submitted a motion in limine, found at Ex. 11, asking that issues related to the first three grounds of the administrative determinations set out above be determined as a matter of law on the basis of the stipulated facts, without the submission of testimony. The motion also asked that the fourth ground be determined after a hearing, with the opportunity to submit testimony and other evidence.

On December 15, 2010 the Department filed its response to the motion in limine, found at Ex. 12. The Department opposed the motion in limine and also asked that, based solely on

[1] Each of these determinations also concludes that the proposals are "substantial" developments, because they exceed the set monetary threshold. Their characterizations as "substantial" is not at issue in these appeals.

the stipulated facts, all three proposals be found to meet the definition of development, obviating the need for a hearing on the appeals.

On December 22, 2010 Appellants filed their reply in support of their motion in limine, found at Ex. 13. Among other matters, the Appellants characterized the Department's position as seeking to convert the motion in limine to a partial summary judgment motion requesting a decision on the first three grounds of the administrative determinations as a matter of law based on the stipulated facts. After receiving clarification from each party, the Hearing Examiner at Ex. 16 characterized the posture of the motions as follows:

> Each party requests summary judgment in its favor on each of the first three grounds on which the administrative determinations at issue are based. Each party asks that summary judgment be granted on the basis of the stipulated facts of December 3, 2010.
>
> Neither party asks to submit additional briefing on the summary judgment motions.
>
> Each party agrees that the fourth ground of the administrative determinations would be decided through an evidentiary hearing. The results of the summary judgment motions may affect whether that ground is reached.
>
> If any part of the motion in limine remains live after the summary judgment decision, it will be decided soon after.

C. <u>The summary judgment motions</u>.

1. <u>Authorization of summary judgment motions</u>.

Summary judgment in Superior Court is granted

> "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law."

Superior Court Civil Rule (CR) 56.

Chapter II, Section 2.6 of the Hearing Examiner Rules imposes a page limitation for motions, plainly implying that motions are authorized. The heart of summary judgment is simply the determination that under agreed or uncontested facts, a party is entitled to prevail under applicable law. Since this determination would be made without an evidentiary hearing, it is suitable for decision by motion under the Hearing Examiner Rules, especially when all parties agree to it. Thus, summary judgment is one of the motions impliedly authorized by the Hearing Examiner Rules.

2. <u>Interpretation of relevant SMA provisions</u>.

Each party makes a number of arguments as to how the SMA should be interpreted in resolving the issues presented by this appeal. These more general points are addressed before reaching the specific issues on appeal.

The Department points out that RCW 90.58.900 states that the SMA

> "is exempted from the rule of strict construction, and it shall be liberally construed to give full effect to the objectives and purposes for which it was enacted."

The Department also notes that the Supreme Court has held that "the SMA is to be broadly construed in order to protect the state shorelines as fully as possible." Buechel v. Department of Ecology, 125 Wn.2d 196, 203 (1994).

The SMA serves both the purposes of protecting the natural and ecological functions of the shorelines and planning for and fostering all reasonable and appropriate uses. See 90.58.020. Therefore, the mandate of RCW 90.58.900 to liberally construe the Act to serve its purposes does not perceptibly push in either direction in construing the definition of development. The holding in Buechel, on the other hand, has much less of the protean about it. The Court's direction to broadly construe the Act to protect the shorelines as fully as possible leans in favor of a broader scope of the definition of "development", everything else being equal, since that will ensure a more thorough implementation of shoreline policies through the permitting process.

The Appellants contend that the broader scope of "development" argued by the Department is inconsistent with the policies of the SMA. The Appellants state that RCW 90.58.020 directs that preference be given to shoreline uses that, among other things, recognize and protect the statewide interest over local interest, result in long term over short term benefit, and protect the resources and ecology of the shoreline. The Appellants then cite to WAC 173-26-241 (3) (b) which states that shellfish aquaculture is of statewide interest and that, "properly managed, it can result in long-term over short-term benefit and can protect the resources and ecology of the shoreline." Therefore, Appellants argue, shellfish aquaculture is a preferred use under RCW 90.58.020, leaving the Department's broad reading of "development" inconsistent with the Act.

However, the statement in RCW 90.58.020 on which the Appellants rely applies to shorelines of statewide significance, and the sites at issue are not such shorelines under the definitions in RCW 90.58.030. On the other hand, the preferences in RCW 90.58.020 cited by the Appellants do seem consistent with the general purposes of the Act. This shows that the Appellants' argument retains its force, even if these are not shorelines of statewide significance.

Turning to the merits of that argument, RCW 90.58.020 states in pertinent part:

> "The department, in adopting guidelines for shorelines of statewide significance, and local government, in developing master programs for shorelines of statewide significance, shall give preference to uses in the following order of preference which:
>
> (1) Recognize and protect the statewide interest over local interest;

(2) Preserve the natural character of the shoreline;

(3) Result in long term over short term benefit;

(4) Protect the resources and ecology of the shoreline;

(5) Increase public access to publicly owned areas of the shorelines;

(6) Increase recreational opportunities for the public in the shoreline;

(7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary."

This, by its express terms, is a ranking of preference among different uses. It does not suggest that any use, no matter how highly ranked, should be preferred over no development by narrowing the scope of permitting requirements. Such a conclusion would ignore the status of the natural features of the shorelines as an element of the statewide interest and the highly ranked position of the natural character of the shorelines in the hierarchy of preferences in RCW 90.58.020. Thus, these policies do not favor either interpretation of "development" in these appeals.

The Appellants state also that shellfish beds are identified as both priority habitats and critical saltwater habitats by the state shoreline rules. They argue that the Department's attempt to regulate shellfish beds as developments is antithetical to the SMA's protection of critical saltwater habitats and that a similar argument was rejected by the Ninth Circuit in APHETI v. Taylor Resources, 299 F.3d 1007 (2002). The issue in that case, in the words of the Court, was

"whether the mussel shells, mussel feces and other biological materials emitted from mussels grown on harvesting rafts . . . constitute the discharge of pollutants from a point source without a permit in violation of the Clean Water Act."

APHETI, supra. The Court answered this question in the negative for a number of reasons. Most pertinently, the Court stated that

"Congress plainly and explicitly listed the “protection and *propagation* of . . . shellfish” as one of the goals of reduced pollution and cleaner water. 33 U.S.C. § 1251(a)(2) (emphasis added) . . . It would be anomalous to conclude that the living shellfish sought to be *protected* under the Act are, at the same time, “pollutants,” the discharge of which may be *proscribed* by the Act. Such a holding would contravene clear congressional intent, give unintended effect to the ambiguous language of the Act and undermine the integrity of its prohibitions."

Id. at 1016. The Applicant argues it is similarly anomalous to conclude that shellfish beds to be protected from encroaching development are also regulated as development under the SMA. Ex. 13, pp. 6-7.

The Appellants' argument is supported by the inference in APHETI that the Clean Water Act's goal of protecting and propagating shellfish means that the natural emissions of shellfish are not subject to NPDES permits. The shoreline rules have a similar goal of protecting

shellfish beds as critical saltwater habitats. The heart of the Court's reasoning, though, was the anomaly of deeming shellfish protected by the Act to be pollutants which can be proscribed under the Act. A similar contradiction is not present in requiring shellfish operations to obtain a permit under the SMA, since the more particular scrutiny afforded by the permit process should better reconcile potentially conflicting shoreline policies touching shellfish farming. Without deciding the issue, the rationale of APHETI could provide an argument against denial of a permit once the merits of the permit are reached. For the reasons given, though, I do not believe it supports any exemption from the permit process itself.

WAC 173.26.020 (24) defines priority habitat as "a habitat type with unique or significant value to one or more species." It states further that an area classified as priority habitat must have one or more of thirteen listed attributes, one of which is "shellfish bed". However, to say that a priority habitat may be a shellfish bed does not imply that all shellfish beds are priority habitats. To do so ignores the heart of the definition that a priority habitat must have unique or significant value to one or more species. The stipulated facts and cited legal authority are insufficient to show that the beds in question are priority habitats.

On the other hand, WAC 173-26-221 (2) (c) (iii) does plainly define critical saltwater habitats to include all commercial and recreational shellfish beds, among other items.[2] Master programs, according to WAC 173-26-221 (2) (c) (iii) (B), "shall include policies and regulations to protect critical saltwater habitats and should implement planning policies and programs to restore such habitats." This subsection states further that "all public and private tidelands or bedlands suitable for shellfish harvest shall be classified as critical areas", presumably critical saltwater habitats.

The designation of shellfish beds as a critical area, though, hardly implies a blanket exemption from shoreline permit requirements. On the contrary, the complexities of applying other shoreline policies in light of those protecting critical saltwater habitats, if anything, increases the worth of a principled permit process. Designation as a critical saltwater habitat does not support a narrower reading of "development" and a consequently narrower scope of the permit process.

3. The first ground of the administrative determinations: that the placement of tubes and netting on the beach constitutes construction of a structure.

By agreement of the parties, the facts on which summary judgment will be decided are those set out in the stipulation of facts at Ex. 9. Those facts relevant to decision of this first ground are set out in Sections 4, 5, 6 and 8 of the stipulation and are summarized above, although not necessarily comprehensively. Any factual allegations not set out in the stipulation will be considered, if at all, only in deciding whether genuine issues of material fact are present.

[2] WAC 173-26 comprises the 2003 shoreline rules, which govern the adoption of shoreline master programs. The County's current SMP was adopted before those rules were promulgated and therefore is not subject to their terms. WAC 173-26-010, however, states that "[t]he provisions of this chapter implement the requirements of [the SMA]." Therefore, I believe the Appellants are correct that these rules may be consulted in interpreting the SMA, even though the County's new master program is not yet adopted.

Factual allegations outside the stipulation will not be considered in establishing any matter of fact.

A substantial development permit (SDP) is required for a use or activity on the shorelines which is both "substantial" and a "development". RCW 90.58.140. Under RCW 90.58.030 (3) (e), a development is "substantial" if its total cost or fair market value exceeds $5718 or if it materially interferes with the normal public use of the water or shorelines of the state. It is not disputed that the cost or value of each proposed operation would exceed this monetary threshold. Thus, the validity of the administrative determinations turns on whether the proposed geoduck operations count as "development".

"Development" is defined by RCW 90.58.030 (3) (a) as

> "a use consisting of the construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal of any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters overlying lands subject to this chapter at any state of water level;"

This definition is the same as that in WAC 173-27-030.

Under these definitions, the key question in the challenge to the first ground of the administrative determinations is whether the proposed operations will involve "construction" of a "structure".

The shoreline rules define "structure" as

> "a permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner, whether installed on, above, or below the surface of the ground or water, except for vessels."

WAC 173-27-030 (15).

The Thurston Region Shoreline Master Program (SMP), on the other hand, defines "structure" as

> "[a]nything constructed in the ground, or anything erected which requires location on the ground or water, or is attached to something having location on or in the ground or water."

This definition, especially its reference to "anything erected which requires location on the ground or water", could, in this context, be substantially broader than the definition in WAC 173-27-030 (15).

Local master programs must be consistent with the shoreline rules found in the WAC. RCW 90.58.080 (1).[3] An ordinance improperly conflicts with a statute if it "permits or licenses

[3] See Footnote 2, above.

that which the statute forbids and prohibits, and vice versa." Weden v. San Juan County, 135 Wn.2d 678, 693 (1998); citing Bellingham v. Schampera, 57 Wn.2d 106, 111 (1960). The broader scope of the definition of "structure" in the SMP, above, does not prohibit that which the statute (or rule) permits, but rather it arguably requires an SDP for an activity for which the statute or rule would not. The requiring of a permit, though, could have just as severe consequences as a flat prohibition. Thus, the Weden/Schampera approach seems also suited to determining whether an SMP's broader definition of "development" would conflict with the WAC rule. Since the broader SMP definition would require an SDP for a use for which the WAC rule would not, it would raise an impermissible conflict by analogy to those decisions.

Perhaps an even more basic principle in determining whether a subordinate level of government may expand restrictions adopted at a superior level is legislative intent. See Ray v. ARCO, 435 U.S. 151 (1978). In that case the Supreme Court held that certain state regulations of oil tankers were preempted by federal law, because

> "[e]nforcement of the state requirements would at least frustrate what seems to us to be the evident congressional intention to establish a uniform federal regime controlling the design of oil tankers."

Ray, 435 U.S. at 165. Although the SMA is focused on local control, it does include detailed definitions as to what counts as a substantial development and establishes the permit for a substantial development as a centerpiece of shoreline regulation. This permitting scheme was adopted by the legislature in service of the sometimes jostling goals of protecting the natural and ecological functions of the shorelines, while planning for and fostering all reasonable and appropriate uses. See 90.58.020.

The adoption of detailed permit thresholds to serve potentially conflicting goals strongly suggests that the legislature intended they be followed. Although a county has ample scope in adopting the policies under which SDPs are judged, I think it must accept the state's call as to when they are required. Therefore, the definition of structure in WAC 173-27-030 (15) will control.

Returning to the examination of that definition, the geoduck activities described in the stipulation do not constitute "a permanent or temporary edifice or building". Thus, they do not involve a structure under the first element of the definition.

The second element is disjunctive: "any piece of work artificially built or composed of parts joined together in some definite manner . . ." Under this, a use involves a structure if it involves a "piece of work artificially built". Under customary definitions, the PVC tubes are pieces of work and are artificially built. This seems plainly to classify them as structures under WAC 173-27-030 (15). The Appellants argue to the contrary that although the tubes are artificial, the tubes and netting together are not a piece of work artificially built, since "built" is defined as "composed of pieces or parts joined systematically". Ex. 13, p. 10. Since the tubes are not joined together by the net, the Appellants argue, the use is not "built" under applicable definitions. Id.

Under this argument, a use could consist of different structures (pieces of work artificially built), but would not itself be a structure unless the constituent structures were "joined

systematically". This position taxes logic with the result that a use consisting exclusively of structures would itself not be a structure unless the constituent structures were satisfactorily joined. Similarly, it contradicts the definition of structure as "any piece of work artificially built". (Emph. mine.) It also would effectively remove the "or" from the definition of structure by requiring that constituent structures also be joined systematically. For these reasons, I don't believe this argument is consistent either with the text of the definitions or the purposes they serve. The proposed geoduck operations involve structures.

The second prong of the disjunctive definition noted above is "a piece of work . . . composed of parts joined together in some definite manner". Whether the proposal involves a structure under this definition is less certain. The only way in which the PVC tubes are arguably "joined together" in the proposed operations is through the area net which is spread over them. The net is not attached to the tubes, but is stretched over them and anchored to the sea bottom with rebar. The Appellants argue through a forceful analogy that if this is enough to make a structure, then every woodpile with a tarp over it is also a structure, since the tarp protects the pile from the elements as the net protects the geoducks from predators. If it be objected that the net also holds loose tubes together, the analogy could be modified to a tarp spread over a pile of leaves to keep them from blowing away. In either event, deeming the presence of the tarp sufficient to transform the pile into a structure seems counter to both ordinary usage and the building codes.

What may seem absurd under one set of laws, though, is not necessarily so under others. As far as process is concerned, the heart of the purpose of the SMA is the recognition that

> "coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

RCW 90.58.020.

Turning to substance, the legislature stated that

> "[i]t is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto."

RCW 90.58.020.

The SMA implements these policies in part through a permit system. The definition of development is in large part the litmus showing when a permit is required for a proposed use. Whether or not it is absurd to deem the tarp to make a structure, it is not irrational or absurd for the legislature to decide that having parts joined together in some definite manner makes a piece of work a "structure" in applying this prong of the definition of development. To fully serve the SMA policies just noted, interpretation should lean in the direction of the broader reading of these definitions. Inclusion of a doubtful case in the permit process better serves those policies, both procedural and substantive, than exclusion.

The PVC tubes, mesh caps and nets are pieces of work, individually or collectively. The tubes are parts of that work. Their array or configuration is in "a definite manner". The question, then, is whether they are "joined together" in that manner.

The area net is spread over and comes into contact with the tubes, but is not attached to them. The two purposes of the nets are to contain loose tubes and afford protection from predators. Ex. 9. Thus, the nets do not hold the tubes together or in place. Only when they come loose does the net contain them.

"Join" is not defined in the SMA, its implementing rules or the SMP. The principal dictionary definitions of "join" are

> "to put or bring together and fasten, connect or relate so as to form a single unit, a whole or continuity . . .
>
> to put or bring into close contact, association or relationship . . .
>
> to come into the company of . . ."

Webster's Third New International Dictionary (1976). The third of these entries, though, is likely not apt, since its examples all relate to persons.

The use of the terms "fasten" and "connect" in the first entry suggests that the net does not "join" the tubes, since the net is not attached to them and only holds them together if they come loose from the sea bottom. On the other hand, the facts that the net is anchored so as to close the area of the tubes to predators and that it is placed to contain the tubes as they are pushed from the sand suggests that it brings the parts into association or relationship, thus falling within the second entry. Ordinary English usage welcomes either reading.

The objective of statutory construction is "to ascertain legislative intent as expressed in the statute." Martin v. Meier, 111 Wn.2d 471, 479 (1988). More specifically,

> "[i]n determining the meaning of words used but not defined in a statute, a court must give careful consideration to the subject matter involved, the context in which the words are used, and the purpose of the statute [cit. om.] 'Language within a statute must be read in context with the entire statute and construed in a manner consistent with the general purposes of the statute.' [cit. om.]"

PUD of Lewis County v. WPPSS, 104 Wn.2d 353, 369 (1985). In short, the "paramount concern"

> "is to ensure that the statute is interpreted consistently with the underlying policy of the statute."

Safeco Insurance Co. v. Meyering, 102 Wn.2d 385, 392 (1984).

For the reasons expressed above, when the text of the law and available definitions leave the matter equally doubtful, the procedural and substantive polices of the SMA are better served by navigating the permit process. Therefore, the PVC tubes should be deemed "joined" for purposes of the definition of "structure".

The final step is to determine whether the use involves the "construction" of a structure, as stated in RCW 90.58.030 (3) (a), when none of the constituent parts of the operations is actually constructed in the shoreline. Although "construction" is not defined in the SMA, other definitions in it answer this question.

RCW 90.58.030 (3) (e) defines substantial development and exempts from its scope the "construction or modification of navigational aids such as channel markers and anchor buoy." Unless they are deemed "obstructions', navigational aids would only be deemed developments or substantial developments by virtue of involving construction of a structure. Buoys and the like are constructed on shore and placed in waters subject to the SMA. Thus, under the Act the placement of structures in the shorelines counts as construction. Therefore, placement of the tubes and nets involve "construction" of a structure.

These conclusions, however, are contradicted by Attorney General Opinion (AGO) 2007 No. 1. That opinion addressed, among others, the question whether shoreline substantial development permits are required for planting, growing and harvesting farm-raised geoducks by private parties. The method of geoduck operations examined by the AGO is virtually the same as that involved in these appeals. The AGO concluded that geoduck operations would fall within the definition of "development" in the SMA only if they caused substantial interference with normal public use of the surface waters, one of the elements of that definition. The AGO concluded that geoduck operations would not fall within any of the other elements of the definition of development.

The AGO cited the definition of structure from WAC 173-27-030 (15) as "a permanent or temporary edifice or building, or any piece of work artificially built or composed of parts joined together in some definite manner", the same definition analysed above. The AGO noted that the PVC tubes are not edifices or buildings and do not form an edifice or building taken together. The opinion stated also that the tubes are not parts joined together in a definite manner. Therefore, it concluded, geoduck operations do not involve structures.

This analysis, however, ignored without explanation the element of the definition including "any piece of work artificially built". In doing so, the AGO read the word "or" out of the definition in violation of the canon of construction that a legislative body is presumed not to have used superfluous words and that meaning, if possible, must be accorded to every word in a statute. See Applied Industrial Materials v. Melton, 74 Wn. App. 73 (1994). The only way of

according meaning to every word in the definition of "structure" is to deem it also to include "any piece of work artificially built". When that is done, as shown above, the proposed operations must be deemed to involve structures.

In addressing the "composed of parts joined together" prong of the definition, the AGO concluded that the tubes do not meet this description, but did not analyse the definition of "join" or the structure or function of the area net. Those analyses, as shown above, indicate that the tubes and net constitute a structure under this prong also.

The AGO states that its conclusion is reinforced by the decision in Cowiche Canyon Conservancy v. Bosley, 118 Wn.2d 801 (1992), in which the Court rejected the argument that the removal of railroad trestles was a development, because it modified a structure. The Department argues at Ex. 12 that Cowiche Canyon has no application to this case, because it involves removal, not installation. The Appellants reply at Ex. 13 that the relevance of the case lies in its use of a common-sense approach in concluding that removal is not modification. The Appellants are correct, but the analysis above applies that common-sense approach in concluding that these operations are structures under the definition.

As the Appellants point out in Ex. 13, Attorney General Opinions are not controlling, but are entitled to great weight. Thurston County v. City of Olympia, 151 Wn.2d 171, 177 (2004). As also pointed out by Appellants, greater weight attaches to an agency interpretation when the legislature acquiesces in that interpretation, and the legislature has not overturned this AGO, even though it has adopted legislation concerning geoducks since its issuance. Legislative acquiescence, however, "is not conclusive, but is merely one factor to consider." Meyering, 102 Wn.2d at 392.

These rules, I believe, mean that an Attorney General Opinion is something more than a tiebreaker if a decision cannot be made on other grounds. They mean, at least, that an AGO must play a prominent and weighty role in making the decision. It is not, however, conclusive.

Here the AGO failed to consider part of the definition which it was construing, the element deeming "any piece of work artificially built" to be a structure. Nor did it offer any analysis construing the definition to exclude that element. This decision, therefore, does not so much disagree with the AGO's analysis, as fill in an element not treated in it. This decision does disagree with the AGO's conclusions, but, for the reasons above, I believe that disagreement is well founded.

The other element of the definition, "piece of work . . . composed of parts joined together in some definite manner . . ." is, as noted, a much closer call. As such, the deference accorded Attorney General Opinions becomes more important. However, as noted the AGO does not analyse the definition of "join" or the structure or function of the area net. When that is done, and the policies of the SMA and the canons of construction are examined, the discussion above shows, I believe, that the better interpretation is that this counts as a structure. Following the AGO in spite of this would elevate "great weight" to conclusiveness, which is not the role of an AGO.

4. The second ground of the administrative determinations: that the proposal will involve the removal of sand, gravel or minerals.

As noted, "development" is defined by RCW 90.58.030 (3) (a) to include "removal of any sand, gravel, or minerals".

The Department states at Ex. 12, pp. 9-10, that proposed operations will remove sand from the site, will generate a turbid plume which transports sediment off the site, will result in loss of elevation at the site due to sand removal, and will increase erosion during storms. The Department bases these factual allegations on a consultant statement and the Washington Geoduck Growers Environmental Codes of Practice, part of Ex. 12.

None of these factual allegations are included in the stipulation of facts at Ex. 9. The principal stipulated facts concerning harvesting are that the sand around the geoduck will be loosened using a pressurized hose and nozzle and a vessel-mounted high volume, low pressure water pump. The clams will then be extracted one at a time by hand. See Ex. 9, Sections 4 and 9.

The parties have stipulated that the summary judgment motions will be decided on the basis of the stipulated facts. This is consistent with the nature of summary judgment, which can only rely on facts which are agreed or which raise no material issue. See CR 56. The Appellants make clear at Ex. 13, p. 2 that they dispute the factual allegations made by the Department in Ex. 12 and are ready to offer contrary evidence.

For these reasons, the factual allegations in Ex. 12 cannot be relied on for the truth of the matters asserted. Only the facts stipulated in Ex. 9 may play that role. The allegations in Ex. 12, however, along with the Appellants' statement at Ex. 13, p. 2, show that the amount and nature of sand or sediment removal is a genuine issue of fact.

The Department points out also that the definition of development includes "removal of **any** sand, gravel, or minerals" (emph. added) and argues that by their nature these operations will result in some removal of sand and sediment through injection of pressurized water and loosening of the geoducks. Based on the stipulation only, I expect the Department is correct in this factual assertion. However, I do not believe the Department is correct in the implied corollary, that the disturbance of the minutest amount of sediment counts as removal under the definition. If that were the case, as the Appellants argue, walking on the beach at low tide would be a "development", since some sand or mud would be removed on shoes. To avoid this strained or absurd consequence, some minimal amount or type of removal of beach material must be allowed without triggering characterization as a development. The nature of that threshold need not be determined here. Its presence, though, means that the Department's argument cannot be accepted.

The Appellants invoke in their favor the canon of construction providing that the meaning of words may be indicated or controlled by those with which they are associated. See State v. Roggenkamp, 153 Wn.2d 614, 623 (2005). They argue that since sand, gravel, and minerals are all materials that are mined in the shorelines, this prong of the definition is intended only to capture the mining of those materials. The purpose of the canons of construction, as with all statutory construction, is to identify and serve legislative intent. Martin, supra. To determine that intent, a court will look first to the language of the statute. Where statutory language is plain and unambiguous, a statute's meaning must be derived from its wording. SEIU v. Superintendent of Public Instruction, 104 Wn.2d 344, 348 (1985).

The use of the word "any" in this definition signals a plain intent to include actions beyond mining. The ambiguity in the *de minimus* threshold just discussed is best dissolved by judicial implication of a reasonable minimum level, not through narrowing the definition's scope to contradict its terms. Further, the inclusion of "dredging" in the definition of development, an activity commonly associated with seabed mining, suggests that the prong of the definition under consideration was intended to reach beyond mining. The reference to "removal of any sand, gravel, or minerals" is not restricted to mining.

The Appellants' principal argument on this point rests on the AGO discussed above and the adherence of the Department of Ecology and Department of Natural Resources to it. The AGO characterized geoduck harvesting as incidentally releasing silt and sediment which may temporarily be found in the surrounding water. AGO 2007 No. 1, p. 2. The AGO concluded that this did not involve the "removal of any sand, gravel, or minerals" for two reasons. First, the disruption of substrate around a geoduck cannot legally be distinguished from clam digging or raking and it would be too burdensome to require substantial development permits for all significant clam beds. Id. at 7. Second, only a "minimal" amount of materials would be removed.

The Attorney General is authorized to give written opinions "upon constitutional or legal questions." RCW 43.10.030 (7). The conclusion that a specific set of facts falls within a statutory definition is an opinion on a legal question. Thus, this AGO's analysis of whether described geoduck operations constituted a structure was an authorized role of an AGO. Here, in contrast, without citing any evidence, the AGO concludes that the geoduck operations will only remove a "minimal" amount of materials and thus do not meet this prong of the definition of development. This conclusion is announced, no matter what the consistency of the substrate, what the pressure of the water used, what the length of water injection, or what the characteristics of water or current; and without any consideration of how much sand or sediment might in fact be removed under these varying conditions. These are factual determinations and, as the assertions of the Appellants and Department suggest, likely highly contested factual determinations. As such, they are not amenable to determination as a matter of law or by definition. The AGO's attempt to do so, I believe, was beyond the authority of RCW 43.10.030 (7).

The AGO also expresses concern that a contrary interpretation would have the unintended consequence of requiring other clam operations to obtain a substantial development permit. This would be persuasive if it were established that geoduck and other clam harvesting disrupts a similar amount of substrate and that other clam harvesting is exempt from obtaining a substantial development permit. The first point is a matter of fact which is assumed by the AGO. The second is a legal issue which is touched only through the statement: "We find no indication that the SMA has ever treated clam harvesting, alone, as development." AGO 2007 No. 1, p. 2. The lack of such an indication, however, doe not necessarily show that all clam harvesting is in fact exempt under the SMA.

Whether these geoduck proposals constitute development through the removal of any sand, gravel, or minerals raises a number of issues of material fact and is not amenable to resolution through this AGO. Therefore, the summary judgment motions by Appellants and the Department on this issue are denied.

5. The third ground of the administrative determinations: that the tubes and netting serve as an obstruction on the beach.

RCW 90.58.030 (3) (a) defines development to include "placing of obstructions". Because the definition also includes "any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters", the obstructions referred to seem intended to be other than those interfering with normal public use of the surface of the waters. The administrative determination on appeal is consistent with this view, finding that the tubes and netting are an obstruction "on the beach".

The tidelands on which these operations are proposed are privately owned. See Ex. 9, Section 1. Under general principles of property law, the private owners could exclude the public from walking on their beaches. See Presbytery of Seattle v. King County, 114 Wn.2d 320 (1990) (the right to exclude others is one of the fundamental attributes of property ownership). The AGO discussed above concluded that tubes could obstruct one walking on the beach, but that would only be relevant if the public had a right to use the tidelands. Thus, the AGO concluded, a geoduck operation on private tidelands would not constitute development through the placing of obstructions. Implicit in this holding is the view that "obstructions" refers to the impeding of human passage, not that of fish, shellfish or sediment.

The AGO's conclusion that tubes and nets cannot obstruct public passage on beaches which the public has no right to use is sound in both logic and policy. Before resting in that conclusion, though, the public trust doctrine must be examined.

Our Supreme Court outlined the public trust doctrine in the following holdings from Caminiti v. Boyle, 107 Wn.2d 662 (1987):

> ". . . the State's ownership of tidelands and shorelands is not limited to the ordinary incidents of legal title, but is comprised of two distinct aspects.
>
> The first aspect of such state ownership is historically referred to as the jus privatum or private property interest. As owner, the state holds full proprietary rights in tidelands and shorelands and has fee simple title to such lands. Thus, the state may convey title to tidelands and shorelands in any manner and for any purpose not forbidden by the state or federal constitutions and its grantees take title as absolutely as if the transaction were between private individuals . . .
>
> The second aspect of the state's ownership of tidelands and shorelands is historically referred to as the jus publicum or public authority interest . . . More recently, this jus publicum interest was more particularly expressed by this court in WILBOUR v. GALLAGHER, 77 Wn.2d 306, 316, 462 P.2d 232, 40 A.L.R.3d 760 (1969), CERT. DENIED, 400 U.S. 878 (1970) as the right
>
> > 'of navigation, together with its incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes generally regarded as corollary to the right of navigation and the use of public waters.'
>
> The state can no more convey or give away this jus publicum interest than it can "abdicate its police powers in the administration of government and the preservation of the peace . . . Thus it is that the sovereignty and dominion over this state's tidelands and

> shorelands, as distinguished from TITLE, always remains in the State, and the State holds such dominion in trust for the public. It is this principle which is referred to as the 'public trust doctrine'. "

Caminiti, 107 Wn.2d at 668-670 (footnotes and citations omitted). See also Wilbour v. Gallagher, 77 Wn.2d 366 (1969), State v. Longshore, 141 Wn.2d 414 (2000), and Washington State Geoduck Harvest Assoc. v. DNR, 124 Wn. App. 441 (2004).

The requirements of the public trust doctrine, the Court held, "are fully met by the legislatively drawn controls imposed by the Shoreline Management Act . . ." Caminiti, 107 Wn.2d at 670.

As stated in the excerpt from Wilbour v. Gallagher, above, the public trust doctrine protects the right of navigation,

> "together with its incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes generally regarded as corollary to the right of navigation and the use of public waters."

In the unpublished opinion of Bainbridge Island v. Brennan, No. 31816-4-II, (2005), Division II of the Court of Appeals held that under the public trust doctrine, the public may use tidelands when covered by water, but the public has no right to walk across private property when the tide is out.

The Supreme Court approached the same issue in State v. Longshore, above, when it decided that the public trust doctrine does not give the public the right to gather naturally growing shellfish on private property. The Court expressly stated, though, that it did not determine whether the public has a right to cross over private tidelands on foot. Longshore, 141 Wn.2d at 429, n. 9.

With the unpublished status of Brennan and the express "non-decision" of Longshore, the fairest conclusion is that our appellate courts have not yet decided whether the public trust doctrine gives the public the right to walk across private tidelands. Consistently with the AGO, whether the PVC tubes are obstructions on the beach and hence "developments" depends on whether the public has that right. Given the complexities of the application of the public trust doctrine, this is not an issue that should be decided without briefing. Therefore, the summary judgment motions on this issue should not be decided at this time.

The remaining issue is the Department's contention that the tubes and nets constitute obstructions on the beach, because they impede the passage of fish and other sea creatures or the flow of sediment.

"Obstruction" is not defined in either the SMA, its implementing rules, or the SMP. No case law or Shoreline Hearings Board decisions on the meaning of obstruction were cited. As noted, the AGO takes the position that obstruction applies only to human passage. The Department argues that the mandate to construe the SMA broadly to protect the state shorelines as fully as possible means that obstructions to marine life must also be considered. The Appellants cite the AGO, point out that the Department's consultants conclude that the effect of the tubes on sediment movement is likely negligible, point out that requiring marine

animals to move around the tubes does not comport with the accepted definition of obstruction, and raise a number of factual issues.

With none of the arguments being definitive, I would normally defer to the view expressed in the AGO, because it is a rational way of implementing the purposes of the SMA. However, because the issue might be treated in the decisions of the Shoreline Hearings Board, it makes most sense to allow the parties to research that, if desired, before deciding whether obstructions of marine life count as obstructions under the definition of development. The one holding that can be made at this time is that the proposed operations do not meet the definition of development due to their effect on sediment flow. Even if the obstruction of sediment flow fell within the definition of development, the facts alleged by the Department, if considered, would show only that the proposals' effect on sediment movement would be negligible. Thus, assuming all pertinent legal and factual issues favorably to the Department, no obstruction of sediment would be shown.

D. Summary of order.

1. The Department's summary judgment motion that the proposed geoduck operations are a "development" under the SMA because they involve "construction of a structure" is granted. The Appellants' summary judgment motion on the same issue is denied. The first ground of the administrative determinations on appeal, that the placement of tubes and netting on the beach constitutes construction of a structure and consequently a development, is upheld.

2. The summary judgment motions by the parties on whether the proposed operations are a "development" under the SMA because they involve "removal of any sand, gravel, or minerals" are denied due to the presence of genuine issues of material fact.

3. On the third ground of the administrative determinations, whether the tubes and netting serve as an obstruction on the beach, summary judgment is granted in favor of the Appellants on the issue of sediment movement: the proposed operations are not developments due to their effect on the movement of sediment. Summary judgment is not entered at this time on the other issues relating to this third ground, due to the need for further examination of the public trust doctrine and review of whether any Shoreline Hearings Board decisions address whether the "placing of obstructions" includes obstructions to marine life.

4. The effect of the above decisions is that the proposed operations are deemed "developments" under the SMA under the first ground of the administrative determinations, requiring a substantial development permit for the proposals. Thus, unless this determination is reversed, a hearing on a substantial development permit is required for the proposed operations, and the appeals of the other grounds of the administrative determinations are mooted, as well as the motion in limine.

Dated this 21st day of January, 2011.

_____
Thomas R. Bjorgen

Polly Stoker

From: Phyllis Farrell <phyllisfarrell681@hotmail.com>
Sent: Wednesday, September 18, 2019 2:09 PM
To: PlanningCommission
Cc: Anne Van Sweringen; Patrick Townsend
Subject: SMP
Attachments: aquaculturepics.docx

Greetings Commissioners, thank you for your time and work on the County SMP review.

I want to reemphasize the need for language in this SMP that reflects the will of the County to design and regulate permissible shoreline
impacts. The language in this plan may guide practices for many years. It is my understanding that if specific language is not in the SMP, the Shorelines Hearings Boards have no jurisdiction over the permit process. So your words count!

I urge you to protect and maintain buffers, especially salt water shorelines threatened by sea level rise.

You should consider "Net Ecological Gain" over No Net Loss" if we are to further salmon recovery: Habitat loss and water quality degradation resulting from poorly regulated development has been documented to be a leading cause of the decline of the salmon populations the orcas rely on. This action has long been called for by Tribes, salmon recovery groups and a wide range of environmental partners. You can recommend this policy and permitting change!

Recommend phasing out the use of marine plastics polluting our waters and threatening sea life. Aquaculture should be able to substitute biodegradable materials for netting and tubes....hemp, bamboo, wooden tubes, stainless steel etc. I have attached pictures of the unsightly and dangerous plastic materials used in geoduck operations.

Insert language to restrict the use of hydraulic harvesting....how is it homeowners are required to have an hydraulic permit to work on stairs or bulkheads, but the aquaculture industry is allowed to "blow up" sensitive near shore environments?

Thank you for your service.

Phyllis Farrell

Geoduck farm: The point source of plastic pollution found on Tolmie State Park shorelines.
Tolmie State Park
Google earth

Public Comment rec'd 10/2/19 @ PC meeting

Thurston County Planning Commission

October 2, 2019

Comments by Patrick and Kathryn Townsend

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Protect Our Shoreline News – Burley Lagoon aquaculture die-off.

Protect Our Shoreline News – Taylor Shellfish Says Clam Die-off in Burley Lagoon from Toxic Algae.

Case Inlet Shoreline Association – FAQ: Industrial Shellfish Aquaculture in Puget Sound.

For more information go to:

ProtectZangleCove.org
CoalitionToProtectPugetSoundHabitat.org
CaseInlet.org
ProtectOurShorelineNews.blogspot.com

Chapter 19.600 Shoreline Use and Modification Development Standards

The following are comments from Patrick and Kathryn Townsend, 7700 Earling Street NE, Olympia WA 98605, on the Aquaculture Section of Chapter 19.600 of the Draft SMP for Thurston County.

19.600.115 Aquaculture

A. Environment Designations Permit Requirements

PT/KT: Things have changed since 1971 when the Shoreline Management Act was written. What existed in the way of shellfish aquaculture in 1971 is a far cry from what exists today.

In 1991, Joan Thomas, one of the original drafters of the Shoreline Management Act stated: ***"When the SMA was written in 1971, aquaculture meant oysters and clams and one salmon raising operation. This activity was recognized and protected as water-dependent. I do not read the original intent or the original guidelines to promote the industry as we know it today."*** Ms. Thomas passed away in 2011. What would she say today?

If there was that big a difference between what existed in the way of industrial shellfish aquaculture in 1971 and 1991, please consider how different it is today in 2019, 28 years AFTER 1991. Yet the County is willing to permit literally acres of PVC tubes on Thurston County tidelands, acres of netting and clam bags, raking of the tidelands, removal of native species and water jet harvest of geoduck. As in North Puget Sound, will we also find tractors on our tidelands? This is not in alignment with the goals to protect salmon and orcas. It is a complete contradiction.

It would appear that county personnel are so afraid of the shellfish industry that they can't ever say "no" to the industry and they are doing their best to comply with the industry demand to reduce monitoring and regulation. Or perhaps they so aligned with the shellfish industry's vision of turning Puget Sound into an unregulated, massive working waterfront that they choose to view ordinary citizens who present a different perspective as irrelevant.

Many of the claims of the shellfish industry are tall tales, for example the claim that the geoduck tubes are hardly ever visible. That is bunk, pure and simple. It is even bigger bunk when geoduck tubes, as in the current geoduck operation in Zangle Cove, are planted well above the beach elevation permitted by the Thurston County Planning Department. The County has not yet responded to our letters about this issue. We would ask the Planning Commission to read our letter to the County listing the permit violations of the ChangMook Sohn geoduck operation as the violations are undoubtedly not unique to this operation. We ask the Planning Commission to give guidance to the County Planners to deal appropriately with the permit violations and if operators refuse to remedy their permit violations, their permits must be terminated.

With 85% of Totten Inlet tidelands filled with shellfish aquaculture on all levels of the beach, we would ask County officials and planners to look at what is currently happening in Burley Lagoon and Rocky Bay in Pierce County. We've attached two articles about the die-off of clams in these waterways and the consequent persistence of the bacteria and long-term horrific stench. The shellfish industry can attribute this to a toxic algae bloom, but everybody knows that illness occurs most easily in a system out of balance. Here is the link to the online source:

https://protectourshorelinenews.blogspot.com
Articles:
9/16/19: Taylor Shellfish Says Clam Die-off in Burley Lagoon from Toxic Algae
9/15/19: Burley Lagoon Residents Complain of Putrid Smell, Clams Die Off: A "Preferred Use" of the tidelands?

We would ask the planning commissioners to review the history of citizen and local organization efforts to bring reason to the shellfish industry's attempt to take over Puget Sound tidelands. It is especially concerning that the primary areas that the industry covets are the estuaries—some of the most fragile areas of the shoreline.

https://protectourshorelinenews.blogspot.com/
http://coalitiontoprotectpugetsoundhabitat.org
http://caseinlet.org
http://protectzanglecove.org
http://apheti.org
https://www.centerforfoodsafety.org/issues/312/aquaculture

We request that the County put all applications for renewal of shellfish aquaculture operations and new shellfish aquaculture operations on hold and work with citizen and environmental groups to formulate appropriate regulations for the shellfish industry that take into consideration the goals to protect native species, salmon and orcas. Use of plastics in Puget Sound by the shellfish industry should be phased out.

Following are comments related to specific items in the Draft Chapter 19.600-SMP Update:

KT: The shellfish industry and has been given too many allowances. Geoduck aquaculture "in all designations" needs to be removed. Shellfish aquaculture should not be allowed in Natural areas. It is clear that this draft would significantly allow for more geoduck operations by the industry.

KT: The wording of this section puts the onus on the landowners to prove "substantial interference with normal public use of the surface waters." This means individual homeowners going up against the shellfish industry and their significant lawyers and lobbyists. This wording fails to protect individual homeowners.

Where aquaculture is proposed in the following upland designations, the identified permit requirements shall apply. Where proposed in the adjacent aquatic designation, the corresponding upland designation shall be used to determine permit requirements:

1. ~~Mining,~~ Shoreline Residential, Urban Conservancy, Rural Conservancy, and Natural: Except as otherwise stated in this section, an SDP shall be required for new aquaculture activities that meet the definition of substantial development under the Shoreline Management Act and this Shoreline Master Program. Exempt if definition of substantial development is not met.

KT: What is definition of substantial development. There should be a reference here to where that is defined.

2. Natural: A CUP shall be required where the proposal requires new structure or facilities.

3. Geoduck aquaculture in all designations:

KT: Geoduck aquaculture, using 7 miles/16 tons of PVC plastics along with netting PER ACRE of tideland, has been given extraordinary license to change the habitat of Puget Sound. It is actually a tiny industry that makes most of its money on the overseas market, selling to a population who believes that consuming geoducks will enhance their virility. Massive alternation of the tidelands of Puget Sound for this craven money making purpose. What does the County actually receive in recompense for giving away the tidelands of Puget Sound to the shellfish industry. Does anyone in Thurston County actually want to save the salmon and the orcas? Geoduck aquaculture "in all designations" needs to be removed.

   a. A CUP shall be required for all new commercial geoduck aquaculture and an administrative CUP for existing aquaculture being converted to commercial geoduck aquaculture;
   b. An SDP shall be required for the planting, growing and harvesting of farm-raised geoducks only if the specific project or practice causes substantial interference with normal public use of the surface waters.
   c. Wildstock geoduck harvest associated with the state and tribal co-managed geoduck fishery is not aquaculture. Since a fishery does not constitute development under this Program, it is not subject to its regulations.

PT: What is the rationale for creating a separate set of regulations for geoduck?

PT: After expending substantial taxpayer resources requiring and defending the need for an SSDP why is the new SMP proposing CUPs? What are the differences between the two?

PT: Existing non-geoduck aquaculture is substantially different that geoduck aquaculture. The preparation, planting, structures, and harvest are very different from oyster operations, as one example. There should be no shortcut via an "administrative CUP" for switching from one to the other.

PT: Thurston County has already determined, and defended in court, that an SDP is required for geoduck operations because of the presence of structures. The court's decision had nothing to do with public use of the waters. This section (b) should be deleted.

4. Certain aquaculture developments and supplemental wild stock seeding may be exempt from SDP requirements pursuant to the exemption criteria at Section 19.500.100(C) of this Program. Such activities shall also comply with all state and federal requirements, including but not limited to Department of Health certification and license, or Shellfish Import or Shellfish Transfer permits, where applicable.

PT: "Certain aquaculture developments" needs to be defined clearly. Unless clearly defined, this item should be deleted. That such activities must comply with all state and federal requirements is an oxymoron. This is, of course, always the case.

KT: If there is "seeding", then the activity has nothing to do with "wild stock." "Seeding" means "planting", means aquaculture farming. Thus wherever "seeding" occurs, that must be designated aquaculture.

B. Application Requirements

In addition to the minimum application requirements in Section 19.500.105(C), aquaculture applications shall include the following information if not already provided in the local, state or federal permit applications. Where requested information is not applicable to a specific proposal, the application shall not be required to include all items listed under this section as long as it is demonstrated why the information does not apply, with concurrence from the Department.

KT: What is the specific process for demonstrating and/or determining why requested information is not applicable to a specific proposal and thus why the information does not apply? Is there a specific form and if so, where is it located? WHO makes the determination about whether requested information is applicable to a specific proposal and is there a process for citizen/community input on the specific claim? Are neighboring citizens/community members notified that requested information has been waived and is there a process for anyone to object to this apparently arbitrary decision by an unknown party? I agree with PT comment below: the last sentence in the above paragraph should be stricken.

1. A site plan, including:

   a. The perimeter of the proposed aquaculture operation area;
   b. Existing bathymetry depths based on mean lower low water (MLLW datum);
   c. Adjacent upland use, vegetation, presence of structures, docks, bulkheads and other modifications;
   d. Areas where specific substrate modification will take place or structures will be constructed or installed;
   e. Access provisions for marine or vehicle traffic, processing structures or facilities; and
   f. Location of storage or processing structures or facilities.

   PT: The last sentence under (B) should be deleted. The site plan should always include information for (a) through (f).

   KT: The term "structures" and "other modifications" should be either be defined or stricken as meaningless terms..

2. A baseline description of existing and seasonal conditions, including best available information. Where applicable to the subject proposal, the following should ~~shall~~ be included if already part of information submitted for another federal or state agency. ~~Note: information regarding wind conditions, current flows and flushing rates (items 3-5) will generally not be applicable to shellfish aquaculture applications.~~

   a. Water quality;
   b. Tidal variations;
   ~~c. Prevailing storm wind conditions;~~
   ~~d. Current flows at each tidal cycle;~~
   ~~e. Flushing rates;~~
   f. Littoral drift;

g. Sediment dispersal, including areas of differing substrate composition;
h. Areas of aquatic, intertidal and upland vegetation complexes; a vegetation habitat survey (see Section 8.10, Biological and Habitat Surveys) must be conducted according to the most current WDFW eelgrass and macroalgae survey guidelines;
i. Aquatic and benthic organisms present, including forage fish, and spawning and other lifecycle use of, or adjacent to, the site;
j. Probable direct, indirect and cumulative impacts to items B.1. - B.9. above; and
k. Visual assessment, including photo analysis / simulation of the proposed activity demonstrating visual impacts within 1,500 feet of the proposed project site. Where predator exclusion devices are proposed, the assessment shall include an analysis of visual impacts of proposed predator exclusion devices at mean high and mean low tides.

PT: Items (c), (d) and ("e) should not be stricken. Prevailing wind storm conditions, current flows at tidal cycles, and flushing rates are relevant to potential impacts on tideland ecosystems, including the impact of siltation by aquaculture operations, and vary from one site to another. These must remain in the specification.

KT: The re-wording in the 2nd sentence ("…should be included if already part of information submitted for another federal of state agency.") should be stricken.

1. The word "should" (rather than "shall") gives complete leeway to the applicant to provide the information or not based on their own interests (IF it was "submitted to another federal or state agency.")
2. The logic of the sentence implies that if the information is not already on a state or federal form, it is not required and the "should" implies logically that even if it is on a state or federal form, it is not required.
3. Providing this information must be a requirement for ALL applications without dithering around trying to put in language that excuses the applicant from supplying relevant information about the site.
4. The second sentence of this section is both garbled and inaccurate.

3. An operational plan, which includes the following, when applicable should be included if already part of information submitted for another federal or state agency.:

a. Species, and quantity to be reared;
b. Source of aquatic product;
c. Implementation methods, including density, schedule, phasing options, time of day, and anticipated lighting and noise levels;
d. Number of employees/workers necessary for the project, including average and peak employment;
e. Methods and location of waste disposal and sanitation facilities;
f. Methods for planting and harvest;
g. Methods for predation control, including types of predator exclusion devices;
h. Food and equipment storage;
i. Anticipated use of any feed, herbicides, antibiotics, vaccines, growth stimulants, antifouling agents, or other chemicals and an assessment of predicted impacts;
j. Methods to address pollutant loading, including biological oxygen demand (BOD);
k. A schedule for water quality monitoring, where required; and
l. Other measures to achieve no net loss of ecological functions consistent with the mitigation sequence described in WAC173-26-201(2)(e).

PT: These items should not be excluded if already provided as a part of a submission to another federal or state agency. The intent of Thurston County SMP regulations does not

duplicate all of the other state and federal regulations, and the specified information is relevant. If the information has been submitted as a part of other regulations, it would not be unreasonably difficult to provide it to Thurston County.

KT: Once again—this is a highly confusing addition. It appears to imply that "an operational plan" may or may not be (should) included if it was included on a federal or state submission, logically implying that it is not required to be included at all. This is garbled at best. Simply say that the following items MUST be included (a-l). The County does not need to run interference with the state and federal requirements. Somebody is obviously trying to say something in a very backward (hidden?) way.

4. Other applications and reports, when applicable or requested depending on site specific details determined during permit review, to ensure compliance with permit conditions, which may include:

a. An accepted Washington Department of Natural Resources lease application, including a waiver of preference rights to access for navigation from the upland property owner, if applicable;
b. An accepted Washington Department of Ecology National Pollutant Discharge Elimination System (NPDES) permit, if applicable;
c. An accepted Washington Department of Health beach certification number;
d. An accepted WDFW aquatic farm permit, and/or fish transport permit;
e. Water quality studies;
f. Reports on solids accumulation on the bottom resulting from the permitted activity along with its biological effects;
g. Report on growth, productivity, and chemical contamination of shoreline plants and animals within or adjacent to the proposed site;
h. Noise level assessments, including mitigation measures to ensure compliance with Chapter 10.36 & 10.38 TCC; and/or
i. Monitoring and Adaptive Management Plan for introduction of aquatic species not previously cultivated in Washington State.

PT: The redline addition should be deleted. All of the subject reports (a) through (h) are relevant to local SMP regulations and should be provided.

KT: I agree with PT. Strike the red-line wording. All that wording does is create confusion and questions about who will make the decision about whether these items are required or not, i.e, who is in charge of the "permit review". There should be a standard set of requirements for all permit applications without having someone in the department able to pick and choose what is required from an individual applicant.

C. Development Standards

1. General Standards.

a. Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, shall be a preferred use.

PT: "Shall be a preferred use" has no basis in WA state law or regulations. The recent Growth Management Hearings Board ruling confirms this. Change this to "is one preferred use among others".

KT: I agree with PT.

b. Proposed residential subdivisions and other land uses and developments which may

impact aquaculture operations shall provide facilities to prevent any adverse water quality impacts to such operations.

PT: This section probably has no basis in any Washington state law. It should be stricken.

c. Site preparation and construction in the vicinity of aquaculture operations shall not result in off-site erosion, siltation, or other reductions in water quality.

PT: This probably has no basis in any Washington state law, other than the HPA. It should be stricken. It is also so vaguely defined as to be unenforceable.

KT: Also it is more than bizarre that Thurston County would want to enshrine in this document the one-way street that upland development may impact aquaculture operations. What about the fact that aquaculture operations have high impact on entire neighborhoods of shoreline property owners? Do you actually think that 7 miles of PVC weighing 16 tons per tideland acre, covered with plastic netting, does NOT impact upland owners? Do you actually think that boats, barges, workers on what once were pristine tidelands, raking, dredging, tractors, etc. do NOT impact upland property owners? We know that geoduck harvesting causes extensive siltation, which will impact any eelgrass in the vicinity and impact water quality.

KT: The shellfish industry claims that geoducks "clean the water." In other words, geoducks remove phytoplankton from the water, which is NOT "cleaning" the water. Shellfish and geoducks filter and consume phytoplankton and detritus. Phytoplankton is an important aquatic plant and nutrient for a number of other aquatic species and is naturally present in the marine environment. Like all creatures, geoducks "poop"--they produce feces and pseudofeces and as the industry plants 3 seeds to the tube and one tube per square foot, that equates to 43,560 (if one seed per tube survives) to a maximum of 120,680 geoducks in one acre. That's a lot of geoduck poop.

KT: Clams and oysters also poop. See excerpt below from:
https://protectourshorelinenews.blogspot.com/2019/09/burley-lagoon-residents-complain-of.html

It's not rocket science. It's "Ecosystem Services".

AUGUST 2017
DUANE FAGERGREN

Under this mat of green macro algae (Enteromorpha sp) lies this year's crop of yearling single Pacifics. The oysters consume phytoplankton, and excrete feces, pseudo feces, and ammonia in a mixture that serves to fertilize this luxurious crop of seaweed. The lush crop also provides habitat for crab (graceful crabs mostly) and fish (shiner perch, stag horn sculpin, and bay pipefish). The downside of this heavy growth is a mat that makes oysters grow slower, clams come to the surface of the beach and can't dig themselves back in, and likely oxygen debt as the algae naturally dies and decomposes.

Oysters poop, seaweed grows, clams die. Ecosystem services at work.
As noted in an August 2017 "Ecosystem Services" winning picture, one source of the problem is directly related to oyster feces, their pseudo feces, associated ammonia, and shell surface area provided by high density planting of oysters. Oysters poop and provide "fertilizer". On the surface of those shells macro algae attaches and thrives on the "nutrients" expelled by the nonnative Pacific oysters. That growth is so intense oyster growth slows and clams rise to the surface. Summertime low tides and summertime heat promote decay and death. Smells emanate. Because of aquaculture. It's not rocket science. Calling it "ecosystem services" deflects attention from dealing with the problem created.

KT: With the above two (new) standards (b and c), obviously written by and for the shellfish industry, you are looking from the perspective of that tiny industry which doesn't provide much money to the County, rather than from the perspective of property owners who are probably your biggest source of income. Why is the County so enamored of the shellfish industry? What do you get form them? This is a specific question that deserves a specific answer.

b. When a shoreline substantial development or conditional use permit is issued for a new aquaculture use or development, that permit shall apply to the initial siting, construction, and planting or stocking of the facility or farm. Authorization to conduct such activities shall be valid for a period of five years with a possible extension per Section 19.500.105(H) of this Program. After an aquaculture use or development is established under a shoreline permit, continued operation of the use or development, including, but not limited to, maintenance, harvest, replanting, restocking or changing the culture technique shall not require a new or renewed permit unless otherwise provided in the conditions of approval, or if required pursuant to permit revision criteria in WAC 173-27-100 or this Program. Changing of the species cultivated shall be subject to applicable

standards of this Program, including, but not limited to, monitoring and adaptive management in accordance with standard g, below.

PT: Due to the extreme risk to endangered and threatened species, such as Southern Resident Killer Wales and salmon, this item should be stricken. There is no current justification for automatic extension of permits. No business should be exempt from periodic review of permit requirements.

c. Aquaculture shall not be permitted in areas where it would result in a net loss of shoreline ecological functions, or where adverse impacts to critical saltwater and freshwater habitats cannot be mitigated according to the mitigation sequencing requirements of this Program (see Section 19.400.100(A)).

PT: This statement ignores the requirement under the general No Net Loss policy for monitoring and adjustment based on results. Research has shown that the large majority of mitigated projects fail to meet No Net Loss requirements. This item should be changed to "Aquaculture shall not be permitted in areas where it would result in a net loss of shoreline ecological functions, or where adverse impacts to critical saltwater and freshwater habitats cannot be monitored and reviewed on a periodic basis based on scientific best practices. In such circumstances the principles of the precautionary principle shall be applied."

KT: Please remind yourselves that county planners have explicitly stated that the County does not have the money or the personnel to monitor these aquaculture operations, that they rely on citizens to monitor for County. Given this fact, it is questionable whether permits should be given at all.

d. Aquaculture shall not significantly conflict with navigation and other water-dependent uses.

e. Aquaculture activities proposed within Shorelines of statewide significance shall first be subject to the policies for shorelines of statewide significance contained in Chapter 19.300 (General Goals and Policies) of this Program, and then the policies and regulations contained in this section, in that order of preference.

PT: This is an unnecessary specification. It should be deleted.

f. In general, when considering new aquaculture activities, refer to policies at Section 19.300.130(E-K) for siting and design preferences.

PT: This is an unnecessary specification at this section. Recommend that this item be deleted.

g. Project applicants proposing to introduce aquatic species that have not previously been cultivated in Washington State are responsible for pursuing required state and federal approvals relating to the introduction of such species, as determined by applicable state and federal agencies. A plan for monitoring and adaptive management shall also be submitted for County review, unless the operation is conducted in a fully contained system with no water exchange to the shoreline. The County shall provide notice and time to comment for appropriate agencies in accordance with County procedural requirements, and shall circulate the monitoring and adaptive management plan. Upon approval, the plan shall become a condition of project approval.

KT: The County should provide notice and time for comment from neighboring landowners and environmental organizations. Who does the County "circulate the monitoring and adaptive management plan to?" It should be specifically stated that the immediate community received written notice and copies of the monitoring and adaptive management plan.

KT: Unless the County will commit to actual monitoring on a regular basis, "g" should be stricken. County personnel have stated to us that they do not have the personnel or the money to do any monitoring of aquaculture operations and that they rely on community members to do it for them.

h. Over-water structures and/or equipment, and any items stored upon such structures such as materials, garbage, tools, or apparatus, shall be designed and maintained to minimize visual impacts. The maximum height for items stored upon such structures shall be limited to three feet, as measured from the surface of the raft or the dock, unless shoreline conditions serve to minimize visual impacts (for example: high bank environments, shorelines without residential development), but in no case shall the height exceed six feet. Height limitations do not apply to materials and apparatus removed from the site on a daily basis. Materials that are not necessary for the immediate and regular operation of the facility shall not be stored waterward of the OHWM.

PT: Suggest changing the first sentence to: "Over-water structures and/or equipment, including barges and similar vessels…."

KT: Last sentence is confusing. It implies that materials that ARE necessary for immediate and regular operation of the facility can be stored waterward of the OHWM. This means that half the time, (and most of daylight hours in the summer), these storage items will be on the beach. Please explain to us what you envision here and how you will monitor these equipment/over-water structures. One of the operators on Dana Passage, has a barge well over 6 feet that he leaves in view of the entire neighborhood of Zangle Cove most of the time. When we complained related to the 3 day limit for such barges, he move his barge every 3 days from one side of the Cove to the other. And this is an operation that, last we checked with the County, doesn't even have a County permit, a fact we have complained about in writing in the past. So any items such as "Item H" appear to be nothing more than nice sounding words, meaning nothing.

i. Aquaculture structures and equipment used on tidelands below ordinary high water shall be of sound construction, with the owners' identifying marks where feasible, and shall be so maintained. Abandoned or unsafe structures and/or equipment shall be promptly removed or repaired by the owner.

PT: Remove "where feasible" from "with the owners' identifying marks where feasible…". It is not clear when this is not feasible, and has been a requirement for a number of years.

j. No processing of any aquaculture product, except for the sorting and culling of the cultured organism and the washing or removal of surface materials or organisms after harvest, shall occur in or over the water unless specifically approved by permit. All other processing and related facilities shall be located on land and shall be subject to the regulations for Commercial) and Industrial Uses (Section 24.10.100), in addition to the provisions of this section.

k. No garbage, wastes or debris shall be allowed to accumulate at the site of any aquaculture operation, except for in proper receptacles.

KT: What is a "proper receptable?" Please give example.

l. All floating and submerged aquaculture structures and facilities in navigable waters shall be marked in accordance with U.S. Coast Guard requirements.

PT: Suggest modifying: "... aquaculture structures, including barges and other marine vehicles, structures and facilities...."

m. The rights of treaty tribes to aquatic resources within their usual and accustomed areas are addressed through direct coordination between the applicant/proponent and the affected tribe(s). Thurston County will notify affected tribes of new shoreline permit applications utilizing the applicable notification process in Title 20.60 TCC.

n. In order to avoid or limit the ecological and aesthetic impacts from aquaculture siting and operations, the following shall apply:

i. Predator exclusion devices shall be firmly attached or secured so as not become dislodged.

PT: Please describe how this will be monitored. Recent projects have already failed in this regard. If this cannot be monitored there should not be any permitting until it can..

ii. Predator exclusion devices shall blend with the natural environment.

PT: Please describe what this means. Currently this is not possible.

iii. Aquaculture operators shall routinely inspect and maintain predator exclusion devices.

iii. Predator exclusion devices such as rubber bands, small nets, and area netting can be dislodged and pose a hazard to birds, marine mammals, and other wildlife and domestic animals, and thus are subject to Thurston County Public Nuisance regulations (Chapter 10 TCC).

PT: Nuisance regulations are ineffective in relation to operations that are routinely permitted.

KT: What outside agency will monitor this? The County has already stated that it does not have the money or the personnel to monitor aquaculture installations.

iv. Predator exclusion devices shall be removed as soon as they are no longer needed to perform protective functions.

PT: This is meaningless unless there is a definition of "protective functions" and their intended need.

v. Predator exclusion methods shall not be designed to intentionally kill or injure wildlife. Predator exclusion methods shall comply with federal and state regulations as determined by applicable federal and state agencies.

PT: "Predator exclusion" is an industry term. It has no place in a regulatory definition. 'Predators", in this case are native, naturally occurring wildlife species. This should be deleted, or changed to refer to native wildlife.

KT: I agree with PT. The term "predator exclusion" is a negatively biased term that reflects only the point of view of the proponents of commercial aquaculture. It is inaccurate from any other point of view. To be accurate this section should read; Wildlife exclusion methods shall not be designed to intentionally kill or injure wildlife. Wildlife exclusion methods shall comply with federal and state regulations as determined by applicable federal and state agencies.

vi. When determined necessary to minimize aesthetic and habitat impacts of large-scale projects, the County may require a phased approach to operation. This includes planting and harvesting areas on a rotational basis within the same tideland parcel.

PT: Rotational planting may aggravate environmental impacts due to increase occurrence of siltation, etc. Please provide the scientific rational for the statement that rotational planting and harvesting may minimize aesthetic and habitat impacts. This is questionable.

o. Where aquaculture occurs on state owned aquatic lands, the project proponent shall contact and adhere to Washington Department of Natural Resources requirements.

2. Additional Standards for Commercial Geoduck Aquaculture.

a. In addition to the general development standards above, commercial geoduck aquaculture shall only be allowed where sediments, topography, land and water access support geoduck aquaculture operations without significant clearing or grading.

PT: This conflicts with current requirements related to tribal rights. A geoduck aquaculture operation must allow tribes to harvest (clear) appropriate amounts of native geoducks.

KT: We recommend excluding estuaries as appropriate for commercial geoduck aquaculture or any kind of aquaculture. Estuaries are the most sensitive of tidelands and should be preserved in their natural state. So many have already been used for aquaculture, there may not be many left. For example, 85% of Totten Inlet is in tideland aquaculture.

b. All permits shall take into account that commercial geoduck operators have the right to harvest geoduck once planted.

PT: What is the point of this statement? This appears to be an attempt to prohibit future constraints on geoduck operations. It should be deleted.

c. All subsequent cycles of planting and harvest shall not require a new CUP, subject to WAC 173-27-100.

PT: This WAC is specific to revisions to permits where environmental conditions do not change. Aquaculture operations occur in highly changeable environments. It should be obvious that permits should be renewed at the end of predictable planting/harvest cycles.

KT: Aquaculture, especially geoduck aquaculture using 7 mile/16 tons of PVC plastic per acre, along with tons of plastic netting, as well as clam culture using plastic net clam bags, are high intensity operations. Because there is no monitoring by the County (as stated to us by County employees), there must be requirements for re-submission of applications after the planting/harvest cycle, which is 5-7 years. This is not unreasonable, as conditions can dramatically change, especially in our era of global warming. It is not reasonable to just write a "blank check for the tidelands" to the industrial shellfish industry, when we, as a culture, are attempting to understand the issues with depletion of salmon and the dwindling pods of Orcas.

KT: It is also unclear why the County is not requiring an SDP for industrial aquaculture after the rulings by Judge Bjorgen and Judge Tabor related to geoduck PVC pipes as "structures." Is this just an example of the County caving in to the industry's attempt to minimize the impacts of their operations? Please explain the difference between the SDP and the CUP in terms of regulation and monitoring required under each along with community participation in the process under each.

d. A single CUP may be submitted for multiple sites within an inlet, bay or other defined feature, provided the sites are all under control of the same applicant and within the Program's jurisdiction.

PT: Multiple sites within an environmentally significate inlet, bay or other marine environment, may be significantly different. This item should be deleted.

e. Commercial geoduck aquaculture workers shall be allowed to accomplish on-site work during low-tides, which may occur at night or on weekends. Where such activities are necessary, noise and light impacts to nearby residents shall be mitigated to the greatest extent practicable.

PT: No night or weekend activity should be allowed within 2,000 feet of a residential area. The term "greatest extent practicable" has no meaning.

3. Additional Standards for Net Pens. Fish net pens and rafts shall meet the following criteria:

PT: Net pen operations have provably demonstrated their environmental damage to Puget Sound. This entire section should be deleted.

a. Fish net pens shall meet, at a minimum, state approved administrative guidelines for the management of net pen cultures. In the event there is a conflict in requirements, the more restrictive shall prevail.
b. Alternative facilities and technologies that reduce ecological and aesthetic impacts shall be preferred to traditional floating net pens.
c. Anchors that minimize disturbance to substrate, such as helical anchors, shall be employed.
d. Net pen facilities shall be located no closer than 1,500 feet from the OHWM, unless a specific lesser distance is determined to be appropriate based upon a visual impact analysis or due to potential impacts to navigational lines.
e. Net cleaning activities shall be conducted on a frequent enough basis so as not to violate state water quality standards.
f. In the event of a significant fish kill at the site of the net pen facility, the facility operator shall submit a timely report to the Thurston County Environmental Health Section and

the Thurston County Department of Resource Stewardship stating the cause of death and shall detail remedial action(s) to be implemented to prevent reoccurrence.

g. New floating net pens shall be prohibited in Thurston County's South Puget Sound jurisdictional area until updates to Ecology's guidance on *Recommendations for Managing Commercial Finfish Aquaculture* is completed and can be reviewed by county staff to evaluate possible environmental benefits and impacts.

19.600.130 Commercial Development

A. Environment Designations Permit Requirements

Where commercial development is proposed in the following upland or aquatic designations, the identified permit requirements shall apply:

1. Natural- Prohibited

2. Urban Conservancy, Rural Conservancy, and Shoreline Residential ~~Mining~~:

   a. SDP for water-oriented commercial activities;

   b. Prohibited for non-water-oriented uses, except CUP for uses described in Section 19.600.130(B)(8)

3. Aquatic: Prohibited, unless the activity is water-dependent or a necessary appurtenance to a use allowed in the adjoining upland designation, then a CUP.

B. Development Standards

1. Commercial development shall result in no net loss of shoreline ecological functions or have significant adverse impact to other shoreline uses, resources and values provided for in RCW 90.58.020, such as navigation, recreation and public access.

2. Commercial developments shall be permitted on the shoreline in descending order of preference. The applicant shall demonstrate that a more preferred use is not feasible when proposing a less preferred use.

   a. Water-dependent uses;
   b. Water-related uses;
   c. Water-enjoyment uses;
   d. Non-water-oriented uses that include substantial opportunities for public access and subject to a CUP.

   PT: What is the basis for this order of preference? And what is the basis for the requirement to demonstrate that a more preferred use is not feasible? Is it even possible to demonstrate this?

3. Commercial development shall not significantly impact views from upland properties, public roadways, or from the water

KT: How do you define "significant impact?" Readers deserve to know if what county officials have in their minds at this moment in history as a definition is adequate or inadequate. Please read description of changes in shellfish aquaculture at the beginning of the Aquaculture section, from the perspective of one of the original drafters of the Shoreline Management Act of 1971.

4. The design and scale of a commercial development shall be compatible with the shoreline environment. The following criteria will be used to assess compatibility:

   a. Building materials
   b. Site coverage
   c. Height
   d. Density
   e. Lighting, signage, and landscaping
   f. Public access
   g. Visual assessment

5. The County shall consider public access and ecological restoration as potential mitigation of impacts to shoreline resources and values for all water-related or water-dependent commercial development, unless such improvements are demonstrated to be infeasible or inappropriate. Public access shall be provided consistent with Section 19.400.145 of this Master Program. In-kind mitigation shall be determined infeasible prior to utilizing out-of-kind mitigation.

PT: Such mitigations must be site-specific.

6. Non-water-dependent commercial uses shall not be allowed over water except in existing structures or in the limited instances where they are auxiliary to and necessary in support of water-dependent uses.

7. Parking shall be located upland of the commercial use and designed to minimize adverse visual impacts to the shoreline. Over-water parking is prohibited.

8. Non-water-oriented commercial uses are prohibited unless:

   a. The use is on land designated commercial by the Thurston County Comprehensive Plan and existing on the effective date of this Program;
   b. The use is on land designated commercial by the Thurston County Comprehensive Plan and is physically separated from the shoreline by another property or public right-of-way;
   c. The use is part of a mixed-use project that includes water-dependent uses and provides a significant public benefit with respect to the Act's objectives, such as providing ecological restoration and public access. Water-dependent components of the project and ecological restoration and access shall be improved prior to occupancy;
   d. The use is on a site where navigability is severely limited and the use would provide a significant public benefit with respect to the Act's objectives, such as providing public access and ecological restoration.

Non-water-oriented commercial uses meeting these criteria must obtain a CUP.

C. Redevelopment

1. When commercial redevelopment involves relocating or expanding the existing structure, shoreline restoration or mitigation shall be a condition of approval (see Appendix B). Restoration may include, but is not limited to:

   a. Moving the structure away from the shoreline;
   b. Removing any shoreline armoring or replacing hard with soft armoring;
   c. Riparian vegetation restoration, including removing invasive and planting natives;
   d. Stormwater retrofits to implement Low Impact Development.

2. When commercial redevelopment involves relocating or expanding the structure, public access shall be a condition of approval, unless infeasible due to health or safety issues. Public access may include, but is not limited to:

   a. Maintaining current public access, if existing;
   b. Connecting a trail to existing public access on adjacent property;
   c. Providing for visual access to the shoreline.

Email from Patrick and Kathryn Townsend to Brad Murphy and Kraig Chalem of Thurston County Planning Department.

Includes Survey by Hatton Godat Pantier, Surveyors on September 9, 2019, of the ChangMook Sohn geoduck operation on Zangle Cove with reference to the beach height of the operation.

The ChangMook Sohn geoduck operation, installed by Taylor Shellfish, is well above the allowed +3 beach height permitted to ChangMook Sohn.

From: Patrick Townsend <patrick.townsend@townsendsecurity.com>
Date: Mon, 9 Sep 2019 12:32:38 -0700
Subject: Changmook Sohn permit violation (please confirm)
To: chalemk@co.thurston.wa.us, Brad Murphy <brad.murphy@co.thurston.wa.us>
Cc: Kathryn Townsend <kath.townsend@gmail.com>

Dear Kraig and Brad,

Please find attached a land survey of the ChangMook Sohn tideland geoduck operation located at 930 76th Avenue Northeast on Zangle Cove in Thurston County, Washington. This survey, produced by Hatton Godat Pantier, establishes the tidal elevations of all areas of the Sohn geoduck planting and is a binding, professionally certified document that precisely states the tidal elevation of the PVC tubes and geoduck seed on the tideland.

It is clear from the Hatton Godat Pantier survey that the geoduck operator has violated the Sohn permit restriction by planting well above the +3 tidal elevation. The plantings of PVC, netting and geoduck are as high as +5.9 tidal elevation. The mitigations outlined in the permit are designed to implement a No Net Loss policy and protect endangered species and the forage fish they depend on. Compliance with the mitigation strategy is expected by other regulating agencies such as the Department of Ecology and the Army Corps of Engineers. It is critical that immediate action be taken to bring this operation into compliance by removing all plantings of PVC, netting and geoduck seed above the +3 tidal elevation. If ChangMook Sohn and his operator are unwilling to come into compliance with their permit, the permit should be withdrawn and fines imposed.

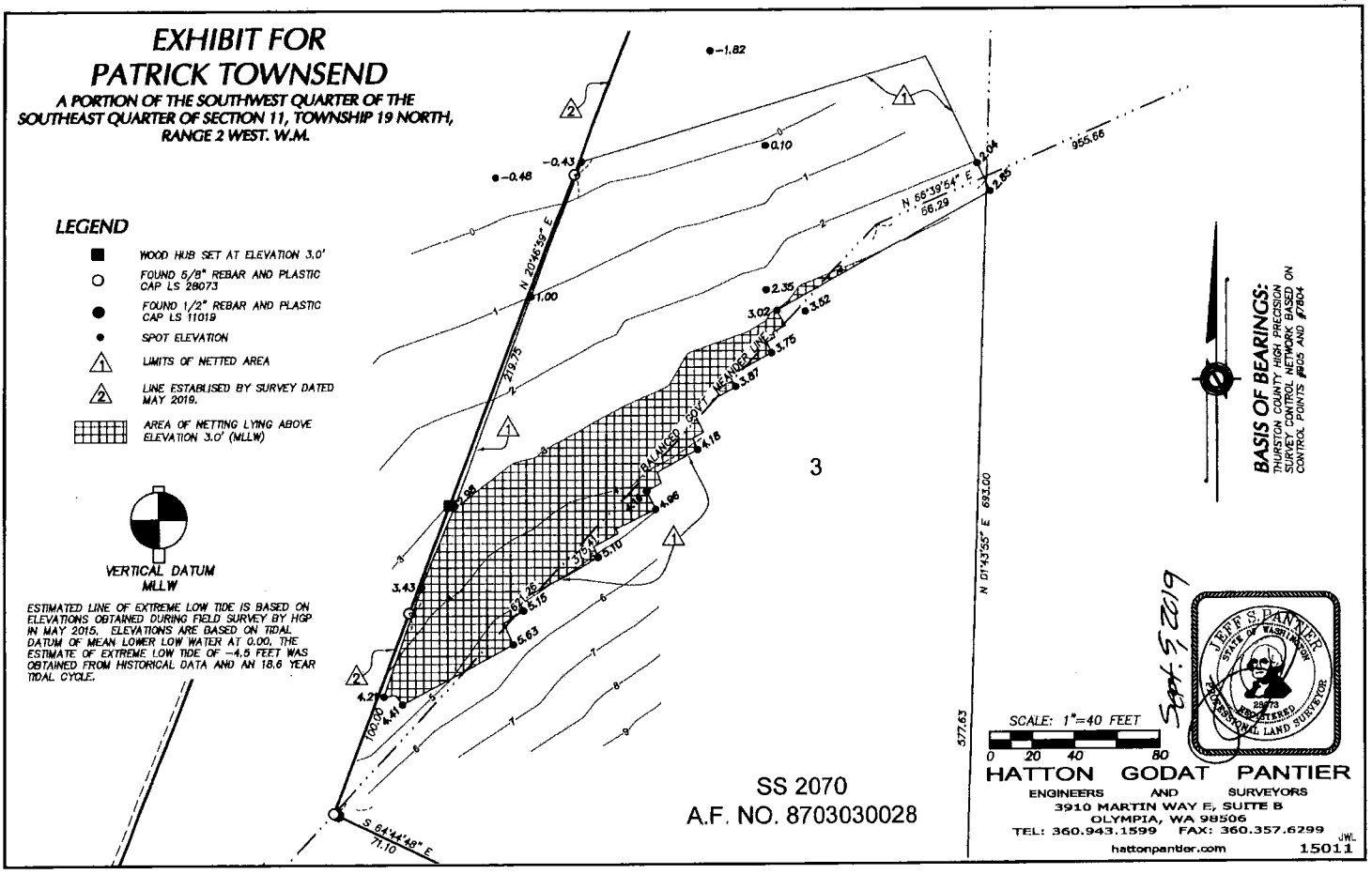
Sincerely,

Patrick and Kathryn Townsend

Netting Survey2.pdf
Hatton Godat Pantier Survey of ChangMookSohn geoduck operation tideland/beach elevation

EXHIBIT FOR PATRICK TOWNSEND

A PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 19 NORTH, RANGE 2 WEST. W.M.



SS 2070
A.F. NO. 8703030028

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

JWL
15011

Patrick and Kathryn Townsend
7700 Earling Street NE
Olympia, WA 98506
360-357-9082

July 9, 2019

Kraig Chalem, Supervisor, Thurston County Compliance Unit
Brad Murphy, Senior Planner, Thurston County Planning Department
John Hutchings, Thurston County Commissioner
Gary Edwards, Thurston County Commissioner
Tye Menser, Thurston County Commissioner
Thurston County Planning Commission
2000 Lakeridge Drive SW
Olympia, WA 98502-6045

Subject: ChangMook Sohn Commercial Geoduck Farm Shoreline Substantial Development Permit Violations
Project Number : 2014108800
Applicant: ChangMook Sohn Industrial Geoduck Farm Application
Property: Parcel Number 12911440102

Dear Messrs. Chalem and Murphy, and Commissioners Hutchings, Edwards and Menser and Thurston County Planning Commission:

The ChangMook Sohn commercial geoduck operation was authorized by Thurston County's Resource Stewardship Department on May 3, 2016 under Project No. 201408800. The required Shoreline Substantial Development Permit was issued based upon a Mitigated Determination of Nonsignificance (MDNS) under the State's Environmental Policy Act (SEPA) . There were 18 separate Mitigating Conditions imposed by the County upon Mr. Sohn's proposed commercial geoduck farm in order for it to be approved for operation. The farm was fully installed on May 7, 2019. It was preceded by a very small sample area that was planted on April 16, 2018. Our tideland property is immediately adjacent to the ChangMook Sohn tideland property.

It has recently come to our attention that the current large planting of geoducks on the ChangMook Sohn tideland violates several of the Mitigating Conditions of the "Determination of Non-Significance" 2014108800 – Sohn Geoduck MDNS.

Following are the permit violations noted to date:

1. #2 of the MDNS states: "An unobtrusive but visible sign shall be placed at the aquaculture bed listing the name and contact information for a person designated to immediately address problems associated with the aquaculture bed when discovered by citizens or agency representatives."

No such sign exists.

2. #4 of the MDNS states: "All tubes, mesh bags, and nets used on the tidelands below the ordinary high water mark (OHWM) shall be clearly, indelibly, and permanently marked to identify the permittee name and contact information (e.g., telephone number, email address and mailing address). On area nets, if used, identification markers will be placed with a minimum of one identification marker for each 100 square feet of net."

There are no identifying markings on any tubes or nets. There is nothing that identifies Sohn and his contact information or Taylor Shellfish (Sohn's aquaculture operations contractor) and their contact information. There are no identification markers on any of the nets, much less every 100 square feet of net. The tubes are old, obviously previously used tubes, quite a few cracked or chipped.

3. #11 of the MDNS states: "Shellfish culturing shall not be placed above the tidal elevation of +3 MLLW in order to minimize potential impacts to forage fish habitat. If herring spawn is observed, then those areas shall be avoided until the eggs have hatched."

1) It appears that the Sohn geoduck operation has been planted well above the permitted tidal elevation of +3 MLLW. See photo below taken on June 26, 2019, 8:17 am at low tide of +3.6.

- The above photo shows the ChangMook Sohn geoduck operation at low tide of +3.6 MLLW at 8:17 am (lowest tide of the day), Wednesday, June 26, 2019.
- Sohn's tubes are placed well above the +3.6 MLLW to at least +4 .3 or higher.
- Based on permit compliance, the Sohn geoduck operation with a maximum tidal elevation of +3 MLLW should not have been visible on this low tide, because the tide never went below +3.6 MLLW.
-

2) The photo below shows the ChangMook Sohn geoduck operation at a low tide of +3.6 at 6:32 pm on July 7, 2019. It is obvious that the tubes were placed well above the tidal height of +3 allowed by the permit.

- ChangMook Sohn geoduck operation at tidal elevation of +3.6 on July 7, 2019 at 6:32 pm
- WillyWeather chart for 6:32 pm on July 7, 2019 shows the tidal elevation at Dofflemeyer Pt. at +3.6.

- The Sohn planting is at a tidal elevation well over +3.6. Again, if planted to a +3, the planting should not be visible at this tidal elevation.

3) Tide table statistics were taken from the NOAA Tide Charts for Dofflemeyer Point, https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9446800

- In the photo below taken on Tuesday, June 25, 2019, at approximately 7:20 pm, when the tidal elevation was approximately +4.3 MLLW, the tubes could still be seen (tidal elevation statistics based on Willyweather tide chart for that date). The Sohn operation was planted to at least a +4.3 tidal elevation. Their permit allows planting to +3.

- Tubes of Sohn geoduck operation seen at approximately the same elevation as the survey stake, which is at least +4.3 MLLW tidal elevation or higher.

The above facts lead us to the conclusion that the Sohn operation was planted well above the permitted tidal elevation of +3 MLLW to at least a tidal elevation of +4.3 MLLW or higher. None of the planting should have been visible during the daylight low tides of June 25 and June 26, 2019 because the lowest tides were +3.6 on those two days.

We request that the County confirm these findings and if they are found to be accurate, require ChangMook Sohn to pull back his planting to the stated tidal elevation allowed by his Thurston County permit.

4. #7 of the MDNS states: "Weekly patrols of tidelands within a half mile of the geoduck farm shall be conducted. During those patrols, all geoduck debris must be collected regardless of its source."

Access to private tidelands in Thurston County has often been shared within neighborhood communities of shoreline property owners. However, with the advent of commercial shellfish farming on private tidelands, the community sharing of access to the tidelands has changed. The County, as in the Sohn MDNS, is granting access to unknown parties to routinely trespass on private property. This would be unheard of for upland properties and it should be no different for tideland properties. Shellfish aquaculture employees must refrain from trespassing on tidelands belonging to owners who do not choose to allow access. For owners who do choose to allow access, the County should get a signed letter of agreement from each participating property owner stating that unknown parties will be coming on to their private property and waiving any liability of the property owner. The County should also sign this agreement. On request of anyone in the tideland community within a half mile of the operation, the County should do background checks and train all such persons who will be going onto private property to the satisfaction of each individual property owner. This also presumes that Thurston County knows specifically where tideland property lines occur and can transmit that specific information to those it is granting access to so that those grantees will not be in danger of trespassing on non-participating property owners.

5. Paragraph Two of the Description of Proposal of the MDNS state: "...4-6 inch diameter PVC pipe will be placed on end and buried in the substrate with 2-3 inches exposed."

Although a few of the tubes on the Sohn operation are only 2-3 inches above the sediment, the vast majority of tubes average 5-6 inches above the sediment and many are higher, a few as much as 8-9 inches. Please see photos below taken with a measuring tape in view.

June 18, 2019. Photos of PVC tube heights on ChangMook Sohn geoduck operation in Zangle Cove.

There may be additional violations of the permit requirements related to this operation, however, we believe the above violations are sufficiently flagrant to require that the operation be stopped, and all tubes pulled until the violations are remedied.

Thurston County issued the permit for this operation and is responsible for its enforcement. Therefore, we request that Thurston County take immediate action to ensure compliance with every requirement of the permit and that the County engage in ongoing inspection to ensure compliance not only of Mr. Sohn's operation, but all commercial geoduck and other shellfish operations within the County for similar lack of compliance with permit requirements.

We look forward to your response.

Sincerely,
Kathryn and Patrick Townsend
Olympia, Washington

Attachments:
5/3/2016 Thurston County Mitigated Determination of Nonsignificance, Project Number 2014108800, ChangMook Sohn, 930 76th Avenue NE, Olympia, WA 98506

PROTECT OUR SHORELINE NEWS

Our mission is to protect the habitat of Puget Sound tidelands from the underregulated expansion of new and intensive shellfish aquaculture methods. These methods were never anticipated when the Shoreline Management Act was passed. They are transforming the natural tideland ecosystems in Puget Sound and are resulting in a fractured shoreline habitat. In South Puget Sound much of this has been done with few if any meaningful shoreline permits and with limited public input. It is exactly what the Shoreline Management Act was intended to prevent.

Get involved and contact your elected officials to let them you do not support aquaculture's industrial transformation of Puget Sound's tidelands.

Governor Inslee:
http://www.governor.wa.gov/contact/contact/send-gov-inslee-e-message
Legislative and Congressional contacts:
http://app.leg.wa.gov/DistrictFinder/

Additional information
Twitter: http://www.twitter.com/protectourshore
Facebook: https://www.facebook.com/ProtectOurShore/

SUNDAY, SEPTEMBER 15, 2019

Burley Lagoon Residents Complain of Putrid Smell, Clams Die Off: A "Preferred Use" of the tidelands?

"Particularly pungent smells

may come from the beach when a common type of seaweed

known as sea lettuce decays

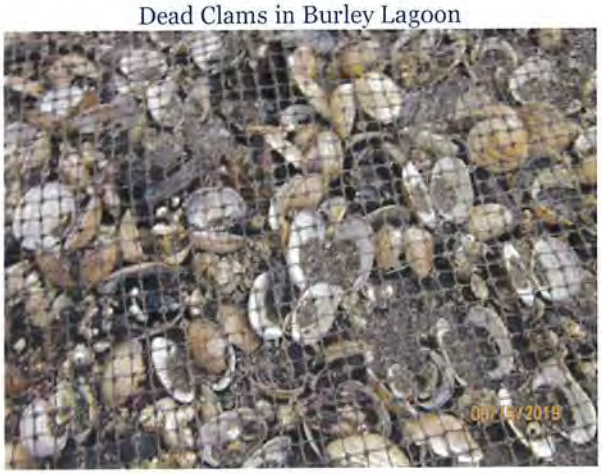
in an environment with low dissolved oxygen."

(Department of Ecology, "Focus on Saltwater Beach Odors")

Promoting and enhancing the public interest or industrial scale aquaculture?

After weeks of residents along the shoreline of Burley Lagoon complaining about a putrid smell so strong it has prevented many from enjoying the air outside of their homes, it appears there has been a clam die off to go along with it. To hear Taylor Shellfish discuss their "rights" under the Shoreline Management Act, the state and counties are to do nothing but promote and enhance aquaculture, prioritizing it over all other water dependent uses, believing it is in the statewide interest to do so. Even if it means what Burley Lagoon is experiencing.

Dead Clams in Burley Lagoon



Clean net placed too late?

The smell of politics.

Pierce County responded sources of the smell could be "Ulva" (aka Sea Lettuce, a native vegetative seaweed) so thick it smells of rotten eggs as it decays. Another source mentioned could be leaking septic fields. Not mentioned is that it could also be the carrying capacity of Burley Lagoon has been exceeded by Taylor Shellfish's intensive and industrial level of planting of clams and oysters, resulting in shellfish rotting as they die off, unable to survive due to the density of planting. Or it could be a combination of these or other things. Whatever it is, the stench is overwhelming and impacts enjoyment and use of the shoreline, whether a resident or a member of the public trying to enjoy the aquatic environment in Pierce County.

Maybe the nets just need
a "good industrial scraping".

(Samish Bay, WA)

Do structures in the tidelands need bigger machines on the tidelands?

Long time residents of Burley Lagoon have stated they do not recall a stench so intense in all of their years living there, some for decades. What they also do not recall are the number of "predator nets" which Taylor Shellfish uses to keep native species from feeding off of the sediments, or the expansive area covered. Nor do they recall the intensity of planting which is occurring, whether it be clams or nonnative Pacific oysters. As seen in the Samish Bay photo above, in order to deal with the heavy growth on their predator nets, Taylor partnered with New Holland and implemented the use of a tractor and a "street sweeper" to clear the nets there of Sea Lettuce so thick it prevents clams below from surviving. Algae which apparently exists in higher densities due to this artificial structure which has been placed over the tidelands of Burley Lagoon and on oysters planted in high densities.

It's not rocket science. It's "Ecosystem Services".

AUGUST 2017

DUANE FAGERGREN

Under this mat of green macro algae (Enteromorpha spl lies this year's crop of yearling single Pacifics. The oysters consume phytoplankton, and excrete feces, pseudo feces, and ammonia in a mixture that serves to fertilize this luxurious crop of seaweed. The lush crop also provides habitat for crab (graceful crabs mostly) and fish (shiner perch, stag horn sculpin, and bay pipefish). The downside of this heavy growth is a mat that makes oysters grow slower, clams come to the surface of the beach and can't dig themselves back in, and likely oxygen debt as the algae naturally dies and decomposes.

Oysters poop, seaweed grows, clams die. Ecosystem services at work.

As noted in an August 2017 "Ecosystem Services" winning picture, one source of the problem is directly related to oyster feces, their pseudo feces, associated ammonia, and shell surface area provided by high density planting of oysters. Oysters poop and provide "fertilizer". On the surface of those shells macro algae attaches and thrives on the "nutrients" expelled by the nonnative Pacific oysters. That growth is so intense oyster growth slows and clams rise to the surface. Summertime low tides and summertime heat

promote decay and death. Smells emanate. Because of aquaculture. It's not rocket science. Calling it "ecosystem services" deflects attention from dealing with the problem created.

This is not "enhancing" the public interest
and is exactly what the Shoreline Management Act
was designed to prevent from happening
to Puget Sound tidelands.

(Read **RCW 98.58.020** to see
intended preferences of the SMA)

"promote and enhance the public interest" - not industrial aquaculture

The Shoreline Management Act was created in response to industrial levels of activities impacting the shorelines of Puget Sound. It was not created to promote the industrial level of activities the shellfish industry has since evolved into. Activities and impacts which lower the statewide ability to enjoy the shorelines of Washington State. The Pierce County Council, in reluctantly passing their updated Shoreline Master Program, listened to Taylor Shellfish complain, even after additional changes were made to accommodate their industry, that more needs to be done in order for their industry to profit from tidelands and public waters.

(Read August 28 letter from attorneys for Taylor Shellfish and the Foss family's North Bay Partners here: https://app.box.com/s/na0wpgwm4mjp7b41toj1iaf533iecij2)

Yes - Washington needs to change its laws.

"Maddening": Banning plastic straws and promoting PVC tubes in Puget Sound.

Most of what is noted in the Taylor/North Bay letter was addressed by Pierce County, yet still, Diane Cooper rose to state before the public and the council, not enough had been done for them. In response, most council members agreed, the state needs to change the law if, in fact, that is what Taylor Shellfish and others are relying on to promote their industry over other water dependent uses. [Read what the legislators who passed the SMA intended, here:

https://app.leg.wa.gov/RCW/default.aspx?cite=90.58.020, where it states counties, in developing their Shoreline Master Programs:

"shall give preference to uses in the following order of preference which:

(1) Recognize and protect the statewide interest over local interest;

(2) Preserve the natural character of the shoreline;

(3) Result in long term over short term benefit;

(4) Protect the resources and ecology of the shoreline;

(5) Increase public access to publicly owned areas of the shorelines;

(6) Increase recreational opportunities for the public in the shoreline;

(7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary."]

Get involved.

Use of structures and methods which create an environment from which odors emanate that are so strong as to prevent the public's enjoyment of the tidelands and shorelines is only one example showing how this industry is out of control. Pierce County agrees that laws promoting this need to change and will become active in the state to change this lopsided interpretation of a law intended benefit all in the state, not just a few corporations.

POSTED BY PROTECT OUR SHORELINE AT 4:55 PM

EMAIL THISBLOGTHIS!SHARE TO TWITTERSHARE TO FACEBOOKSHARE TO PINTEREST

LABELS: GEODUCK, PIERCE COUNTY SHORELINE MASTER PROGRAM UPDATE, PVC, SHORELINE MANAGEMENT ACT, TAYLOR SHELLFISH

PROTECT OUR SHORELINE NEWS

Our mission is to protect the habitat of Puget Sound tidelands from the underregulated expansion of new and intensive shellfish aquaculture methods. These methods were never anticipated when the Shoreline Management Act was passed. They are transforming the natural tideland ecosystems in Puget Sound and are resulting in a fractured shoreline habitat. In South Puget Sound much of this has been done with few if any meaningful shoreline permits and with limited public input. It is exactly what the Shoreline Management Act was intended to prevent.

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Legislative and Congressional contacts:
http://app.leg.wa.gov/DistrictFinder/

Additional information
Twitter: http://www.twitter.com/protectourshore
Facebook: https://www.facebook.com/ProtectOurShore/

MONDAY, SEPTEMBER 16, 2019

Taylor Shellfish Says Clam Die-off in Burley Lagoon from Toxic Algae

"Based on recent water samples,

there is a toxic algae bloom in Burley Lagoon."

Taylor Shellfish, September 15

Testing and reporting to...?

After weeks of complaints over a putrid smell in Burley Lagoon and large areas of dead clams rising found on the surface of sediments, an email was sent to Taylor Shellfish asking if perhaps the cause may be that Burley Lagoon's carrying capacity has been exceeded. In response, Taylor Shellfish stated water samples had shown there was a toxic algae bloom occurring in Burley Lagoon. It did not appear from the email any residents had been notified of the toxic algae.

"The stench of dead clams
nearly knocked him over," he said.

In July.

Burley Lagoon? No, Rocky Bay.

The stench of dead clams.

Toxic algae blooms have impacted high density clam plantings by Taylor Shellfish elsewhere in Puget Sound this year. In July, residents near Rocky Bay also complained of a similar "stench". In the case of Rocky Bay, it was found large areas with clams planted in high densities by Taylor Shellfish had also risen to the surface and died. The Key Peninsula News wrote about the event August 1. (Read article here: https://keypennews.com/rocky-bay-algae-bloom-suspected-in-clam-die-off

This looks and smells very familiar.

This canary flew around for a long time.

In the September 15 email, Taylor noted the toxic algae is a "canary" of some sort, indicating something. That sampling shows the algae is still present months later, and shellfish planted in high densities in the tidelands of Puget Sound are still dying, should motivate health officials to do something more than they are. Before shellfish with toxins make their way from tidelands to the public.

POSTED BY PROTECT OUR SHORELINE AT 8:18 AM
LABELS: BURLEY LAGOON, PUGET SOUND, SHELLFISH, TOXIC ALGAE

To view the online posting of September 16, 2019, go to this link:

https://protectourshorelinenews.blogspot.com/2019/09/taylor-shellfish-says-clam-die-off-in.html

CASE INLET SHORELINE ASSOCIATION
3919 51st Ave Ct NW
Gig Harbor, WA 98335

Frequently Asked Questions:
Industrial Shellfish Aquaculture in Puget Sound

http://www.caseinlet.org/FAQ_s.php

Q. The shellfish aquaculture industry claims that shellfish and geoduck aquaculture is good for the environment. Is this true?

A. No, this is not true. In reality, the shellfish industry is responsible for damage to the environment. Depletion of native species, introduction of harmful invasives and the spread of alien organisms, the killing and hazing of shorebirds, the use of chemical poisons to kill native burrowing shrimp and disruption to fish habitat are just a few examples of environmental damage. The shellfish industry commonly uses out of context self serving pseudo science to justify its harmful practices.

Q. Is shellfish aquaculture sustainable?

A. It depends on the practice and scale of the operation. Based on the rapid expansion and intensity of techniques of shellfish aquaculture in South Puget Sound, many new techniques are probably not sustainable by any definition. Generally, 'sustainable' means that the activity is capable of being continued without damage to the environment. Other definitions relate to environmental stewardship, but also to the social implications. Does the activity interfere with the commercial or recreational use of others? Does the activity reduce the scope for future users to benefit from the commercial, environmental or recreational use of the area? Does the activity alter or diminish the environment and biodiversity? These questions also relate to the issue of sustainability.

95 percent of geoducks are shipped via air freight to Asian markets. This carbon footprint precludes these commercial activities as "green" or "sustainable".

From The Association for Responsible Shellfish Farming, Definition of Sustainability:

"There are various forms of sustainability but, in essence, these condense around concepts relating to stewardship. It is perfectly acceptable to exploit the environment, provided it is done in a way which:

a. does not significantly interfere with the commercial or amenity use of that environment by others (although those others must also utilize the environment in a sustainable manner to preserve equity);
b. does not reduce the scope for future users to benefit from the environmental resource; and
c. does not significantly alter or diminish environmental quality and biodiversity per se."

Excerpt from: K.D. Black, 2001. "Sustainability of Aquaculture" in K. Black (ed.), *Environmental Impacts of Aquaculture*. CRC Press. Pg. 199.

Q. The shellfish industry claims that shellfish aquaculture "provides ecological functions" and "improves water quality". Is this true?

A. No, this is false and misleading industry propaganda and public relations fraud. Shellfish and geoducks filter and consume phytoplankton and detritus, and excrete feces and pseudofeces as waste. Phytoplankton is an important aquatic plant and nutrient for a number of other aquatic species and is naturally present in the marine environment. The shellfish industry actually wants to install their operations in areas of planktonic abundance. In the wild, geoduck and other shellfish are stimulated to spawn due to increased water temperature and increased plankton blooms. So the argument: *"shellfish clean the water"* or *"shellfish provide ecological services"* are totally false and misleading statements. Removing phytoplankton from the water column is not "cleaning" the water at all. Shellfish filter everything out of the water column, including crab zoeas and fish eggs, and although this may temporarily clarify the water in the area of the shellfish farm, this can be harmful to other species.

The shellfish industry's own scientific studies (Totten mussel raft EIS) indicate that shellfish aquaculture actually adds nitrogen to the water column, thereby increasing phytoplankton production and substantially decreasing dissolved oxygen by as far as 200 meters away, so the industry's claim of improving water quality is utterly false. Mussel rafts, for example, actually contribute to nitrogen loading and increased phytoplankton blooms and anoxic/hypoxic or eutrophic/low oxygen conditions that can lead to fish kills.

According to a study by Pietros and Rice, in order for farmed shellfish to *"clean the water"*, filtration rates must exceed phytoplankton regeneration. In this particular mesocosm study, this does not occur. In fact, phytoplankton production is actually

stimulated from the wastes produced from shellfish farming.

No studies currently exist specific to South Puget Sound to corroborate the shellfish industry claim that farmed shellfish "clean" the water or are beneficial in any way. In Willapa Bay, the shellfish industry has historically used Carbaryl, a chemical pesticide, to kill native burrowing shrimp to enhance oyster production. Spraying Carbaryl on the tidelands also negatively affects salmon, steelhead and crab populations, and negatively impacts water quality.

The shellfish industry here in Puget Sound commonly uses studies by Roger Newell in Chesapeake Bay to claim that shellfish aquaculture is beneficial. In Chesapeake Bay, an entirely different ecosystem than Puget Sound, the oyster reefs have been over harvested to less than one percent of historic levels. Newell's studies address restoration of the oyster reefs in Chesapeake Bay, where reserves are set up and harvest is restricted. Newell does not address aquaculture in Puget Sound. The shellfish industry uses these studies disingenuously to mislead and manipulate government agencies and legislators to affect policy decisions in favor of the shellfish industry.

Q. Then why does the shellfish aquaculture industry claim themselves as champions of clean water?

A. The shellfish industry is referring to pathogens, such as fecal coliform bacteria. The shellfish industry cannot sell shellfish infected with pathogens from runoff or sewage contamination and is thus required to help monitor water quality regularly. Typically, the shellfish industry establishes shellfish aquaculture districts with local governments requiring taxpayers to fund sewer systems or runoff containment and maintenance to protect their commercial interests.

Q. The shellfish and geoduck industry promotes themselves as environmental heroes. Are they considerate of fish and bird habitat?

A. No, absolutely not. They're interested in making money as a business by exploiting Puget Sound's tidelands. If they were interested in fish, bird and other wildlife habitat of the intertidal, they would have waited to expand operations until baseline studies had been completed. The shellfish industry removes and destroys eelgrass, sand dollars, starfish, and many other important native species and organisms that get in the way of their profits. The shellfish industry is lying when they assert that they are environmentalists. They're only interested in the environment to the extent that it benefits them.

Q. Why do some environmental groups refuse to condemn the harmful practices of the shellfish industry?

A. Many NGO's, or so called "non-profit environmental groups" accept money and large donations from the shellfish industry. Groups such as People for Puget Sound, Puget Soundkeepers Alliance, Surfrider, Futurewise, the Nature Conservancy and the Puget Sound Restoration Fund all regularly take money or free shellfish from the shellfish industry. Some groups, such as the Skagit Conservation Education Alliance, were started by the shellfish industry to promote shellfish interests. Others, like the Puget Sound Restoration Fund, operate essentially as a public relations tool of the shellfish industry.

From the document "A Challenge to Conservationists": *"...NGO's entrusted with the enormous responsibility of defending the planet's natural ecosystems against the encroachment of the modern world in its most destructive manifestations have increasingly partnered with -- and become dependent on -- many of the corporations and governments that are most aggressively making this encroachment..."*

Q. What about Endangered Species Listed salmon and steelhead?

A. The South Puget Sound Salmon Recovery Group lists shellfish aquaculture as a "stressor" to salmon populations. The National Marine Fisheries Service (NMFS) and the Army Corps. of Engineers state that shellfish aquaculture is likely to adversely affect essential fish habitat for all fish, and to adversely affect critical habitat for endangered Puget Sound Chinook salmon and Hood Canal Summer-run Chum salmon. Steelhead habitat has not yet been determined. Ironically, the NMFS is a division of NOAA, a branch of the Department of Commerce, which is actively engaged in promoting aquaculture and funding various research and development projects that benefit the shellfish aquaculture industry.

Q. Is geoduck aquaculture consistent with the Endangered Species Act?

A. No, intertidal geoduck aquaculture is not consistent with the federal Endangered Species Act of 1973. As stated in section 2 of the act, it was designed to protect critically imperiled species from extinction as a consequence of economic growth and development untendered by adequate concern and conservation, and to protect the ecosystems on which these species depend. Chinook, Coho and Steelhead are all listed under the ESA in Puget Sound. American bald eagles are still listed as a species of concern. The Puget Sound orca is also ESA listed and is dependent on increased salmon runs.

Q. Is geoduck aquaculture consistent with the Magnuson-Stevens Act?

A. No, intertidal geoduck aquaculture is not consistent with the federal Magnuson-

Stevens Fishery Conservation and Management Act of 1996. The underlying principle of the act is to promote the long term protection of essential fish habitat and to ensure the effective conservation and scientific understanding of recreational and commercial fishery resources. It is documented that some methods of shellfish aquaculture negatively impact Essential Fish Habitat (EFH) for salmon. It is documented that geoduck aquaculture negatively impacts eelgrass. We also know that shellfish farmers have removed eelgrass and sand dollars to establish geoduck sites, and that once these sites have been established for geoducks, the eelgrass and sand dollars will not return and can no longer survive in these areas. Eelgrass is EFH and is federally protected, and the Washington State Department of Ecology has a 'no net loss' policy on eelgrass.

Q. Is geoduck aquaculture consistent with the Shoreline Management Act?

A. No, intertidal geoduck aquaculture is not consistent with Washington State's Shoreline Management Act of 1971. The overarching policy of the SMA is that the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible. One of the primary goals of the SMA is to preserve the natural character of the shoreline. Priority is to be given to developments that provide opportunities for substantial numbers of people to enjoy the shorelines of the state. The SMA also implements the Public Trust Doctrine, limiting the public and private use of tidelands to protect the public's right to use the water. Last year, the Pierce County Hearings Examiner (Taylor/Foss vs. Pierce County) concluded that geoduck farms are indeed a structure, that they obstruct public use of the water, and that they cause habitat disruption. According to the SMA, aquaculture should not be permitted in areas where it would result in a net loss of ecological functions, adversely impact eelgrass and macroalgae, significantly conflict with navigation and other water-dependent uses or significantly impact the aesthetic qualities of the shoreline.

Q. How does shellfish aquaculture impact salmon and fish habitat.

A. The shellfish industry uses plastic mesh bags, PVC pipes, and large anti-predator canopy nets to cover intertidal substrata areas. Salmon, sole, flounder, and a large number of other aquatic species use the natural functions of this habitat for feeding. Endangered Chinook salmon and flounder both have similar benthic diets, and some of these prey taxa are depressed by tubes and nets. Conversely, tubes and nets can provide a surface for algae growth and production of epibenthic prey, but it is not known if salmon will feed over geoduck sites. It is also not known how geoduck structures affect migration patterns of salmon, or the effects of the constant ongoing removal/replacement of tubes, nets and bags.

Q. Is intertidal shellfish aquaculture legal in Puget Sound?

A. No, technically most methods that we see today, including geoduck aquaculture, are not legal. But because of the industry's long economic and cultural history, decades without regulations, corruption, feeble administration and misinterpretation of the Shoreline Management Act (SMA), plus very little enforcement efforts, it has been allowed to perpetuate largely unchecked.

The SMA is state law. The over-arching policy of the SMA is to preserve the physical and aesthetic qualities of natural shorelines. The SMA gives priority to developments related to residential and recreational uses over aquaculture as a preferred use. Aquaculture may only be considered a preferred use if it does not interfere with residential and recreational uses, and if it does not interfere with the natural functions of the ecosystem.

The Shoreline Management Act also states:

"*Alterations of the natural conditions of the shorelines of the state, in those limited instances when authorized, shall be given priority for...development that will provide an opportunity for substantial numbers of people to enjoy the shorelines of the state.*"

This statement clearly indicates that shoreline alterations will be (1), limited in instance, and (2), prioritized toward recreational uses.

In 1971 when the SMA was drafted and approved by voters, shellfish aquaculture in Puget Sound was localized and confined primarily to bottom oyster culture. Today, it's millions of plastic tubes, plastic mesh bags, huge canopy predator exclusion nets, barges, pumps, hoses and nozzles, an unprecedented amount of anthropogenic activity and disturbances to the ecosystem. This is not consistent with the SMA on several levels. It does not preserve the natural character of the shoreline. It does not protect the resources and ecology of the shoreline. It decreases recreational opportunities for the public in the shoreline area. The public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines is not being preserved. It is an alteration of the natural condition of the shoreline.

It is clear that intertidal geoduck aquaculture is in violation of the Shoreline Management Act. It is not a "reasonable or appropriate use". It does not "promote and enhance the public interest". It is contrary to the state's policy of "protecting against adverse effects to the waters of the state and their aquatic life". It is not a preferred use consistent with prevention of damage to the environment. It does not meet the "no net loss of ecosystem function" criterion.

Intertidal geoduck aquaculture adversely impacts eelgrass, depresses key prey invertebrates important to endangered salmon, disrupts resident and migratory birds including bald eagles, and significantly impacts the aesthetic qualities of the shoreline.

The Public Trust Doctrine is not statutory law, but is an ancient legal principle that certain resources are for public use, and that the government is required to maintain those resources for the public's reasonable use. The doctrine holds that the land between the tides and under navigable water is inalienably dedicated to public use. This includes the biological resources contained within and dependent on that water. A whole string of court decisions, both at the federal and state levels, have confirmed its validity for the present day.

Intertidal shellfish aquaculture negatively impacts public resources and restricts navigation and public access in violation of the Public Trust Doctrine.

The Precautionary Principle is a moral principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action, and that a lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Shellfish aquaculture is also outside the moral compass of the Precautionary Principle.

Q. The shellfish industry claims that shellfish aquaculture is a *'preferred use'* of the shoreline according to the Shoreline Management Act. Is this true?

A. No, most shellfish aquaculture techniques are not a *'preferred use'*. The activity must be environmentally neutral to qualify as preferred under state guidelines. This is not the case with geoduck tubes, predator exclusion nets, grow bags, off bottom culture and 'kiddie pool' geoduck incubators. Most other techniques also disrupt ecological processes to some extent.

The SMA states: "The interests of all the people shall be paramount in the management of shorelines of statewide significance." *"Preferred"* uses include single family residences, ports, shoreline recreational uses, water dependent industrial and commercial developments and other developments that provide public access opportunities. To the maximum extent possible, the shorelines should be reserved for "water-oriented" uses, including "water-dependent", "water-related" and "water-enjoyment" uses. Preferred uses for Shorelines of Statewide Significance, in order of priority, are to "recognize and protect the state wide

interest over local interest; preserve the natural character of the shoreline; result in long term over short term benefit; protect the resources and ecology of the shoreline; increase public access to publicly owned shoreline areas; and increase recreational opportunities for the public in the shoreline area." The overarching policy is that "the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally. "Alterations of the natural conditions of the shorelines of the state, in those limited instances when authorized, shall be given priority for...development that will provide an opportunity for substantial numbers of people to enjoy the shorelines of the state." The SMA also implements the common law Public Trust Doctrine. The essence of this court doctrine is that the waters of the state are a public resource for the purposes of navigation, conducting commerce, fishing, recreation and similar uses and that this trust is not invalidated by private ownership of the underlying land. The doctrine limits public and private use of tidelands and other shorelands to protect to public's right to use the waters of the state.

The SMA guidelines address aquaculture generally but do not have provisions related to geoduck specifically, as the SMA was drafted before the advent of intertidal geoduck aquaculture techniques. The guidelines state: "Aquaculture is the culture or farming of food fish, shellfish, or other aquatic plants and animals. This activity is of statewide interest. Properly managed, it can result in long-term over short-term benefit and can protect the resources and ecology of the shoreline. Aquaculture is dependent on the use of the water area and, *when consistent with control of pollution and prevention of damage to the environment, is a preferred use of the water area.* Local government should consider local ecological conditions and provide limits and conditions to assure appropriate compatible types of aquaculture for the local conditions as necessary to assure no net loss of ecological functions. Potential locations for aquaculture are relatively restricted due to specific requirements for water quality, temperature, flows, oxygen content, adjacent land uses, wind protection, commercial navigation, and, in marine waters, salinity. The technology associated with some forms of present-day aquaculture is still in its formative stages and experimental. Local shoreline master programs should therefore recognize the necessity for some latitude in the development of this use as well as its potential impact on existing uses and natural systems. Aquaculture should not be permitted in areas where it would result in a net loss of ecological functions, adversely impact eelgrass and macroalgae, or significantly conflict with navigation and other water-dependent uses. Aquacultural facilities should be designed and located so as not to spread disease to native aquatic life, establish new nonnative species which cause significant ecological impacts, or significantly impact the aesthetic qualities of the shoreline. Impacts to ecological functions shall be mitigated according to the mitigation sequence described in WAC 173-26-020." WAC 173-26-241(3)(b)

Joan K. Thomas, of the Washington Environmental Council (WEC) and one of the drafters of the SMA, spoke on the history of the act (page 16) at the 1991 SMA Symposium. The WEC, along with citizen and environmental groups, were instrumental in the passage of the SMA, and in getting the SMA on the ballot. In 1970, these groups had gathered over 160,000 signatures in 10 weeks. The earlier versions of the act also provided for direct citizen enforcement.

Joan K. Thomas stated at the 1991 symposium:

"I have thought about this carefully over the years as I have seen my expectations frustrated. We have lost the full potential of the SMA to protect a valuable resource through fainthearted administration."

"When the SMA was written in 1971, aquaculture meant oysters and clams and one salmon raising operation. This activity was recognized and protected as water-dependent. I do not read the original intent or the original guidelines to promote the industry as we know it today. In fact, the guidelines specified that navigational access not be restricted and that visual access of upland owners be considered. Aquaculture has become a sore point between local governments and the Department of Ecology – a fraying of the partnership."

Brian Boyle, 1991 Public Lands Commissioner, spoke on the Public Trust Doctrine (page 111):

"For the average family, a walk on the beach is a free and easy amusement. It's something most of us take quite for granted. To a public land manager, however, that same walk represents the exercise of a right with roots that can be traced back through the foundation of our state, to the foundation of our republic, and beyond that to the laws of England and the statutes of the Roman Empire."

"Our walk on the beach is, in fact, defended by a legal doctrine more than 1,500 years old – a doctrine that holds that the land between the tides and under navigable water is inalienably dedicated to public use. This is the famous public trust doctrine, and a whole string of court decisions, both at the federal and state levels, have confirmed its validity for the present day."

"Our stewardship has two separate but related goals. The first is the preservation of values inherent in the public trust – waters where we can fish and swim and ecologically healthy bottom lands and beaches. Although much of this effort is carried out by other state agencies, including the departments of Ecology and Fisheries and Wildlife, there is an important difference in emphasis and authority. Those agencies rely on the police power of the state, which is subject to a

number of constraints when it affects private property."

"For example, when the state limits what private property owners can do with their property, as in zoning restrictions, property owners may object that the state has taken some part of the values of their property without compensation, which is a violation of the constitution. But the situation is very different when the state acts to protect its own property, or the property rights it holds in trust for the people under the public trust doctrine. Potentially, this is a much more powerful means of securing public rights, against which the "taking" argument has no effect. The Washington Supreme Court held in the Orion case that private owners can expect no economic benefit from their lands if obtaining that benefit deprives the public of rights it holds under the public trust doctrine."

Q. Is shellfish aquaculture documented as a stressor to fish habitat and salmon populations?

A. Yes. For one example please: Click here.

Q. What about the social disruptions caused by shellfish aquaculture expanding into non traditional and residential areas?

A. Profits are the primary goal of the expanding shellfish/geoduck industry in Puget Sound.

Q. What about the loss of traditional and recreational sport fishing grounds? Does the shellfish industry respond to this issue?

A. No. There has not been any consideration given to this issue by the shellfish aquaculture industry. The industry uses non-scientific opinion as propaganda to suggest shellfish aquaculture enhances sport fishing.

Q. Does the plastic tubes (PVC - polyvinyl chloride) used in geoduck aquaculture contain Bisphenol A (BPA) or Phthalates?

A. Yes, the plastic PVC pipes used in geoduck aquaculture contain Phthalates. According to a University of Washington study: 'Plastics: Possible Impacts on Children's Health', Pediatric Environmental Health Specialty Units: "Phthalates are man-made chemicals used as a 'plasticizer' in a variety of industrial and commonly used products. These chemicals are anti-androgenic, and can adversely impact androgen sensitive tissues during specific windows of development."

The use of PVC is banned in New York State and elsewhere because of it's negative

environmental impacts. Yet the shellfish industry places eight miles, or 150,000 pounds (75 tons) of PVC plastic PER ACRE of Puget Sound tidelands for geoduck aquaculture. It then weathers and wears away directly into the environment. PVC pipe was designed for indoor or underground construction use, not for outdoor use in the aquatic environment where it is exposed to UV light, wind and wave erosion. No studies have been done to assess the long or short term impacts of this unprecedented amount of PVC plastics, literally millions of pounds, into the nearshore environment of Puget Sound.

In 1987, Congress enacted the 'Marine Plastic Pollution Research and Control Act', which is intended to reduce plastics in the marine environment.

Throughout its entire life cycle, from manufacturing to disposal, PVC has high environmental costs. It contains a high percentage of chlorine, is made with the carcinogen vinyl chloride, plus dioxin and ethylene dichloride are by-products of its manufacture. PVC is not readily recyclable and when incinerated releases both the carcinogen dioxin and hydrogen chloride gas.

Q. How many companies are pursuing geoduck aquaculture in South Puget Sound?

A. Primarily five: Taylor Shellfish, Seattle Shellfish, Allen Shellfish, Arcadia Shellfish and Chelsea Shellfish. Additionally, the Pacific Coast Shellfish Growers Association, the Washington State Department of Natural Resources, and various other private, state, county and federal agencies work to assist the shellfish aquaculture industry in expanding into inappropriate areas of South Puget Sound.

Q. Is geoduck farmed in its natural habitat?

A. No, geoduck is mainly a subtidal animal. Geoduck is farmed in the intertidal zone using plastic PVC pipes and nylon nets for predator exclusion. Geoducks cannot grow in the intertidal without pipes or nets.

Q. What about natural densities? Are geoduck farmed in natural densities as they occur in the subtidal?

A. No, absolutely not. Not only are geoducks farmed in the intertidal, which is not their natural habitat, they are farmed in densities that are many times their densities in the wild.

Q. Has the Washington State Department of Natural Resources done a good job of

managing the subtidal geoduck harvest?

A. No. Areas have been overfished and harvest boundaries have been violated on a number of subtidal tracts.

Q. Are geoducks an aphrodisiac or do they have properties of male enhancement?

A. No, absolutely not. Some Asian cultures believe this is the case because of the geoduck's profound phallic appearance.

Q. Are geoducks a valuable food source.

A. No. Salmon has three times the calories, twice the protein, and five times the healthy Omega 3's as geoduck, but at one third the price.

Q. Why is geoduck so expensive?

A. The demand is driven by the false cultural belief that geoducks have properties of aphrodisia. More than 95% of geoduck is sold to Asian markets.

Q. The shellfish aquaculture industry claims that geoduck farming is good for the economy. Is this true?

A. No, this statement has not been quantified or substantiated. Because geoduck are largely exported, sales and excise taxes are avoided, depriving Washington state and Puget Sound counties of significant revenues. Since tidelands are taxed at only $3. per acre, substantial tax revenues to Puget Sound counties are avoided. Yet the shellfish industry's clean water initiatives, in which they gain financially, cause great expenses to be incurred by taxpayers in lieu of other programs. The truth is: only a handful of individuals stand to gain substantially from geoduck aquaculture.

Q. What about jobs?

A. The shellfish industry claims to provide about 2,000 family wage jobs in Washington State. For some perspective, the tourism industry in Washington State provides about 150,000 jobs.

Q. Does shellfish aquaculture help balance the seafood trade imbalance and the overall trade deficit.

A. The U.S. exports over 70% of its seafood products to other countries while importing about 80% of seafood from foreign countries; primarily

China. We export our high quality seafood and import cheaper farmed seafood products to consume here. This is a business and policy issue/problem that cannot ever be solved by exporting our shellfish overseas. Click here for video.

Q. What about the shellfish industry claim that shellfish aquaculture provides heathy protein for a growing population?

A. This is typical false propaganda. Shellfish are a luxury food, and as such will never be a staple protein source. Six medium sized oysters contain about the same amount of protein as one egg. Six medium oysters retail for about $5. or $6. dollars, compared to about .23 cents for one egg - a difference in price of about 95 percent. Oysters and other shellfish are a luxury item that will never be found at the local food bank, nor will they ever be a viable protein source for feeding the masses. The shellfish industry is not about an altruistic desire for clean water or feeding hungry people. The shellfish industry wants to expand for the purposes of increasing profits at the expense of the nearshore ecosystem and public rights.

Shellfish are not necessarily a "healthy" food either. Outbreaks of paralytic shellfish poisoning are relatively common, as is vibrio vulnificus in oysters. Vibrio is one of the most deadly food borne illnesses known, killing half of all people that come into contact with it. Oysters are number 4 on the FDA's top ten list of riskiest foods.

Q. Why is the shellfish aquaculture industry moving into traditional and historic recreational and residential areas of South Sound?

A. Money and greed. The South Sound has optimum conditions for geoduck aquaculture: clean pristine waters, abundance of planktonic nutrients, suitable intertidal substrate, proper salinity and proximity to processing facilities.

Q. Has the government of British Columbia, Canada, banned new intertidal geoduck aquaculture?

A. Yes. The B.C. Ministry of Agriculture and Lands used to state that this was: "due to the lack of understanding on the effects of geoduck aquaculture techniques to fish habitat". Because of pressure from the shellfish aquaculture industry, this now says: "while the policy for intertidal geoduck culture is under review".

Q. What is hypoxia?

A. 'Hypoxia' is low dissolved oxygen, or 'anoxia': absence of oxygen. It is caused by a number of factors, including an over-abundance of shellfish. Other causes: algal or plankton blooms, decaying plant and animal matter and riparian

loss. Plankton blooms can occur naturally and can be exacerbated by septic and fertilizer runoff.

Q. The shellfish aquaculture industry claims that geoduck farming improves hypoxia (low dissolved oxygen) in Puget Sound. Is this true?

A. No, this is not true and cannot be scientifically substantiated. In fact, too much geoduck can contribute to hypoxia in two ways: geoduck as aerobic consumers of oxygen, and from feces deposition increasing organic carbon levels and hence, sediment oxygen demand. Mussel rafts significantly contribute to the hypoxia problem according to the shellfish industry's own environmental assessments.

Q. Is hypoxia caused by upland development?

A. In Hood Canal, the hypoxic conditions are primarily caused by the nitrogen leached from decaying alder leaves and other deciduous trees, a result of massive clearcutting of native evergreens. Reforestation to native conifers would be the best solution to hypoxia in Hood Canal. Residential upland development (septic and fertilizer runoff) accounts for about 10% of the hypoxia problem in Hood Canal.

Q. What about oysters? Are they good for the environment?

A. Yes. A natural abundance of shellfish are important to the ecosystem. Oysters are particularly beneficial. One oyster can filter about 30 gallons of water per day. Oysters are superior at sequestering carbon and provide natural habitat to crab and other filter feeders, such as barnacles.

Q. What about invasive species?

A. The shellfish industry has introduced a number of harmful invasive species, while contributing to the near extinction of the native Olympia oyster. The Pacific oyster is an invasive species, as is the oyster drill from Japan. Mediterranean mussels are invasive, as are Manila clams. Aquaculture is the number one method of introduction of invasive species in Puget Sound. Marine invasive species are a major threat to biodiversity and have profound ecological and economic impacts.

Various forms of the Vibrio bacteria are most likely spread through human activity. In Puget Sound, some shellfish diseases can be distributed through aquaculture activities from the spread of seed from hatcheries in California or outside the Puget Sound area. Hatcheries are generally not regulated. Parasites such as Orthione griffenis are distributed through human activities and may initially take root from ballast water. Griffen's parasite threatens native mud shrimp with extinction, yet the shellfish industry continues to spray Carbaryl in

Willapa Bay to kill mud shrimp and other burrowing shrimp.

Q. Does CISA oppose all shellfish aquaculture?

A. CISA supports reasonable scale, properly sited eco-friendly shellfish culture techniques such as on bottom triploid oyster culture harvested by hand. CISA does not support the use of carbaryl or other pesticides, nor will we support culture methods that negatively impact salmon and other valuable species. CISA does not support further shellfish aquaculture expansion in Puget Sound without site specific unbiased scientific review and stakeholder participation.

Q. How can I help?

A. Call or write or email your local and state representatives. Tell them that you do not want aquaculture expanding into Puget Sound without strict environmental regulations, public participation in the regulatory process, and exhaustive and unbiased scientific review. Or email us at info@caseinlet.org with questions or comments.

CISA

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Public Communications
rec'd 10/16/19 PCmtg

PRESS RELEASE
COALITION TO PROTECT PUGET SOUND HABITAT
CENTER FOR FOOD SAFEY

OCTOBER 15, 2019

CONTACT: Laura Hendricks (253) 509-4987
Maradel Gale (206) 842-5133

The Coalition To Protect Puget Sound Habitat (Coalition) and Center For Food Safety welcome the following attached Federal decision: "The Corps issuance of a nationwide permit, at least with respect to activities in the waters of the State of Washington, was arbitrary and capricious and not in accordance with NEPA or the CWA. Pursuant to 5 U.S.C. § 706(2), the Court holds unlawful and sets aside NWP 48 insofar as it authorizes activities in Washington."

For over two decades, citizens have been ignored by Washington State Agencies and most Counties as shellfish aquaculture lobbying paved the way for the unlimited proliferation of this industrial conversion of our shorelines. Judge Lasnik stated "The Court finds that the Corps has failed to adequately consider the impacts of commercial shellfish aquaculture activities authorized by NWP 48, that its conclusory findings of minimal individual and cumulative impacts are not supported by substantial evidence in the record, and that its EA does not satisfy the requirements of NEPA and the governing regulations."

While citizens have been pointing out the limited scientific findings that the Corps and the shellfish industry have used to gain permitting, the Judge noted: "There is no discussion of the impacts on other types of aquatic vegetation, on the benthic community, on fish, on birds, on water quality/chemistry/structures, or on substrate characteristics. There is no discussion of the subtidal zone. There is no discussion regarding the impacts of plastic use in shellfish aquaculture and only a passing reference to possible side effect of pesticide use."

As the decision reinforces: "In this case, the Corps acknowledged that reissuance of NWP 48 would have foreseeable environmental impacts on the biotic and abiotic components of coastal waters, the intertidal and subtidal habitats of fish, eelgass, and birds, the marine substrate, the balance between native and non-native species, pollution, and water quality, chemistry, and structure, but failed to describe, much less quantify, these consequences."

Laura Hendricks, the Director of the Coalition "hopes that Judge Lasnik will choose a remedy for the Corps permitting that will finally focus on the unlimited aquaculture expansion adverse impacts that threatens the very existence of our marine life and Washington State iconic species that we all treasure.

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

THE COALITION TO PROTECT PUGET SOUND HABITAT,

Plaintiff,

v.

U.S. ARMY CORPS. OF ENGINEERS, *et al.*,

Defendants,

and

TAYLOR SHELLFISH COMPANY, INC.,

Intervenor - Defendant.

Case No. C16-0950RSL

CENTER FOR FOOD SAFETY,

Plaintiff,

v.

U.S. ARMY CORPS OF ENGINEERS, *et al.*,

Defendants,

and

PACIFIC COAST SHELLFISH GROWERS ASSOCIATION,

Intervenor - Defendant.

Case No. 17-1209RSL

ORDER HOLDING NWP 48 UNLAWFUL IN THE STATE OF WASHINGTON AND REQUESTING ADDITIONAL BRIEFING

This matter comes before the Court on cross-motions for summary judgment filed by the parties and intervenors in the above-captioned matters. Dkt. # 36, # 44, and # 45 in C16-

0950RSL; Dkt. # 31, # 43, and # 44 in C17-1209RSL. The Court has also considered the Swinomish Indian Tribal Community's submission in a related case, C18-0598RSL (Dkt. # 28). Plaintiffs challenge the U.S. Army Corps of Engineers' issuance of Nationwide Permit 48 ("NWP 48") authorizing discharges, structures, and work in the waters of the United States related to commercial shellfish aquaculture activities. Plaintiffs argue that the Corps failed to comply with the Clean Water Act ("CWA"), the National Environmental Policy Act ("NEPA"), and the Endangered Species Act ("ESA") when it reissued NWP 48 in 2017. They request that the decision to adopt NWP 48 in Washington[1] be vacated under the Administrative Procedures Act ("APA") and that the Corps be required to comply with the environmental statutes before issuing any new permits or verifications for commercial shellfish aquaculture in this State.[2]

BACKGROUND

The CWA authorizes the Army Corps of Engineers to issue permits for the discharge of dredged or fill material into the navigable waters of the United States. 33 U.S.C. § 1344(a). If the Corps determines that activities involving discharges of dredged or fill material "are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment," it may issue general permits on a state, regional or nationwide basis permitting the activities for a five year period. 33

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[1] The Coalition to Protect Puget Sound Habitat seeks to bar the use of NWP 48 only in Puget Sound.

[2] The Court finds that one or more members of plaintiff Center for Food Safety has/have standing to pursue the CWA, NEPA, and ESA claims based on their concrete, particularized, and imminent injuries arising from activities in Washington that are permitted under the 2017 version of NWP 48.

U.S.C. § 1344(e). "[T]he CWA imposes substantive restrictions on agency action" (Greater Yellowstone Coalition v. Flowers, 359 F.3d 1257, 1273 (10th Cir. 2004)): if "the effect of a general permit will be more than minimal, either individually or cumulatively, the Corps cannot issue the permit" (Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs, 351 F. Supp. 2d 1232, 1255-57 (D. Wyo. 2005)). General permits often impose requirements and standards that govern the activities undertaken pursuant to the permit, but they relieve operators from the more burdensome process of obtaining an individual, project-based permit.

In 2017, the Corps reissued NWP 48, thereby authorizing "the installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the United States. This NWP also authorizes discharges of dredged or fill material into waters of the United States necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities." NWP003034. The nationwide permit authorizes(a) the cultivation of nonindigenous shellfish species as long as the species has previously been cultivated in the body of water at issue, (b) all shellfish operations affecting ½ acre or less of submerged aquatic vegetation, and (c) theall operations affecting more than ½ acre of submerged aquatic vegetation if the area had been used for commercial shellfish aquaculture activities at any point in the past 100 years. NWP003034-35.[3]

In addition to the CWA's requirement that the Corps make "minimal adverse effect" findings before issuing a general permit, "NEPA imposes procedural requirements on federal agencies to analyze the environmental impact of their proposals and actions." O'Reilly v. U.S.

[3] The 100-year look back provision was not in the 2012 version of NWP 48.

Army Corps of Engr's, 477 F.3d 225, 228 (5th Cir. 2007). Federal agencies are required to do an environmental assessment ("EA") of their proposed action, providing a brief discussion of the anticipated environmental impacts and enough evidence and analysis to justify a no-significant-impact determination. 40 C.F.R. § 1508.9. If the agency, after conducting an EA, is unable to state that the proposed action "will not have a significant effect on the human environment," a more detailed and comprehensive environmental impact statement ("EIS") must be prepared. 40 C.F.R. § 1508.11 and § 1508.13.[4]

The Corps' EA regarding the 2017 reissuance of NWP 48 is presented in a Decision Document dated December 21, 2016. NWP003034-3116. An additional condition was later imposed by the Seattle District through its Supplemental Decision Document dated March 19, 2017. COE 127485-611. The Court has considered both Decision Documents to the extent they reflect the Corps' analysis of the anticipated environmental impacts of issuing the nationwide permit and imposing the additional regional condition. The Decision Documents set forth the Corps' discussion of anticipated environmental impacts and the evidence and analysis justifying its determination "that the issuance of [NWP 48] will not have a significant impact on the quality of the human environment," making an EIS unnecessary under NEPA. NWP003106. The Decision Documents also reflect the Corps' determination that the "activities authorized by [NWP 48] will result in no more than minimal individual and cumulative adverse effects on the aquatic environment" for purposes of the CWA. NWP003107. The Seattle District, for its part, concluded that if it added a regional condition preventing the commercial harvest of clams by

[4] "Impact" and "effect" are used interchangeably in the regulations and are deemed synonymous. 40 C.F.R. § 1508.8.

means of hydraulic escalator equipment and evaluated proposed activities as they were verified under the reissued permit, the effects of the permitted activities would be individually and cumulatively minimal. COE 127592-93.

Plaintiffs argue that these conclusions must be invalidated under the APA because the record does not support the Corps' conclusions regarding the environmental effects of individual shellfish aquaculture activities or their cumulative impacts and the EA does not accurately describe the anticipated environmental impacts of NWP 48 or otherwise justify a no-significant-impact determination. Under the APA, a reviewing court must set aside agency actions, findings, or conclusions that are "arbitrary, capricious, an abuse of discretion, [] otherwise not in accordance with law" or "without observance of procedure required by law." 5 U.S.C. § 706(2)(A) and (D). Agency action is arbitrary and capricious "if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). Although agency predictions within the agency's area of expertise are entitled to the highest deference, they must nevertheless have a substantial basis in fact. Ctr. for Biological Diversity v. Zinke, 900 F.3d 1053, 1067 (9th Cir. 2018). In determining whether a decision is supported by substantial evidence in the record, the Court will not substitute its own judgment for that of the agency but rather considers whether the decision is based on relevant evidence that a reasonable mind might accept as adequate to support the agency's conclusion.

San Luis & Delta-Mendota Water Auth. v. Jewell, 747 F.3d 581, 601 (9th Cir. 2014).[5]

DISCUSSION

Having reviewed the submissions of the parties and the administrative record, and having heard the arguments of counsel, the Court finds that there is insufficient evidence in the record to support the agency's conclusion that the reissuance of NWP 48 in 2017 would have minimal individual and cumulative adverse impacts on the aquatic environment for purposes of the CWA and that the Corps' environmental assessment does not satisfy NEPA's requirements. Although the minimal impacts finding is repeated throughout the Corps' Decision Document (see NWP003038, NWP003045-46, NWP003049, NWP003051, NWP003091, NWP003107), it is based on little more than (1) selectively chosen statements from the scientific literature, (2) the imposition of general conditions with which all activities under nationwide permits must comply, and (3) the hope that regional Corps districts will impose additional conditions and/or require applicants to obtain individual permits if necessary to ensure that the adverse impacts will be minimal. Each of these considerations is discussed below.

(1) Effects Analysis

At various points in its analysis, the Corps acknowledges that commercial shellfish aquaculture activities can have adverse environmental impacts. See NWP003040 (commercial

[5] Plaintiffs also argue that the agency action should be invalidated because the Corps (a) failed to analyze a reasonable range of alternative actions in the EA, (b) failed to allow for meaningful public participation, and (c) failed to re-initiate consultation with expert wildlife agencies under the ESA when the 2017 version of NWP 48 was modified to increase the acreage on which commercial shellfish production was authorized, failed to incorporate assumed conservation measures and conditions, and failed to analyze the impacts of pesticides on endangered species. Because the Court finds that the Corps violated the CWA and NEPA, it has not considered these alternative theories for why NWP 48 should be invalidated.

shellfish aquaculture activities "have some adverse effects on the biotic and abiotic components of coastal waters, including intertidal and subtidal areas"); Id. (noting that "at a small spacial scale (e.g., the site directly impacted by a specific aquaculture activity) there will be an adverse effect."); NWP003041 (acknowledging "some impacts on intertidal and subtidal habitats, fish, eelgrass, and birds"); NWP003042 (recognizing that "commercial shellfish aquaculture activities do have some adverse effects on eelgrass and other species that inhabit coastal waters"); COE 127559 (stating that "marine debris is a serious impact on the marine environment"); COE 127570 (acknowledging "potential adverse impacts" to riffle and pool complexes); COE 127584 (noting that "[c]ommercial shellfish aquaculture activities can result in conversion of substrates (e.g. mudflats to gravel bars), impacts to submerged aquatic vegetation, alteration in aquatic communities from native to non-native shellfish species, and water quality impacts from harvest activities"). It concludes that these impacts are no more than minimal, however, (a) when considered on a landscape rather than a site-by-site scale, (b) because the relevant ecosystems are resilient, and (c) because the impacts are "relatively mild" in comparison "to the disturbances and degradation caused by coastal development, pollution, and other human activities in coastal areas." NWP003040 and NWP003044.

(a) Scale of Impacts Evaluation

In determining the potential effects of a proposed discharge of dredged or fill material in an aquatic environment, the Corps is required to determine the nature and degree of the environmental impact the discharge will have, both individually and cumulatively. "Consideration shall be given to the effect at the proposed disposal site of potential changes in substrate characteristics and elevation, water or substrate chemistry, nutrients, currents,

circulation, fluctuation, and salinity, on the recolonization and existence of indigenous aquatic organisms or communities." 40 C.F.R. § 230.11(e) (emphasis added). Ignoring or diluting site-specific, individual impacts by focusing solely on a cumulative, landscape-scale analysis is not consistent with the governing regulations.

(b) Resilient Ecosystems

The Decision Document issued by Corps Headquarters acknowledges that "[t]he effects of commercial shellfish aquaculture activities on the structure, dynamics, and functions of marine and estuarine waters are complicated, and there has been much discussion in the scientific literature on whether those effects are beneficial or adverse." NWP003040. Relying in large part on a paper published by Dumbauld and McCoy for the U.S. Department of Agriculture in 2015, the Corps concluded that the individual and cumulative impacts of the activities authorized by NWP 48 would be minimal "because the disturbances caused by these activities on intertidal and subtidal ecosystems are temporary and those ecosystems have demonstrated their ability to recover from those temporary disturbances." NWP003045-46.[6]

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[6] The Corps also cites a 2009 paper co-written by Dumbauld, which it describes as "a review of empirical evidence of the resilience of estuarine ecosystems and their recovery (including the recovery of eelgrass) after disturbances caused by shellfish aquaculture activities." NWP003044. The Corps relies on the 2009 Dumbauld paper to support its conclusion that commercial shellfish production can have beneficial impacts on some aspects of the aquatic environment. See NWP003406 ("Many species co-exist with commercial shellfish aquaculture activities and many species benefit from these activities."); NWP003086 (noting improved water and habitat quality at moderate shellfish population densities); NWP003087 ("Activities authorized by this NWP may alter habitat characteristics of tidal waters. Some species of aquatic organisms will benefit from those changes, while others will be adversely affected."); NWP003104 ("Sessile or slow-moving animals in the path of discharges of dredged or fill material and aquaculture equipment may be destroyed. Some aquatic animals may be smothered by the placement of fill materials. Some aquatic organisms will inhabit the physical structure created by equipment used for commercial shellfish aquaculture activities."). The fact that there are environmental winners and losers when activities authorized under NWP 48 are undertaken does not resolve the issue of whether the

Dumbauld and McCoy's research cannot justify such a broad, sweeping conclusion regarding the resilience of entire ecosystems in both the intertidal and subtidal zones. According to the Corps' own summary of the paper, the authors evaluated only the effects of oyster aquaculture activities on submerged aquatic vegetation. NWP003044. The paper itself shows that Dumbauld and McCoy were studying the effects of intertidal oyster aquaculture on the seagrass *Zostera marina*. There is no discussion of the impacts on other types of aquatic vegetation, on the benthic community, on fish, on birds, on water quality/chemistry/structures, or on substrate characteristics. There is no discussion of the subtidal zone. There is no discussion regarding the impacts of plastic use in shellfish aquaculture and only a passing reference to a possible side effect of pesticide use. The Corps itself does not remedy these deficiencies: although it identifies various resources that will be adversely impacted by issuance of the national permit (along with resources that may benefit from shellfish production), it makes virtually no effort to characterize the nature or degree of those impacts. The Decision Document's "Impact Analysis" consists of little more than an assurance that district engineers will consider the direct and indirect effects caused by the permitted activity on a regional or case-by-case basis. NWP003073-74.

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proposed agency action has more than minimal impacts or obviate the need for a "hard look" at all impacts, beneficial and adverse. Native Ecosys. Council v. U.S. Forest Serv., 428 F.3d 1233, 1238-39 (9th Cir. 2005). The 2009 review clearly shows, and the Corps acknowledges, that at least some aquatic species and characteristics are adversely affected by commercial shellfish aquaculture. The Ninth Circuit, faced with a similar situation under NEPA, noted that "even if we had some basis for assuming that [the agency's] implementation of the BiOp would have exclusively beneficial impacts on the environment, we would still lack a firm foundation for holding that [the agency] need not prepare an EA and, if necessary, an EIS." San Luis & Delta-Mendota Water Auth. v. Jewell, 747 F.3d 581, 652 n.52 (9th Cir. 2014).

Under the CWA, the Corps must find that the proposed activity "will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment" before it issues a general permit. 33 U.S.C. § 1344(e). Under NEPA, the Corps is required to "[b]riefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." 40 C.F.R. § 1508.9(a)(1). The agency is required to take a "hard look" at the likely environmental impacts of the proposed action and prepare an EA to determine whether the impacts are significant enough to necessitate the preparation of an EIS. Native Ecosys. Council, 428 F.3d at 1238-39. The analysis, though brief, "must be more than perfunctory" and must be based on "some quantified or detailed information; . . . [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt., 387 F.3d 989, 993-94 (9th Cir. 2004) (alteration in original, citations omitted).

In this case, the Corps acknowledged that reissuance of NWP 48 would have foreseeable environmental impacts on the biotic and abiotic components of coastal waters, the intertidal and subtidal habitats of fish, eelgass, and birds, the marine substrate, the balance between native and non-native species, pollution, and water quality, chemistry, and structure, but failed to describe, much less quantify, these consequences. The Corps cites the two Dumbauld papers for general statements regarding the positive or negative effects of shellfish aquaculture on certain aquatic resources or characteristics (focusing on seagrass), but it makes no attempt to quantify the effects or to support its conclusion that the effects are no more than minimal.

Even if the health and resilience of seagrass were the only concern - and, as discussed

above, it is not - the 2015 Dumbauld and McCoy paper cannot reasonably be interpreted as evidence that seagrass is only minimally impacted by commercial shellfish aquaculture. As noted above, the paper evaluated only the effect of oyster aquaculture. In that context, it recognized the research suggesting that oyster aquaculture has direct impacts on native seagrasses at the site of the activity and in short temporal spans. These impacts are then ignored by both Dumbauld and the Corps in favor of a landscape, cumulative analysis which, as discussed above, is inadequate. Just as importantly, NWP 48 authorizes the discharge of dredged and fill material from not only oyster operations, but also from mussel, clam, and geoduck operations carried out on bottom substrate, in containers, and/or on rafts or floats. Thus, Dumbauld and McCoy did not evaluate, and drew no conclusions regarding, the impact that many of the activities authorized by NWP 48 would have on seagrass (much less other aquatic resources). The Seattle District, for its part, acknowledged the breadth of species and cultivation techniques that are encompassed in the phrase "commercial shellfish aquaculture." A draft cumulative impact assessment generated in February 2017 dedicated twenty-five pages to discussing the wide range of work and activities covered by NWP 48 and noting the species-dependent variability in cultivation techniques, gear, and timing. COE 125591-616.[7] These variations gave rise to a wide array of effects on the aquatic habitat (COE 125635-36), none of which is acknowledged or evaluated in the national Decision Document. In its Supplement, the Seattle District noted:

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[7] The Corps acknowledges that the draft regional impact assessment "was a NEPA-level analysis," but faulted the author because that level of analysis should be performed by Headquarters for a nationwide permit. COE 125856. No comparable analysis is included in the national Decision Document, however.

> The impacts to eelgrass from aquaculture can be temporary, depending on the activity, because the habitat conditions themselves (elevation, water quality, etc.) are not permanently altered which allows eelgrass to eventually recover given sufficient time. In Washington State, the timeframe for recovery has been documented to be about 5 years depending on the activity and other factors. For example, when a geoduck farm is seeded it is covered with tubes and nets for 2 or more years and then the tubes and nets are removed until harvest, 3-5 years later. The eelgrass would have died back under the nets, had a chance to return when nets were removed, and then eelgrass is disturbed/removed again when harvest occurs. While this process allows for eelgrass return at the site, the frequency of disturbance and relatively long recovery times result in a local habitat condition where eelgrass more often than not is either not present or present at a much reduced functional state. This effect would persist as long as aquaculture is occurring at the site. In some cases, such as when nets are placed over planted clam beds, any eelgrass is likely to be permanently smothered and not recover. This is because of the permanence of the nets, which are only removed between harvest and the next planting cycle. The time between harvest and planting may only be a matter of weeks or months. Other impacts are discussed in the national decision document. This existing cycle of impacts to eelgrass represents the existing environment from aquaculture activities authorized under NWP [48] 2012; and these or similar effects may continue if verification under NWP 48 2017 is requested and received.

COE 127587-88.

Agency predictions within their areas of expertise are entitled to the highest deference, but they must have a substantial basis in fact. The Corps recognized that certain shellfish operations would displace eelgrass entirely for extended periods of time. In some cases, nets are used to smother the vegetation, precluding any chance of recovery. Where smothering nets are not in use, the eelgrass may recover to some extent, but was not likely to return to is full functional state before being disturbed and/or removed again for the next harvest or seeding

activity. The impacts of commercial shellfish aquaculture on eelgrass (and presumably on all species that rely on eelgrass) would continue as long as the permitted activity continued. Under the 2017 version of NWP 48, a significant number of additional acres that were not cultivated under the 2012 NWP could be put into shellfish aquaculture if the area had been commercially productive during the past 100 years. See COE 118145-49; COE 127584. Any such "reopened" beds could result in additional losses of seagrass and the benefits it provides. COE 127589 ("[F]or many current operations, verification under NWP 2017 will create no appreciable change to the baseline environmental conditions, and the impacts will be minimal both individually and cumulatively.[8] For other operations, however, activities may create a change in current conditions, for example if activities are proposed on land populated with recovered eelgrass."). The national Decision Document does not quantify the periodic and permanent losses of seagrass[9] or the impact on the wider aquatic environment. A reasonable mind reviewing the

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[8] By quoting this portion of the Seattle District Supplement, the Court is not adopting its reasoning. National, regional, and state permits issued under the authority of the CWA last for only five years. When a NWP is reissued, the environmental impacts of the agency action logically include all activities conducted under the auspices of the permit, regardless of whether those operations are brand new or are simply "verified" as covered by the reissued NWP. The governing regulations expressly impose upon the Corps the obligation to consider the ongoing effects of past actions when conducting a cumulative impacts analysis. 40 C.F.R. § 1508.7. See Ohio Valley Envtl. Coalition v. Hurst, 604 F. Supp. 2d 860, 886-87 (S.D. W. Va. 2009) (rejecting the Corps' *post hoc* rationalization that past authorizations of moutaintop mining had no continuing effects and noting that, in the court's "common sense judgment," "[t]hese losses and impacts do not exist in a vacuum; they are not corrected or cured every five years with the renewal of a new nationwide permit. Nor do these accumulated harms become the baseline from which future impacts are measured. Before authorizing future activities with such tremendous impacts, the Corps must at least consider the present effects of past activities . . . .").

[9] The cumulative impacts of reissuing NWP 48 are to be analyzed in accordance with 40 C.F.R. § 230.7(b)(3), pursuant to which the Corps must predict "the number of activities expected to occur until the general permit expires." NWP003043. The Corps' estimates of how many acres are likely to be cultivated under the reissued national permit vary widely, however. The estimate provided in Section

record as a whole would not accept Dumbauld and McCoy's limited findings regarding the landscape-level impact of oyster cultivation on a species of seagrass in the intertidal zone as support for the conclusion that entire ecosystems are resilient to the disturbances caused by shellfish aquaculture or that the impacts of those operations were either individually or cumulatively minimal.

(c) Impacts of Other Human Activity

Although the Corps does not rely on this line of reasoning in opposing plaintiffs' motions for summary judgment, its Decision Document is replete with various forms of the following statement: "[c]ommercial shellfish aquaculture activities are a minor subset of human activities that affect coastal intertidal and subtidal habitats and contribute to cumulative effects to those coastal habitats." NWP003041. See also NWP003040; NWP003042-44; NWP003061; NWP003068; NWP003075-76; NWP003081; NWP003083-85. To the extent the Corps' minimal impacts determination is based on some sort of comparison between the environmental impacts of shellfish aquaculture and the environmental impacts of the rest of human activity (see

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7.2.2 of the Decision Document states that NWP 48 will be utilized 1,625 times over the five-year period, resulting in impacts to approximately 56,250 acres of water. NWP003098. Those numbers are reportedly based on past uses of the NWP plus an estimate of the number of activities that did not require pre-construction notification and were not voluntarily reported to the Corps district. Id. According to the Seattle District, however, over 56,000 acres of marine tidelands were permitted under the 2012 version of NWP 48 in Washington State alone, and that number was only going to increase under the 2017 version. COE 127590. Recognizing the long history of commercial shellfish operations in the State's waters and the 100-year look back for identifying "existing" operations, the Seattle District estimated that 72,300 acres of Washington tidelands could be authorized for commercial shellfish production under the 2017 NWP 48. COE 127590-92. Thus, even if Headquarters had attempted to quantify the proposed action's impacts on seagrass (or any other aquatic resource) before reissuing NWP 48, its data regarding past uses of the permit was incorrect and its estimates of future uses are suspect.

NWP003046 (commercial shellfish aquaculture activities "cause far less change to the environmental baseline than the adverse effects caused by development activities, pollution, and changing hydrology that results from the people living and working in the watersheds that drain to coastal waters . . ."); NWP003078 ("[T]here are many categories of activities that contribute to cumulative effects to the human environment. The activities authorized by this NWP during the 5-year period it will be in effect will result in no more than minimal incremental contributions to the cumulative effects to these resource categories."); NWP003081 ("The activities authorized by this NWP will result in a minor incremental contribution to the cumulative effects to wetlands, streams, and other aquatic resources in the United States because, as discussed in this section, they are one category of many categories of activities that affect those aquatic resources.")), the analysis is inadequate. NEPA and the CWA were enacted because humans were adversely affecting the environment to a noticeable and detrimental extent. See 42 U.S.C. § 4331(a) (Congressional recognition of "the profound impact of man's activity on the interrelations of all components of the natural environment"); 33 U.S.C. § 1251(a) ("The objective of [the CWA] is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."). Noting that a particular environmental resource is degraded is not an excuse or justification for further degradation. The Corps must analyze the individual and cumulative impacts of the proposed activity against the environmental baseline, not as a percentage of the decades or centuries of degrading activities that came before.

The Corps makes a similarly untenable argument whenever the use of pesticides in a shellfish operation permitted under NWP 48 is discussed. While acknowledging that these substances are used and released into the environment during permitted activities, the Corps

declines to consider the environmental impacts of pesticides because they are regulated by some other entity. See NWP003077. Even if the Corps does not have jurisdiction to permit or prohibit the use of pesticides, it is obligated to consider "other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." NWP003074 (quoting 40 C.F.R. § 1508.7). The Corps' decision to ignore the foreseeable uses and impacts of pesticides in the activities it permitted on a nationwide basis does not comport with the mandate of NEPA or with its obligations under the CWA. Having eschewed any attempt to describe the uses of pesticides in commercial shellfish aquaculture or to analyze their likely environmental impacts, the decision to permit such activities through NWP 48 cannot stand.

(2) General Conditions of NWP 48

In making its minimal impact determinations, the Corps relied in part on the general conditions imposed on all nationwide permits. NWP003072. According to the Corps, the prohibitions it has imposed against impacts on the life cycle movements of indigenous aquatic species (general condition 2), spawning areas (general condition 3), migratory bird breeding areas (general condition 4), concentrated shellfish beds (general condition 5), and endangered or threatened species (general condition 18), and the requirements that permittees use non-toxic materials (general condition 6) and confer with other regulatory agencies as needed (general condition 19) will ensure that the individual and cumulative environmental effects of NWP 48 are minimal. Even if the Court were to assume that the general conditions will be universally heeded, regulatory fiat does not satisfy NEPA's requirement that the EA contain "sufficient evidence and analysis for determining whether to prepare an environmental impact statement or

a finding of no significant impact." 40 C.F.R. § 1508.9(a)(1). The general conditions are just that: general. They apply to all NWPs and do not reflect a "hard look" at the environmental sequellae of commercial shellfish aquaculture. For purposes of the CWA, the general conditions on which the Corps relies do not necessarily prohibit substantial impacts: general condition 3, for example, precludes the most destructive of activities in spawning areas but leaves unregulated many activities that could significantly impact those areas. In addition, the general conditions relate to only some of the environmental resources the Corps acknowledges are impacted by the permitted activities and do not address the cumulative impacts of commercial shellfish aquaculture at all. 40 C.F.R. § 1508.7 ("Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.").

The Court does not intend to suggest, and is not suggesting, that the general terms and conditions imposed on a nationwide, regional, or state permit cannot be relevant to and supportive of a finding of minimal impacts. They are simply too general to be the primary "data" on which the agency relies when evaluating the impacts of the permitted activities.

(3) Regional Conditions and District Engineers

Any permit authorizing activities on a nationwide level runs the risk of sanctioning activities that have more than minimal environmental impacts. In order to safeguard against that risk, regional district engineers have the discretionary authority to modify, suspend, or revoke the NWP within a particular region or class of waters, to add regional conditions to the NWP, to impose special conditions on a particular project, and/or to require an applicant to seek an individual permit. NWP003037 (citing 33 C.F.R. §§ 330.4(e) and 330.5). Although permittees may generally proceed with activities authorized by an NWP without notifying the district

engineer, (33 C.F.R. § 330.1(e)(1)), general condition 18(c) requires the submission of a pre-construction notification ("PCN") if the proposed activity may affect or is in the vicinity of a species listed or habitat designated as critical under the ESA. Because all aquaculture operations in the State of Washington occur in waters where there are threatened/endangered species and/or critical habitat, applicants who seek to operate under the auspices of NWP 48 in this State must submit a PCN and obtain a "verification" that the activity falls within the terms of the permit and that the requirements of the ESA have been satisfied. COE 127592. "For a project to qualify for verification under a general permit, a Corps District Engineer must conclude that it complies with the general permit's conditions, will cause no more than minimal adverse effects on the environment, and will serve the public interest." Sierra Club v. U.S. Army Corps of Eng'rs, 803 F.3d 31, 39 (D.C. Cir. 2015) (citing 33 C.F.R. §§ 330.1(e)(2), 330.6(a)(3)(i)).

There is nothing arbitrary, capricious, or unlawful about having the regional district engineer review site-specific proposals to "cement [Headquarters'] determination that the projects it has authorized will have only minimal environmental impacts." Ohio Valley Envtl. Coalition v. Bulen, 429 F.3d 493, 501 (4th Cir. 2005). Tiering the review and decision-making tasks is permissible, but there must be a national decision document that actually evaluates the impacts of the proposed activity in light of any regional conditions imposed. The problems here are that the Corps' minimal impact determinations were entirely conclusory and the regional conditions that it assumed would minimize impacts were not in place at the time NWP 48 was adopted. The record is devoid of any indication that the Corps considered regional data, catalogued the species in and characteristics of the aquatic environments in which commercial shellfish aquaculture activities occur, considered the myriad techniques, equipment, and

materials used in shellfish aquaculture, attempted to quantify the impacts the permitted activity would likely have on the identified species and characteristics, or evaluated the impacts of the as-yet-unknown regional conditions.

Faced with incredible diversity in both the environment and the activities permitted under NWP 48, the Corps effectively threw up its hands and turned the impact analyses over to the district engineers. The "Impact Analysis" section of the national Decision Document simply reiterates the district engineer's powers to revoke, modify, or condition the NWP and directs the district engineers to make minimal adverse environmental effects determinations after considering certain factors. NWP003073-74. Its "Cumulative Effects" analysis bluntly acknowledges that "[i]t is not practical or feasible to provide quantitative data" regarding the cumulative effects of NWP 48 other than the estimated number of times the permit will be used. NWP003081.

Because a nationwide analysis was impossible, the task of conducting a cumulative impacts analysis in specific watersheds was devolved to the district engineers. NWP003077. Even where adverse impacts are acknowledged, the Corps ignores its obligation to analyze and quantify them, instead relying on the district engineers to perform the analysis on a project-by-project basis. In the context of the public interest discussion regarding impacts to fish and wildlife, for example, the Corps recognizes that NWP 48 may "alter the habitat characteristics of tidal waters," that "[s]ome species of aquatic organisms will benefit from those changes, while other species will be adversely affected," and that equipment used in commercial shellfish operations may impede bird feeding activities and trap birds." NWP003087. It then states:

The pre-construction notification requirement[] provides the district engineer with

> an opportunity to review those activities and assess potential impacts on fish and wildlife values and ensure that the authorized activity results in no more than minimal adverse environmental effects.

Id. This abdication of responsibility is not authorized under the CWA or NEPA.[10]

As discussed in the preceding sections, Headquarters' prediction that the issuance of NWP 48 would have minimal individual and cumulative impacts on the environment, though repeatedly stated in the Decision Document, is not based on relevant evidence that a reasonable mind might accept as adequate to support the agency's conclusion, and the inclusion of general permit conditions does not obviate the need to analyze the impacts of proposed federal action. Thus, the Corps' impact analyses are based in large part on the hope that district engineers will mitigate any adverse environmental effects by revoking NWP 48, imposing regional or project-based conditions, and/or requiring an applicant to seek an individual permit. In this context, the Court finds that the Corps may not rely solely on post-issuance procedures to make its pre-issuance minimal impact determinations. See Bulen, 429 F.3d at 502 ("We would have substantial doubts about the Corps' ability to issue a nationwide permit that relied solely on post-

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[10] The Corps' analysis with regards to plastic debris discharged into the marine environment is even more problematic. The Corps acknowledges the many public comments raising concerns about the introduction of plastics into the marine food web, but relies on the fact that "[d]ivision engineers can impose regional conditions to address the use of plastics" in response to these concerns. NWP003402. The Seattle District, for its part, declined to quantify the impact of plastics, instead noting that "it would not be a practicable solution to regionally condition NWP 48 to not allow the use of PVC and HDPE gear as there are no current practicable alternatives to use of the materials." COE 127559. The CWA requires the Corps to make minimal adverse effect findings before issuing a general permit. If, as appears to be the case with regards to the discharge of plastics from the permitted operations, the Corps is unable to make such a finding, a general permit cannot issue. The Corps has essentially acknowledged that it needs to individually evaluate the impacts of a particular operation, including the species grown, the cultivation techniques/gear used, and the specific location, before it can determine the extent of the impacts the operation will have.

issuance, case-by-case determinations of minimal impact, with no general pre-issuance determinations. In such a case, the Corps' 'determinations' would consist of little more than its own promise to obey the law.").

CONCLUSION

A nationwide permit can be used to authorize activities involving the discharge of dredged or fill material only if the Corps makes a determination that the activity will have only minimal individual and cumulative adverse effects on the environment. In issuing NWP 48, the Corps has opted to interpret the "similar in nature" requirement of 33 U.S.C. § 1344(e)(1) broadly so that all commercial shellfish aquaculture activities in the United States could be addressed in a single nationwide permit. That choice has made assessing the impacts of disparate operations difficult: the Corps essentially acknowledges that the permitted activity is performed in such different ways and in such varying ecosystems that evaluating impacts on a nationwide level is nearly impossible. It tries to avoid its "statutory obligations to thoroughly examine the environmental impacts of permitted activities" by promising that the district engineers will do it. Hurst, 604 F. Supp. 2d at 901-02. The Court finds that the Corps has failed to adequately consider the impacts of commercial shellfish aquaculture activities authorized by NWP 48, that its conclusory findings of minimal individual and cumulative impacts are not supported by substantial evidence in the record, and that its EA does not satisfy the requirements of NEPA and the governing regulations.

For all of the foregoing reasons, plaintiffs' motions for summary judgment (Dkt. # 36 in C16-0950RSL and Dkt. # 31 in C17-1209RSL) are GRANTED and defendant's and intervenors' cross-motions (Dkt. # 44 and # 45 in C16-0950RSL and Dkt. # 43 and # 44 in C17-1209RSL)

are DENIED. The Corps' issuance of a nationwide permit, at least with respect to activities in the waters of the State of Washington, was arbitrary and capricious and not in accordance with NEPA or the CWA. Pursuant to 5 U.S.C. § 706(2), the Court holds unlawful and sets aside NWP 48 insofar as it authorizes activities in Washington.

The only remaining issue is whether NWP 48 should be vacated outright to the extent it has been applied in Washington, thereby invalidating all existing verifications, or whether equity requires that the permit be left in place while the agency performs an adequate impact analysis and environmental assessment to correct its unlawful actions. Idaho Farm Bureau Fed'n v. Babbitt, 58 F.3d 1392, 1405 (9th Cir. 1995).

> Although not without exception, vacatur of an unlawful agency action normally accompanies a remand. Alsea Valley All. v. Dep't of Commerce, 358 F.3d 1181, 1185 (9th Cir. 2004). This is because "[o]rdinarily when a regulation is not promulgated in compliance with the APA, the regulation is invalid." Idaho Farm Bureau Fed'n[, 58 F.3d at 1405]. When equity demands, however, the regulation can be left in place while the agency reconsiders or replaces the action, or to give the agency time to follow the necessary procedures. See Humane Soc. of U.S. v. Locke, 626 F.3d 1040, 1053 n.7 (9th Cir. 2010); Idaho Farm Bureau Fed'n, 58 F.3d at 1405. A federal court "is not required to set aside every unlawful agency action," and the "decision to grant or deny injunctive or declaratory relief under APA is controlled by principles of equity." Nat'l Wildlife Fed'n v. Espy, 45 F.3d 1337, 1343 (9th Cir. 1995) (citations omitted).

All. for the Wild Rockies v. United States Forest Serv., 907 F.3d 1105, 1121 (9th Cir. 2018). Courts "leave an invalid rule in place only when equity demands that we do so." Pollinator Stewardship Council v. U.S. E.P.A., 806 F.3d 520, 532 (9th Cir. 2015) (internal quotation marks and citation omitted). When determining whether to leave an agency action in place on remand,

we weigh the seriousness of the agency's errors against "the disruptive consequences of an interim change that may itself be changed." Cal. Cmties. Against Toxics v. U.S. E.P.A., 688 F.3d 989, 992 (9th Cir. 2012). In the context of environmental regulation, courts consider whether vacating the invalid rule would risk environmental harm and whether the agency could legitimately adopt the same rule on remand or whether the flaws were so fundamental that it is unlikely the same rule would result after further analysis. Pollinator Stewardship, 806 F.3d at 532.

Despite the fact that both plaintiffs clearly requested vacatur as the remedy for unlawful agency action, defendants provided very little evidence that would justify a departure from the presumptive relief in this APA action. The federal defendants state that additional briefing as to remedy should be permitted once the seriousness of the agency's error is determined. The intervenors assert that vacatur would cause disruption in the Washington shellfish farms and industry, including significant impacts to employees and the communities in which they live. Neither tact is compelling. The substantive defects in the agency's analysis when adopting the 2017 NWP are significant, the existing record suggests that adverse environmental impacts will arise if NWP 48 is not vacated, and, given the nature of the analytical defects and record evidence that seagrass is adversely impacted in the immediate vicinity of shellfish aquaculture, it seems unlikely that the same permit could issue following remand. As for the disruptive consequences to Washington businesses, employees, and communities, more information is required. As plaintiffs point out, shellfish growers can apply for individual permits (as they did before 2007). In addition, the Court has the equitable power to allow a period of time in which growers can avail themselves of that process before the existing verifications would be

invalidated or to fashion some other equitable remedy to minimize both the risks of environmental harm and any disruptive consequences.

While the current record does not support deviation from the presumptive remedy for an APA violation, the Swinomish Indian Tribal Community has requested an opportunity to be heard regarding the scope of the remedy. C18-0598RSL (Dkt. # 28). Swinomish also challenge the Corps' minimal impacts analyses in reissuing NWP 48, but, unlike the plaintiffs in the above-captioned matters, does not seek vacatur of verifications or permits issued under the NWP. The Court will accept additional briefing regarding the appropriate remedy.

Because there is a presumption in favor of vacatur, defendants, intervenors, and Swinomish will be the moving parties and may file motions, not to exceed 15 pages, regarding the appropriate relief for the APA violations discussed above. Only one motion may be filed in each of the three cause numbers at issue, C16-0950RSL, C17-1209RSL, and C18-0598RSL. The motions, if any, shall be filed on or before October 30, 2019, and shall be noted for consideration on November 15, 2019. Plaintiffs' responses, if any, shall not exceed 15 pages. Replies shall not exceed 8 pages.

The Clerk of Court is directed to docket a copy of this order in Swinomish Indian Tribal Community v. Army Corps of Engineers, C18-0598RSL.

Dated this 10th day of October, 2019.

Robert S. Lasnik
United States District Judge

12/4/19 Written comment received during public communication

Industrial Shellfish Aquaculture is Converting Puget Sound Aquatic Habitat to Agricultural Use

How much expansion is good for Puget Sound?

Geoduck farm, Nisqually Reach, 6/30/07

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Our concerns are:

Habitat degradation and fragmentation

The trend of converting natural ecosystems to agricultural use

The extent of expansion

Environmental impacts: unknown

Invasive species and disease

Interference with recreational and residential uses

Marine debris

Zangle Cove, 4/29/06

Approximately 43,500 tubes planted per acre (about 8 miles of PVC pipe) with either individual net tops or canopy nets that cover the entire installation;

Geoduck and oyster bag operation – Totten Inlet

Geoducks are not an essential food.

"...geoduck is a super luxury item which only the rich can afford. The product's price in the Chinese market can reach $60 to $100 per pound. If the price of the product were to fall by 50 percent, it will still be out of the price range of most of the population."

--*The World Geoduck Market and the Potential for Geoduck Aquaculture on Washington State Lands*, prepared for DNR by Northern Economics, Inc. 2004

Shellfish Industry 'working waterfront'

New intensive methods are converting natural beaches into single use agricultural zones. How does this square with the requirement of the Shoreline Management Act to achieve "no net loss" in ecological function?

To the average person, it is common sense that this is a disturbance to both people and wildlife.

"We believe the environmental impacts are at worst benign and at best they're beneficial." --Shellfish Industry, Seattle Times, 10/5/06

Totten Inlet 6/26/06

(as reported by Totten Inlet residents)

In the last 10 years the shellfish industry has moved out of traditional shellfish growing areas into new territory in Thurston County, using non-traditional high intensity methods on fragile tidelands. 6

Industry is now targeting areas in Case and Carr Inlets in Pierce County and further north, along with subtidal lands.

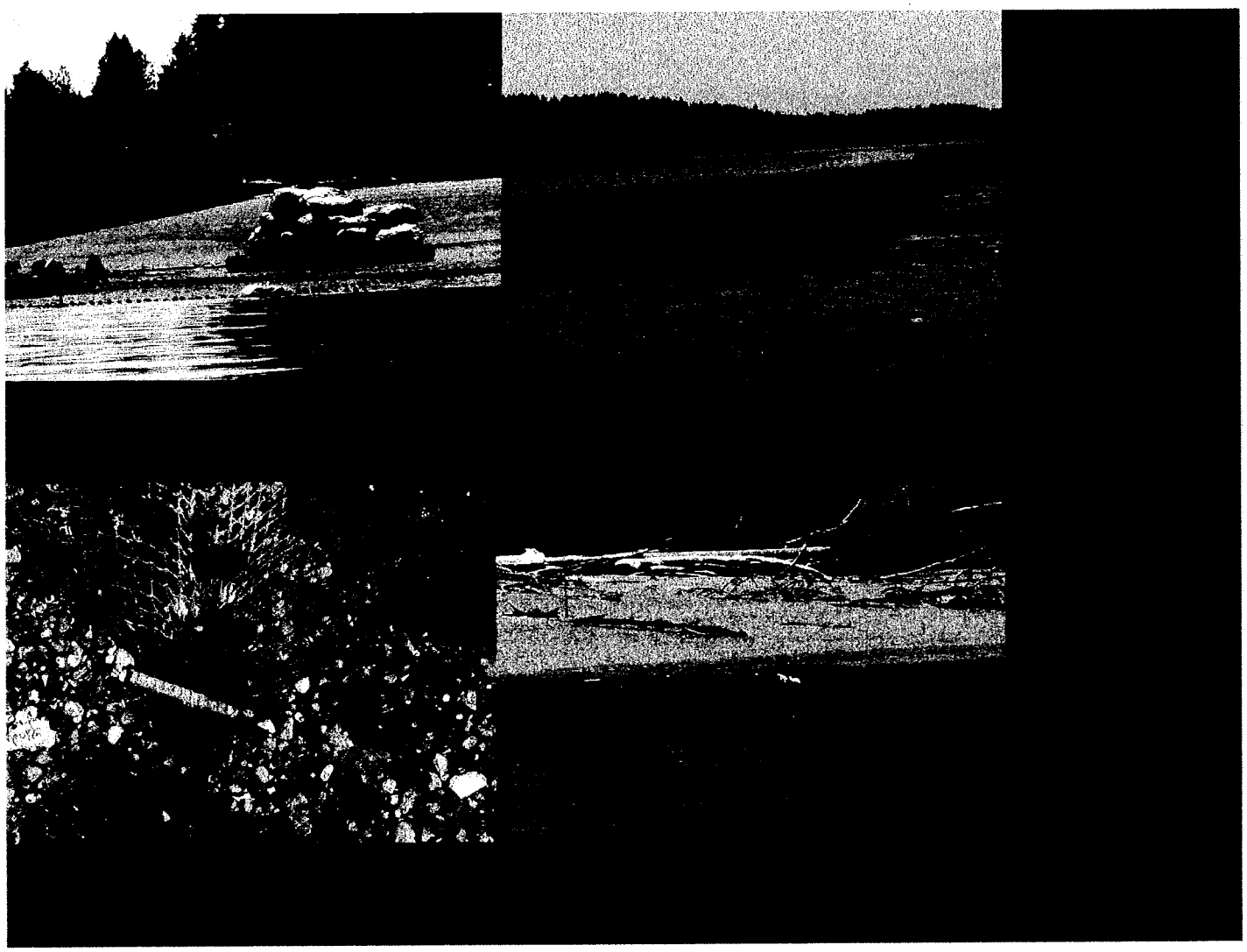
Another new geoduck farm, Pickering Passage 7/07, in surf smelt and rock sole spawning area. Close to sand lance and herring spawning areas.
***--WDFW Surf Smelt, Sand Lance, Rock Sole and Herring Map*, 2007**

New geoduck planting on Zangle Cove, an area rich in intertidal marine life. 6/2006

Where are these farms being installed?

In a variety of locations and sediment types.

DOH states that 137,000 acres of tidelands are approved for shellfish harvest in Puget Sound.



On all levels of the beach, multiple species, Eld Inlet, 7/29/07

In residential areas, Eld Inlet, 7/29/07

Filling up protected coves, Hammersley Inlet, 6/17/07

On beaches with strong currents. Case Inlet, 2006.

Industry has advocated for subtidal geoduck aquaculture in legislative hearings and community geoduck forums.

DNR is leasing 570 acres of intertidal and subtidal aquatic lands for shellfish and net fish pen culture in Puget Sound, Hood Canal and the Strait of Juan de Fuca as of 8/07.

Multiple parcel installations degrade and fragment habitat. 10

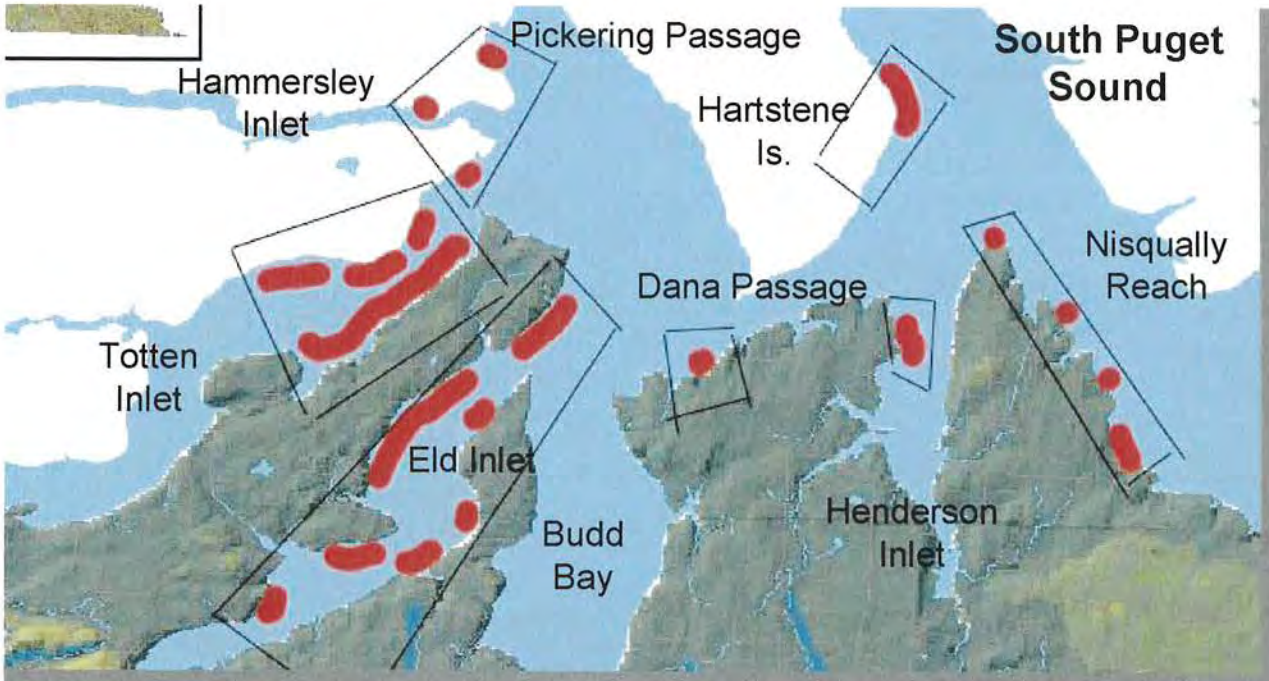
Migratory shore birds and all Puget Sound salmon depend on the nearshore habitat, including Endangered Species Act listed Puget Sound Chinook Salmon.

DOH, WDFW and Army Corps records show geoducks planted here on a large swath of beach stretching hundreds of feet along the shoreline:

34 parcels

64 acres

Nisqually Reach
6/30/07



Limited visual survey of geoduck operations in South Puget Sound as of 7/30/07.

Blocked areas are where visual surveys of existing geoduck aquaculture have been done by boat at low tide in South Puget Sound. Red marks show geoduck operations that have been seen in those blocked areas. Some areas in Totten and Eld Inlet have multiple types of culture—geoduck, oyster bags, oysters on racks, manila clam netting.

How much habitat loss is acceptable?

PVC tubes, Nisqually Reach, new planting, 6/30/07

Vexar tunnels, Nisqually Reach, 6/30/07

The South Puget Sound Salmon Recovery Group identifies shellfish aquaculture as one of the twelve major human-induced stressors on natural processes specific to South Puget Sound.

--The Development of Nearshore Stressor Conceptual Models for Chinook Recovery Planning in South Puget Sound. 2005

Henderson Inlet canopy net, 6/01/07

Eld Inlet, newly install netting over geoduck tubes, 7/29/07

Newly installed canopy net, Totten Inlet, 7/30/07

Canopy net over new planting, Case Inlet, 6/07

Predator exclusion netting changes the ecological character of the shoreline.

Rubber band around otter's waist. Case Inlet, 2/06

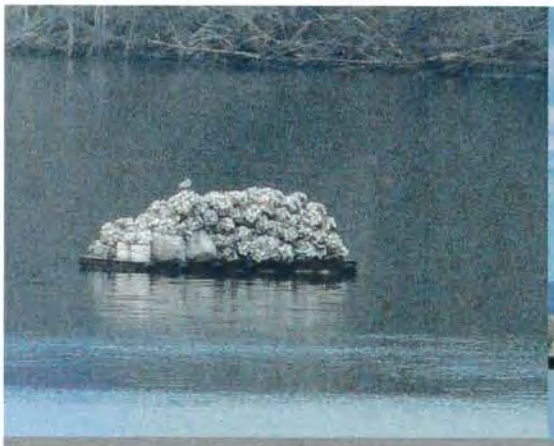
Crab "excluded from habitat" Case Inlet, 2006

Crab caught under the predator exclusion net. Case Inlet, 2006

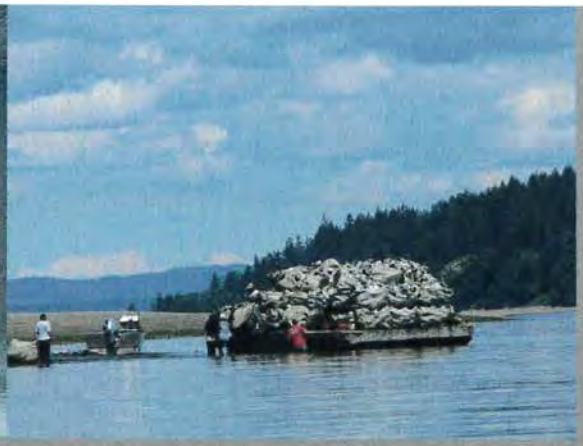
Juvenile bald eagle caught in geoduck net. Hartstene Island, 2006

Predator exclusion netting both excludes and entraps wildlife.

There have now been three documented instances of eagles trapped in geoduck netting.



Zangle Cove, 1/07



Wilson Point, Hartstene Island, 6/30/07

Eld Inlet, 7/29/07

Nisqually Reach, 6/30/07

Activity, once established, is ongoing.

Citizens in Mason, Thurston and Pierce Counties are reporting that shellfish growers leave barges such as these for prolonged periods of time in front of shoreline properties

New planting, Totten Inlet, 7/30/07

Aggregation of shellfish farms using new methods is becoming the norm in South Puget Sound inlets.

There is currently an expansion of this trend into Carr and Case Inlets.

The shellfish industry claims that there are only 150 acres of geoduck culture in Puget Sound. Most of this acreage appears to be clustered in the low flushing inlets and coves of South Puget Sound. It is important to quantify linear feet of aquaculture in these inlets and coves to determine cumulative impact to habitat for endangered species.

Is industry's claim of 150 acres of commercial geoduck culture as 1/1000 of all tideland acres in Puget Sound meaningful? Is it even accurate?

1595 acres claimed for *existing* geoduck farms

←

10% of the total tideland acreage in South Puget Sound Basin

South Puget Sound Basin - 15,725 tideland acres (south of Tacoma Narrows)

--*The Shape and Form of Puget Sound*, Robert Burns, a Washington Sea Grant Publication, 1985

1595--the number of acres claimed as existing geoduck farms in South Puget Sound.

Mason County: 800 acres
Thurston County: 750 acres
Pierce County: 45 acres
Taylor Shellfish: 491 acres
Seattle Shellfish: 309 acres
Other Growers: 795 acres

--Preliminary totals of Army Corps of Engineers NWP 48 Report Forms 6/2007 received as a FOIA request.

With planned expansion in Pierce County, the numbers will increase.

Meaningful comparison of shellfish aquaculture installation to an inlet – Totten Inlet

Totten Inlet – 90% of shoreline miles in shellfish aquaculture.

30 miles of farmed tidelands in Totten Inlet per Taylor Powerpoint Presentation.

33 Miles of shoreline in Totten Inlet per APHETI.

How many of these miles use canopy nets, oyster bags, PVC geoduck tubes, and/or water jet harvesting?

According to APHETI, streambeds channels have been altered.

Shellfish industry claims 10,629 acres as existing geoduck aquaculture in Puget Sound and Willapa Bay.

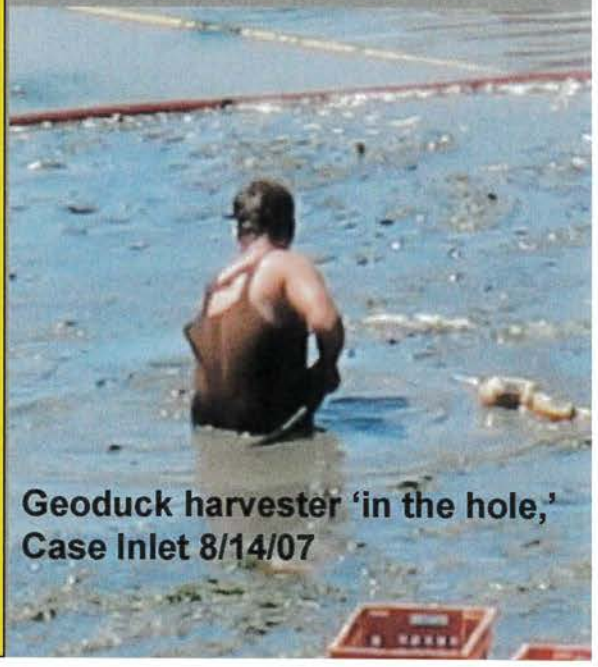
Taylor Shellfish – 90% of claimed geoduck acres

10,629 acres claimed as existing geoduck aquaculture.*

9,475 acres claimed by Taylor Shellfish.*

6000 acres Willapa Bay --Taylor
2300 acres Samish Bay -- Taylor
1175 acres Puget Sound -- Taylor
1154 acres Puget Sound -- Other growers

*Per Department of Ecology list of Army Corps of Engineers NWP 48 Report Forms, dated 6/29/07



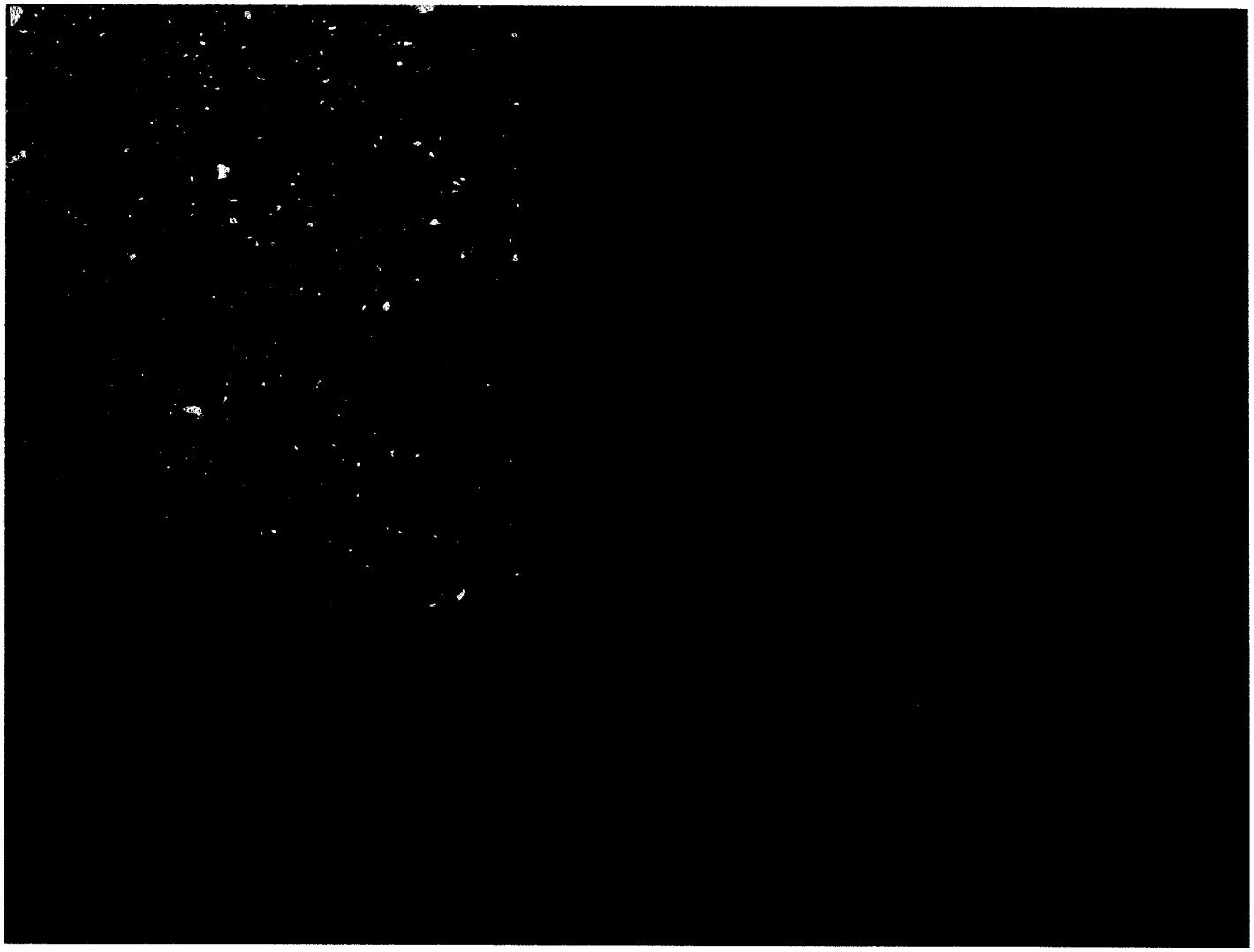
Geoduck harvester 'in the hole,' Case Inlet 8/14/07

Eld Inlet, 7/29/07

To what extent does shellfish aquaculture, as a human induced stressor, disrupt the function of natural beach processes?

One hypothesis is that "shellfish aquaculture reduces productivity, abundance, spatial structure, and diversity of salmon populations" in South Sound.

--Chinook and Bull Trout Recovery Approach for the South Puget Sound Nearshore, Draft, 2004.



Totten Inlet, siltation on geoduck nets, 2006

Beaches are permanently converted to commercial aquaculture use.

Areas under shellfish aquaculture lose their unique characteristics. *–Bendell-Young study on intertidal shellfish farming from Simon Fraser Univ. 2006*

Densities of harvestable cultured geoducks are approximately 19-23 per square meter based on industry statistics.

Natural densities of wild geoducks average 2 per square meter in South Puget Sound. -- *"Comprehensive Literature Review of Issues Relating to Geoduck Ecology" 2004*

Shellfish filter large particles and can consume zooplankton as well as copepods (the biggest source of protein in the ocean), crab larvae, fish eggs and crustacean larvae. – *CSAS, 2006*

Totten Inlet, 2006

Shellfish do not magically "clean the water" of all bad things.

If shellfish consume fecal coliform, toxic bacteria or contaminants they cannot be harvested or eaten.

Growers say "clean" to mean filtering phytoplankton out of the water. Phytoplankton is the basic food source for other aquatic species as well as shellfish.

In agricultural densities, excessive shellfish feces and pseudofeces can contribute to toxic conditions. (See Studies, slide 48).

Do filtration benefits outweigh these impacts?
--Habitat degradation and fragmentation
--Liquefaction of tideland using water jets
--Plastics and canopy nets covering beaches
--Increased shellfish waste in low flushing inlets
--Industrialization of shoreline

Are geoducks good for filtering Puget Sound...or not?

Shellfish growers claim that the filtering capabilities of their commercial geoduck will mitigate for nutrients coming into Puget Sound from upland development. *--Taylor Shellfish Presentation 2007.*

But DNR claims (with the help of industry) that filtering capacity of native geoducks harvested from subtidal areas is insignificant. *--DNR Habitat Conservation Plan, July, 2007*

Yearly harvest of native subtidal geoducks is up to 4 million pounds. *--DNR website*

So its OK to remove the native geoducks from the Sound (some live over 165 years), but we have to convert our tidelands to industrial geoduck farms to filter the water and save Puget Sound? Illogical at best.

Nisqually Reach geoduck harvest on privately leased tideland, 6/30/07

Eelgrass in Zangle Cove, 5/13/07

Destruction of eelgrass habitat.

Eelgrass is an important habitat for herring spawning and it provides protection for small fin fish, including juvenile salmonids.

Annual progress report of a UW study on the interaction of filter feeders and eelgrass observes "direct negative effects of disturbance and of geoducks on eelgrass" and "little evidence of indirect positive effects of geoducks" on eelgrass. --Sally Hacker, OSU and Jennifer Ruesink, UW 2005

Is geoduck waste really good for eelgrass...or not?

A Pacific Coast Shellfish Growers Association brochure states that: "As digested algae is expelled into the beach sediment, the remaining nutrients become more readily used by eelgrass, essentially providing a fertilizing function."

The ongoing OSU/UW study on eelgrass and geoducks says: "'fertilizer' effect does not result in enhanced growth rates of eelgrass. "

Industry says: "So long as the geoduck farming does not substantially disturb eelgrass (i.e., geoduck are not planted in the eelgrass), geoduck culture has little effect on eelgrass." –Taylor Shellfish Presentation 2007.

Eelgrass in Zangle Cove, 6/2006

Is industry data reliable and unbiased?

Pacific Coast Shellfish Growers Association promotional literature, states that "a recently conducted comprehensive biological assessment found that geoduck farming practices are not likely to adversely affect any listed threatened or endangered species or essential fish habitat." ***–DRAFT Programmatic Biological Evaluation of Potential Impacts of Intertidal Geoduck Culture Facilities to Endangered Species and Essential Fish Habitat, prepared for Taylor Shellfish, Seattle Shellfish and Chelsea Farms by Entrix, Inc. 10/27/04***

Chinook Salmon, moving up the Nisqually. -Photo USFW

A principal author of the Entrix draft document signed a lease with a property owner on Totten Inlet to conduct commercial geoduck farming on June 5, 2004, just before the Biological Evaluation was published. -- per recently obtained Army Corps of Engineers NWP 48 Report Forms.

Is shellfish aquaculture gear really mostly invisible as industry claims?

An analysis of daylight hours between Memorial Day and Labor Day, when the beach is most often used, shows geoduck gear visibility:

Planted at +2 beach elevation:
Visible an average of 19% daylight hours
Visible 76% of the days.

Planted at +3 beach elevation:
Visible an average of 23% daylight hours
Visible 87% of the days.

Almost all Army Corps NWP 48 Report Forms we reviewed for existing geoduck aquaculture included multiple species, some planted up to +10 tidal elevation.

Oyster bags and Manila clam canopy nets are visible most days for long time periods during the summer.

Geoduck farm (after tubes pulled) and oyster bags at higher beach elevation. Eld Inlet 7/29/07

Fact or fiction: water jet harvesting is the same as boat wake or wind storm.

Pacific Coast Shellfish Growers Association states in relation to hydraulic water jet harvesting of geoducks that impacts *'are temporary and well within the range of disturbance caused by boat wakes or a winter storm.'* *--Letter from PCSGA to Pierce County 10/5/07*

Ordinary citizens view with disbelief a comparison of boat wakes or wind storms with water jet harvesting of geoducks.

Any boat wake, wind storm or other climate event that would cause liquefaction of entire acres of tideland sediment up to three feet in depth would rightly be viewed as an extraordinary event, not an ordinary one.

Totten Inlet geoduck harvester, 2006

Hunter Point, Eld Inlet 6/17/07

Nisqually Reach, 6/30/07

Cliff Point, Henderson Inlet, 6/30/07

Eld Inlet, 7/29/07

How does hydraulic water jet harvest change the beach?

Geoduck growers ECOP's state that "the beach will be lowered about 1-2 inches by the harvest."

(This is the equivalent of 13-26 dump trucks of material per acre.)

The Geoduck Growers Environmental Codes of Practice (ECOP) state that the "harvester will not harvest geoduck one at a time producing single holes but will systematically emulsify the substrate with the water jet."

Commentary from *Dirty Jobs* Geoduck Segment with Mike Rowe, describing geoduck harvest:

You're going to take the pressure hose and shove it in here and turn the sand to liquid… and you're going to be "in the hole." Just dig around your feet and you go down.

I take this hose and I squirt it on my feet liquefying the sand around me and slowly sink into the beach.

Work down (with water jet)…reach down and feel the neck of the geoduck...then pull it up when it loosens up.

The *Dirty Jobs* segment clearly shows workers kneeling or sitting up to hip or waist in the hole created by the water jet.

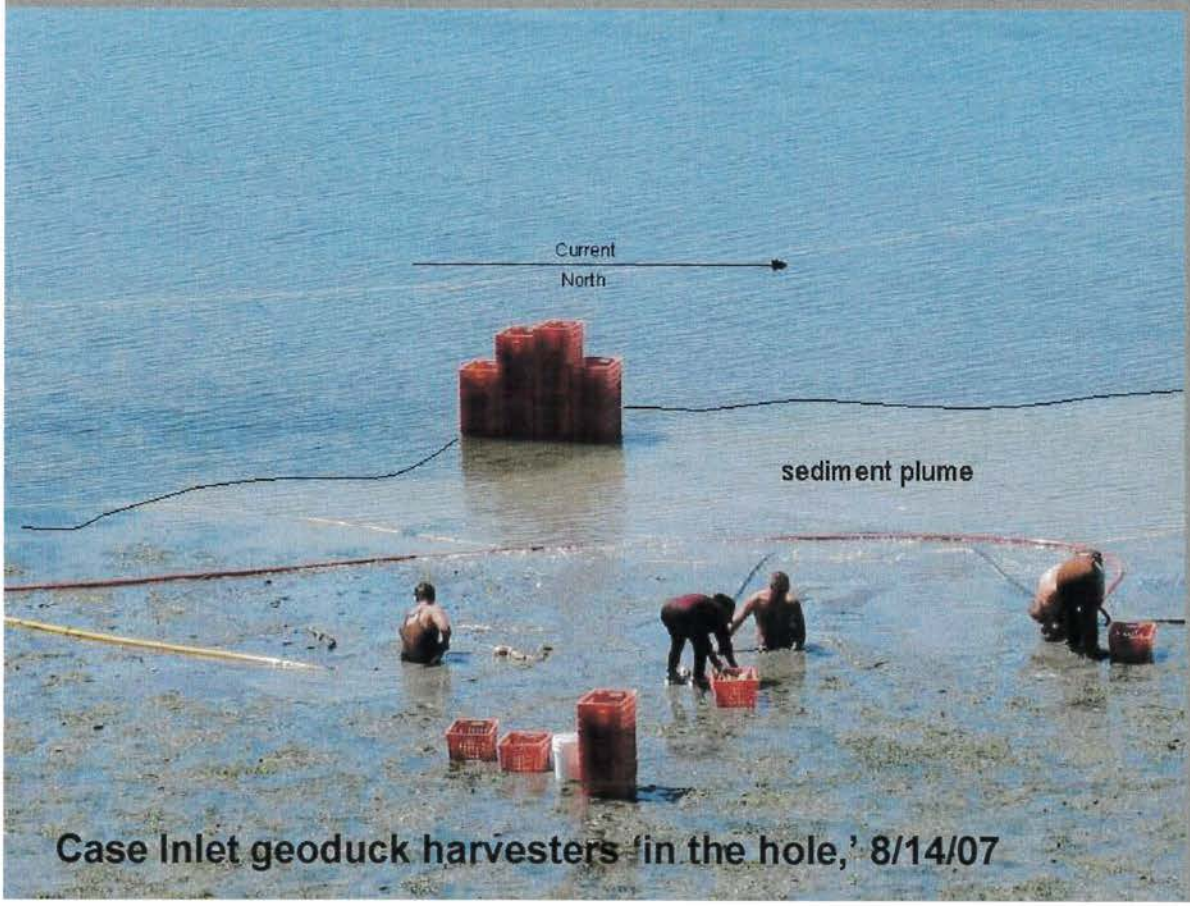
Photo from Totten Inlet harvest 2006 (not Dirty Jobs)

What happens when sediments are emulsified up to three feet deep in large areas on the tidelands?

For example: "Little research has been conducted on geoduck toxicity induced by the ingestion of Alexandrium catenella cysts" which "overwinter in surface sediments where they are buried." Toxic "cysts are reintroduced to the water column by currents or other types of disturbance such as dredging or harvesting."
--Comprehensive Literature Review of Issues Relating to Geoduck Ecology and Aquaculture Production. Prepared by DNR by UW and the Pacific Shellfish Institute. This is one of the primary documents used by industry to support their expansion plans.

Henderson Inlet, 6/30/07

When the beach is liquefied, where do the sediment plumes go?



Case Inlet geoduck harvesters 'in the hole,' 8/14/07

After geoduck harvest, Case Inlet, 2007

"At the end of harvest the 'beach will have been turned upside down--a moonscape yielding hundreds of pounds of high-grade geoducks and a by catch of any worm or clam that was living in the sand." –*Cashing in on Geoducks, Seattle PI, 8/21/04*

Loose tubes, Henderson Inlet, 6/1/07

Loose tubes, Pickering Passage, 6/17/07

Marine debris around geoduck farms.

Loose tubes, Eld Inlet 7/30/07

Loose tubes, Zangle Cove, 4/12/07

WA Dept Fish & Wildlife staff estimate PVC tube and net debris in deep water areas of South Puget Sound

100" x 24" Vexar plastic net identified as belonging to shellfish company found on beach in Case Inlet 5/20/07.

Net tops found on beach opposite geoduck farm, Zangle Cove 2006

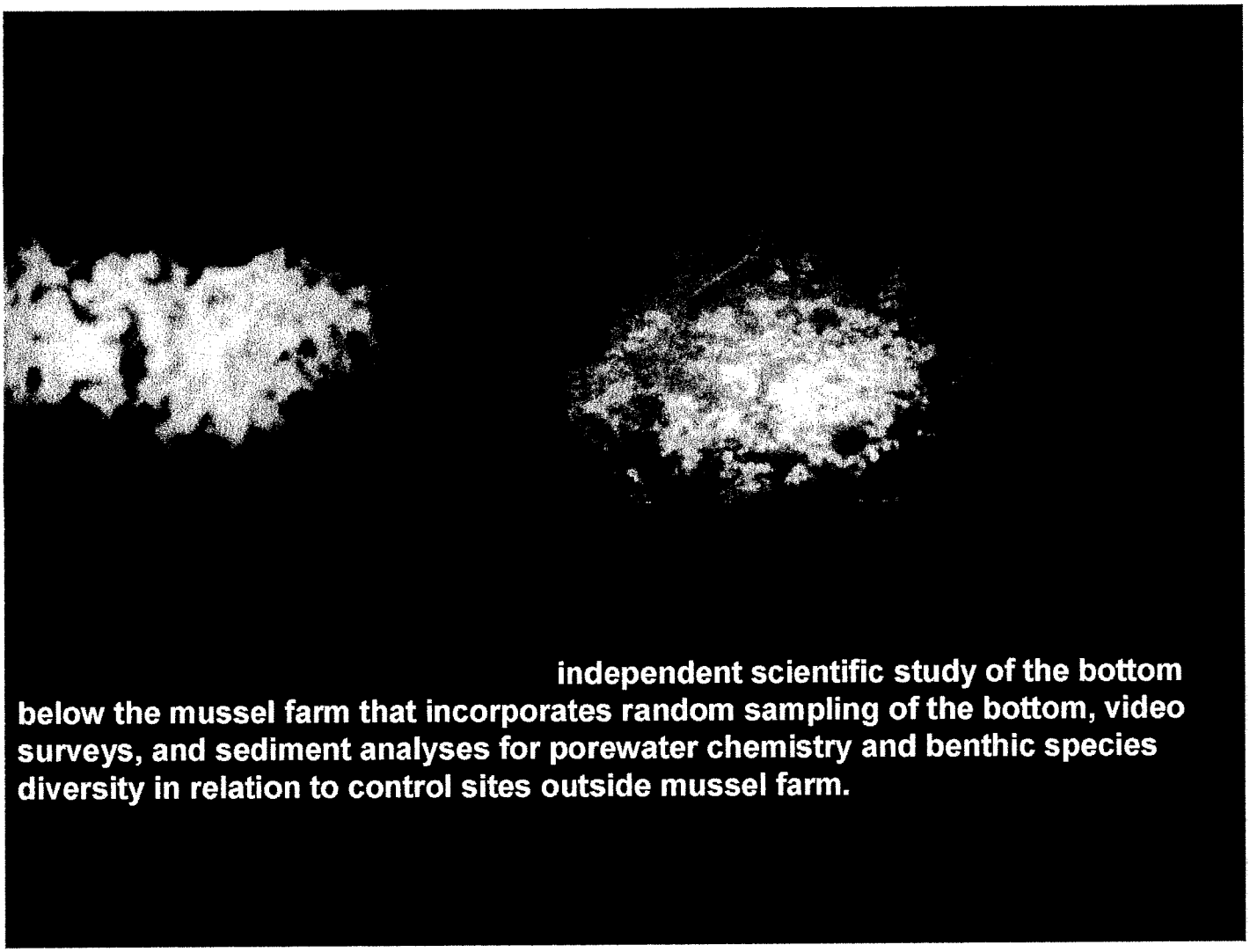
2005 Washington State Fish & Wildlife bottom fish survey trawl finds aquaculture debris in South Puget Sound from 30-120' depth. Biologists extrapolate to 21,600 tubes and 61,600 nets for a total of 83,200 estimated items.

Mussel rafts in low flushing inlets.

Bivalves can be stocked at such high intensities that "anaerobic microbial pathways dominate, and sulfur reducing bacteria produce high levels of hydrogen sulfide that are toxic to benthic...species."

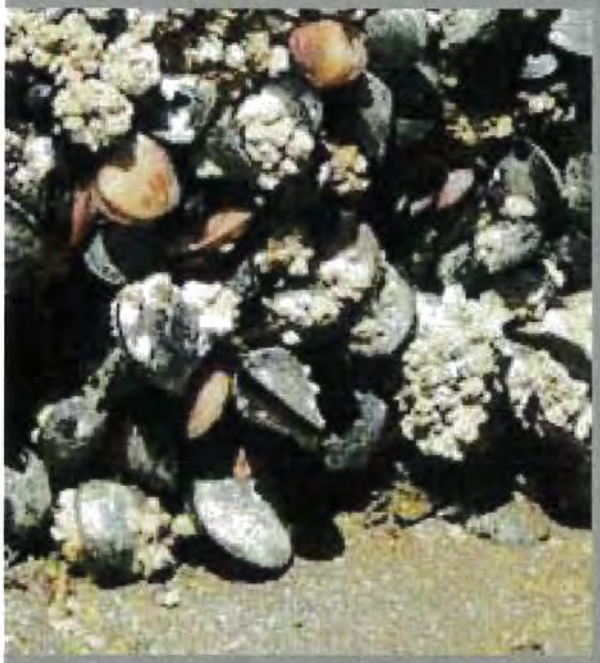
--Dr. Roger Newell, University of Maryland, on possible impacts from shellfish aquaculture.

Mussel rafts--Gallagher Cove, Totten Inlet



independent scientific study of the bottom below the mussel farm that incorporates random sampling of the bottom, video surveys, and sediment analyses for porewater chemistry and benthic species diversity in relation to control sites outside mussel farm.

Mussel rafts propagate non-native species.



Non-native (Gallo) Mediterranean mussel has hybridized with native mussel.
Totten Inlet, 6/2006

An Environmental Impact Study regarding mussel raft installations in Totten Inlet, mandated by Thurston County in 1999, is still ongoing.

Mytilus galloprovincialis, the Mediterranean mussel, is listed in the *100 of the World's Worst Invasive Alien Species* list. www.issg.org, www.conservationinstitute.org, nas.er.usgs.gov

'The proposed mussel farms will have a probable significant adverse environmental impact to the Totten Inlet and to the waters of Puget Sound" relating to "the establishment of the Gallo mussel as a common form of mussel within Puget Sound waters and impacts related to said introduction.' From Hearings Examiner's conclusions, Thurston County, 1999

With EIS still pending, why is the industry allowed to sell the gallo mussels to the public?

Mussel rafts a congregation point for invasive tunicates.

Congregation of tunicate 'didemnum.' on mussel rafts in Gallagher Cove, Totten Inlet.
--Photo from USGS website.

'The invasive colonial tunicate, *Didemnum sp.*, is native to Europe and probably came to this region in ballast water discharged from ships, as hitchhikers on recreational boats, or on shellfish and/or shellfish equipment brought to the region from other locations.'--Washington State's Response to an Invasion of Non-Native Tunicates, Accomplishments, Challenges and Next Steps, Report to the Legislature. February 2007.

Dirty Jobs segment on the Gallagher Cove mussel farm shows extent of tunicates on mussels and on gear.

What steps is industry taking to remove tunicate infestation?

Shellfish seed transported to and from other states.

Henderson Inlet, 6/30/07

Hammersley Inlet, 6/17/07

Plastic "kiddie" pools are used as nurseries for geoduck seed. Clam and oyster seed is transported to and from Hawaii and geoduck seed from Washington and Oregon hatcheries "under strict regulations governing control of invasive species" according to Taylor Shellfish.

How does industry ensure compliance so that disease, parasites and non-native species are not introduced into Puget Sound?

There is currently no siting criteria to take into account habitat preservation related to large swaths of shellfish aquaculture installations and cumulative impact.

This large geoduck farm is just south of a proposed DNR 2006 geoduck lease site.

Another large farm is in the distance.

Henderson Inlet, 6/1/07

DNR and commercial growers are siting geoduck farm leases in forage fish spawning areas. Forage fish are important critical prey species for predators such as salmon.

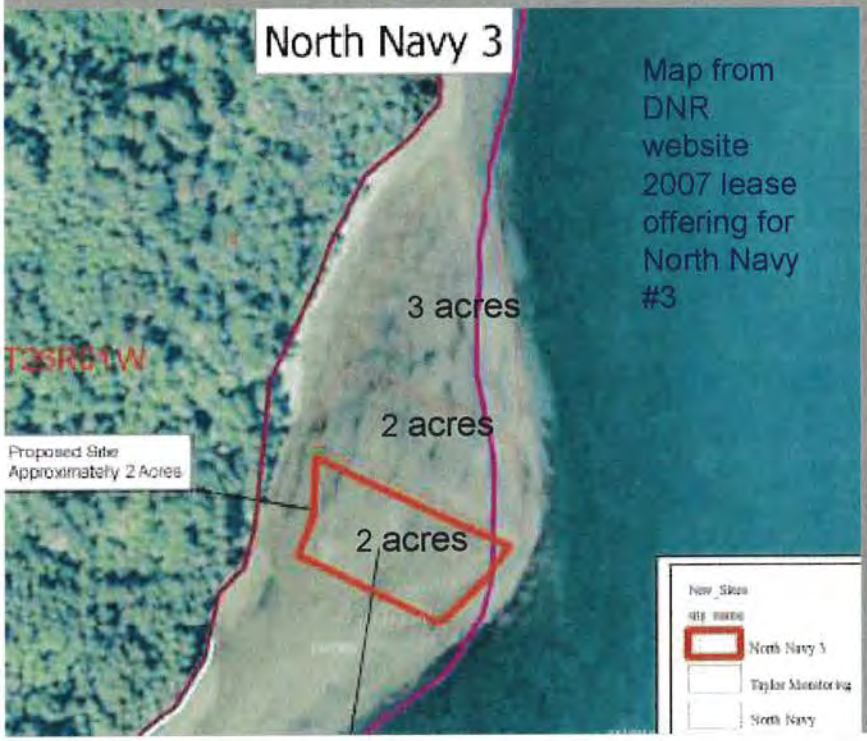
'Standard aquaculture practices may have profound effects on the benthic ecology of Washington state's tidelands and the conservation of forage fish spawning areas, especially for herring.' --Marine Forage Fishes in Puget Sound, WDFW, 2007

Photo and map from DNR website 2007 lease offering for Shine Beach, Hood Canal

A 2 acre DNR lease parcel is not much, right? Think again.

The total DNR geoduck acreage for this parcel in Hood Canal is now 7 acres. Will another two acres be added at North Navy in 2008? This plan of incrementally increasing acreage fits well with the geoduck grower strategy of rotational planting.

http://www.dnr.wa.gov/htdocs/aqr/aquaculture/index.htm



This map shows three DNR geoduck lease parcels at North Navy:

2006 North Navy #1 lease, 3 acres

2006 Taylor Shellfish monitoring site, North Navy #2 lease, 2 acres.

2007 North Navy #3 lease, 2 acres.

Multiple parcels are also in Taylor Bay (Pierce County) and Stretch Island (Mason County)

Expansion of shellfish aquaculture into traditionally residential areas represents a major land use conflict for adjacent property owners and other citizens who have the goal of protecting the tidelands for natural habitat and traditional recreational use.

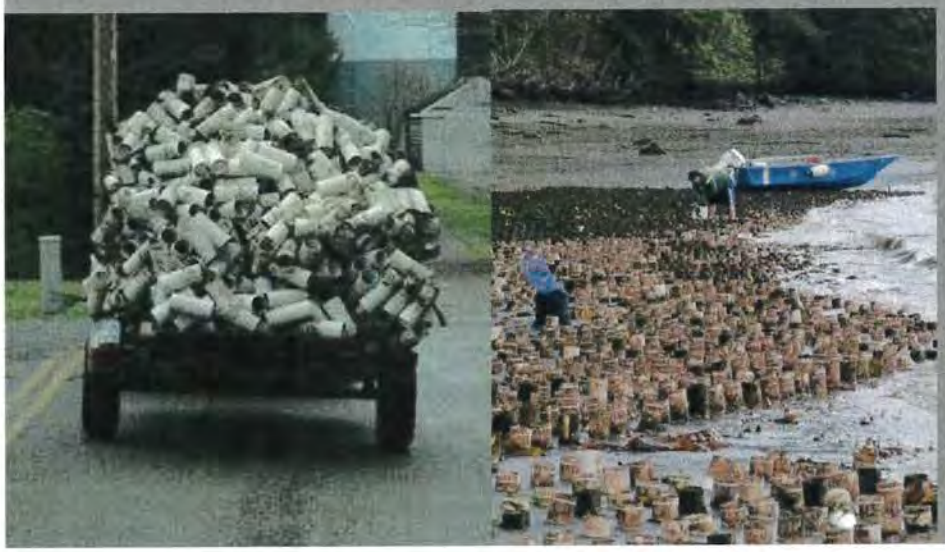
Zangle Cove, 4/29/06

The issue is *not* that tubes or nets remain in place for only 1-2 years.

The issue is that there is no siting criteria for these operations and once put into aquaculture use, the shellfish industry states the tideland is intended for "a perpetual cycle of planting, cultivation and harvesting."
--Taylor Shellfish Notice of Appeal of Administrative Determination, 8/22/07

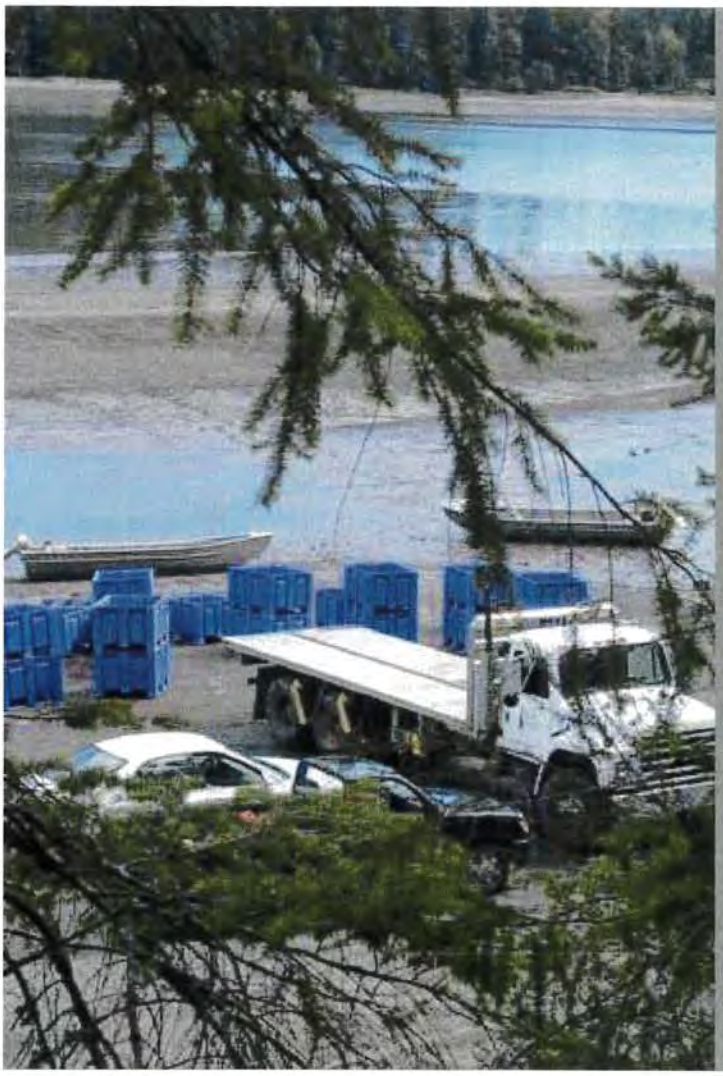
Shellfish aquaculture operations bring an industrial zone to quiet residential neighborhoods. Conflicts include: 46

--Day and night time noise disturbance to both wildlife and adjacent property owners and intense smell during harvest
--Aquaculture debris, utility vehicles and workers on the beach
--Barges left directly in front of residential properties for prolonged periods
--Demand for use of neighborhood roads for access and parking
--Access to the water eliminated for some adjacent property owners at low tide
--Permanent alteration of the character of the beach with rotational plantings and multiple species.



"...the interests of all stakeholders need to be addressed...in order to assess the social carrying capacity of the management area."
—Review of recent carrying capacity models for bivalve culture and recommendations for research and management. McKindsey, 2006

Zangle Cove, 2006-2007



Current shellfish industry practices.

Heavy equipment on tidelands is not consistent with telling school children and adults to walk carefully on the beach.

Heavy equipment and modification of tidelands are not consistent with the objective of the Puget Sound Partnership to protect habitat.

Industry is demanding upland access to the beach for operations in Pierce County.

The industry is legally challenging rules and conditions.

Oakland Bay, Mason County. 8/07

Dutcher's Cove is an example of what it at risk from expanding shellfish aquaculture.

New application in Pierce County for a 26 acre shellfish farm with at least 21 acres for geoducks.

Residents who have resided in this cove for 50 to 100 years or more now face the prospect of a cove converted to single agriculture use on a perpetual and permanent basis.

Industry says citizens just have to "get used to it."

Dutcher Cove application for massive geoduck farm submitted 7/19/07 in Pierce County

Operation in Hammersley Inlet is another example of current shellfish industry practices.

Small cove in Hammersley Inlet with a geoduck farm and plastic "kiddie pool" seed nurseries. August 26, 2007. These tidelands are owned by the shellfish company, not the shoreline residents. It is a documented herring and surf smelt spawning area.
***--WDFW Surf Smelt, Sand Lance, Rock Sole and Herring Map*, 2007**

Examples of High density raft leases in Baynes Sound, British Columbia

Photo courtesy of Association for Responsible Shellfish Farming
www.responsibleshellfishfarming.CA

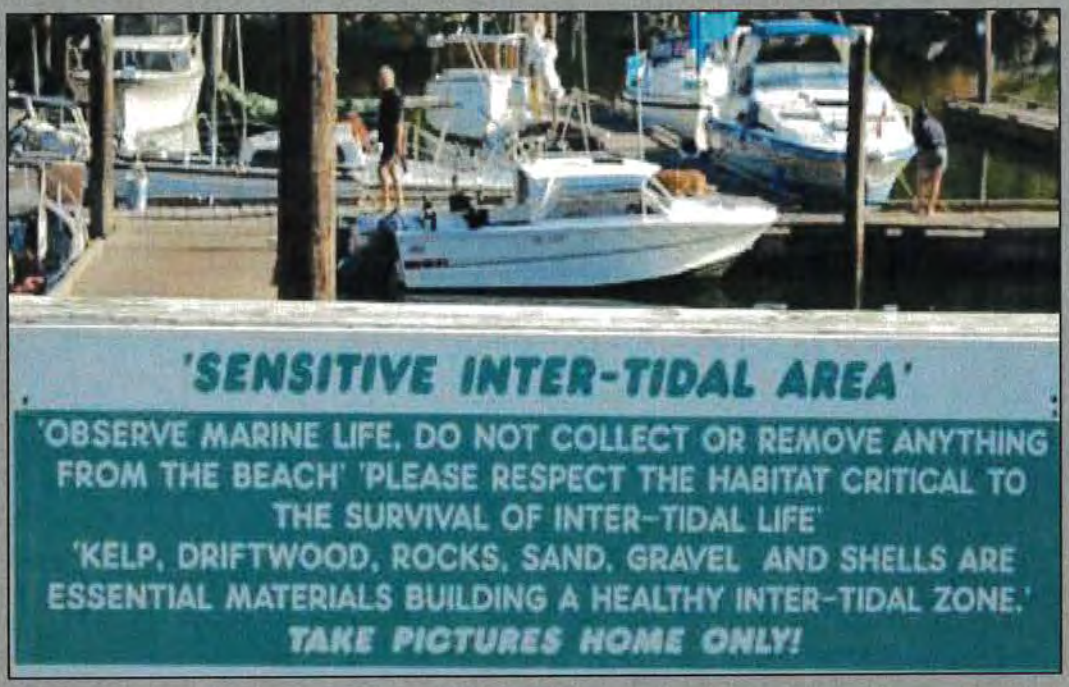
Examples of long-line culture in British Columbia.

High density beach lease in Baynes Sound, BC

Photos courtesy of Association for Responsible Shellfish Farming
www.responsibleshellfishfarming.CA

Canadians suspend applications for intertidal geoduck farming

'Applications for new intertidal geoduck aquaculture are currently not being accepted due to gaps in understanding of geoduck aquaculture techniques on fish habitat.'
http://www.agf.gov.bc.ca/fisheries/Shellfish/geoduck/main.htm



Sign on a dock in British Columbia, September 2006.

Long term goals of the shellfish industry are indicated by industry 'Goals and Research Priorities for 2015.' We have received no response to our written request for clarification of these goals.

"Explore options under the Endangered Species Act (ESA) Sections 7 and 10, to develop a regional general permit in cooperation with the Army Corp to provide growers with protection from prosecution under the ESA, Clean Water Act, Rivers and Harbors Act and Marine Mammal Protection Act."

"3.3.2. (H) Identify gaps in current understanding of shellfish ecology specific to West Coast ecosystems and pursue research to fill those gaps. The final goal is to gain a clear understanding of the ecological impacts associated with:

- Oyster culture - bottom, rack and bag, bag, intertidal longline, stake, suspended (longline, tray, lantern net, bag), mechanical dredge harvesting as well as culture of native Olympia and assorted non-native species.
- Clam (Manila & native) culture - bottom and bag, hand and mechanical harvesting.
- Mussel culture - suspended raft & long line, Mytilus galloprovincialis and M. trossulus.
- Geoduck culture - intertidal, subtidal, hydraulic harvesting (intertidal geoduck), predator exclusion.
- Other species not yet commonly grown for aquaculture purposes.
- Integrated Pest Management (IPM) of burrowing shrimp, European green crab, red rock crab, Dungeness crab, shore crab, diving ducks, starfish, oyster drills, gulls, crows and moon snails by the use of deterrents, exclusion or destruction.
- Substrate modification (cultching, graveling, tilling, harrowing, mowing).
- Carrying capacity - modeling of intensively cultured estuaries and an understanding of key phytoplankton species affecting growth, health and survival of shellfish (look at models developed in France, New Zealand, and Maine)."

--Excerpts from Pacific Shellfish Institute West Coast Shellfish Research and Education 2015 Goals and Priorities. For full document go to:http://www.pacshell.org/

NOAA Aquaculture Program

Washington Aquaculture Opportunities for Growth

Shellfish production, including oysters, mussels, Manila clams, and geoduck clams

New finfish species such as black cod

Culture of salmon and steelhead

Open ocean aquaculture in the Strait of Juan de Fuca

Production of submersible offshore fish cages

www.aquaculture.noaa.gov

9/12/07

World Wildlife Fund

Draft Goals of the World Wildlife Fund Molluscan Dialog:

Develop and implement performance-based, measurable standards that will minimize the potential negative effects of mollusc aquaculture, while permitting the shellfish farming industry to remain economically viable.

Continue to promote the beneficial environmental and social aspects of shellfish cultivations.

www.worldwildlife.org/cci/dialogues/mollusc.cfm

10/15/07

When Puget Sound is turned over to the aquaculture industry, will citizens have a say?

Worldwide studies document environmental impacts of intensive shellfish aquaculture.

Totten Inlet 2006

Manila nets, oyster bags, geoduck tubes all on same tidal area.

Click on this link for a list of summaries of worldwide studies on the impacts of intensive shellfish aquaculture.

http://ProtectOurShoreline.org/articles/Studies_IntensiveShellfishAquaculture.pdf

Click on this link to read a "Data Gap Analysis" related to geoduck aquaculture from Puget Sound biologists.

http://ProtectOurShoreline.org/070314GeoduckAquacultureDataGapAnalysis.pdf

Comments from the "Bivalve Experts" at the Washington Sea Grant Shellfish Aquaculture Workshop

- Baseline and ecological mapping of shoreline habitat is necessary to making informed decisions.
- Spatial scale of effects should be related to meaningful regional scales, such as drift cells (not to the entire Puget Sound)
- Environmental conditions should be monitored at aquaculture site.
- Practices are cumulative and have the potential to adversely affect foreshore ecology.
- The precautionary principal should be followed when there is lack of data.
- Both ecological and social carrying capacity must be considered in siting of shellfish aquaculture, not just production carrying capacity
- Shellfish farms will cause increase in some species and decrease in others.

Sea Grant Shellfish Aquaculture Workshop final recommendations
http://www.wsg.washington.edu/research/geoduck/WSGBivalveWorkshop_Recommendations.pdf

Shellfish farm rebar,
Totten Inlet 7/30/07

We share all of the eight objectives of our Governor for the Puget Sound Partnership initiative and especially the objective to protect habitat.

We welcome the Sea Grant Shellfish Aquaculture Workshop Scientist recommendations.

We support the following:

- Identification and documentation of all existing shellfish farms in every Puget Sound County;
- Assessment of current and future expansion of shellfish farming as to cumulative impacts;
- Baseline and environmental impact studies before additional plantings using new shellfish farming techniques are allowed.
- A substantial development permitting process for shellfish aquaculture on a site specific basis.

For more information go to:

Coalition to Preserve Puget Sound Habitat

http://www.ProtectOurShoreline.org

http://www.APHETI.com

http://www.HendersonBayShorelineAssociation.com

http://www.NoGeoduckFarm.com

http://www.CaseInlet.org

Coalition Contact: llhendricks@comcast.net

Canadian partners:
http://www.responsibleshellfishfarming.ca

Supporting organizations:

The Washington Council of Trout Unlimited

Last updated 11/20/07

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Patrick and Kathryn Townsend
Comments on Chapter 19.600.115 Aquaculture
12/4/2019

Chapter 19.600 Shoreline Use and Modification Development Standards

19.600.115 Aquaculture

A. Environment Designations Permit Requirements

Where aquaculture is proposed in the following upland designations, the identified permit requirements shall apply. Where proposed in the adjacent aquatic designation, the corresponding upland designation shall be used to determine permit requirements:

1. ~~Mining.~~ Shoreline Residential, Urban Conservancy, Rural Conservancy, and Natural: Except as otherwise stated in this section, an SDP shall be required for new aquaculture activities that meet the definition of substantial development under the Shoreline Management Act and this Shoreline Master Program. Exempt if definition of substantial development is not met.

   According to the 2011 ruling by Judge Tabor, geoduck operations require an SDP because the tubes constitute a "structure." See pages 6-7 of the Tabor ruling.

2. Natural: A CUP shall be required where the proposal requires new structure or facilities.

3. Geoduck aquaculture in all designations:

   a. A CUP shall be required for all new commercial geoduck aquaculture and an administrative CUP for existing aquaculture being converted to commercial geoduck aquaculture;

   This section should clarify the distinctions between and SDP, a CUP and an Administrative CUP. If an Administrative CUP is simply an authorization on paper without the actual requirements of an SDP or a CUP, then it is worthless. Andrew was unable to adequately explain the differences in these definitions at the Planning Commission meeting on this topic and this section has no clarity on the subject. The conversion of existing aquaculture to commercial geoduck aquaculture involves the use of some 7 miles/16 tons of PVD/HDPE plastics placed on an acre of tideland, with the addition of heavy plastic netting to cover this acre. This is not a small "conversion" and it requires all the permitting requirements of a new commercial geoduck operation, which it essentially is, in any case.

   b. An SDP shall be required for the planting, growing and harvesting of farm-raised geoducks only if the specific project or practice causes substantial interference with normal public use of the surface waters.

According to the 2011 ruling by Judge Tabor, geoduck operations require an SDP because the tubes constitute a "structure." See pages 6-7 of the Tabor ruling. The above requirement that exempts operations from obtaining an SDP is in contradiction to the Tabor ruling, to our understanding of that ruling.

c. Wildstock geoduck harvest associated with the state and tribal co-managed geoduck fishery is not aquaculture. Since a fishery does not constitute development under this Program, it is not subject to its regulations.

4. Certain aquaculture developments and supplemental wild stock seeding may be exempt from SDP requirements pursuant to the exemption criteria at Section 19.500.100(C) of this Program. Such activities shall also comply with all state and federal requirements, including but not limited to Department of Health certification and license, or Shellfish Import or Shellfish Transfer permits, where applicable.

Define "certain aquaculture developments." Make it easy for the ordinary reader to understand specifically what you are talking about. Give examples. Using the term "certain aquaculture developments" lacks clarity.

B. Application Requirements

In addition to the minimum application requirements in Section 19.500.105(C), aquaculture applications shall include the following information if not already provided in the local, state or federal permit applications. Where requested information is not applicable to a specific proposal, the application shall not be required to include all items listed under this section as long as it is demonstrated why the information does not apply, with concurrence from the Department.

Where is the phrase "where requested information is not applicable to a specific proposal" defined? Give examples of what is meant by this.

1. A site plan, including:

   a. The perimeter of the proposed aquaculture operation area;
   b. Existing bathymetry depths based on mean lower low water (MLLW datum);
   c. Adjacent upland use, vegetation, presence of structures, docks, bulkheads and other modifications;
   d. Areas where specific substrate modification will take place or structures will be constructed or installed;
   e. Access provisions for marine or vehicle traffic, processing structures or facilities; and
   f. Location of storage or processing structures or facilities.

~~2.~~ A baseline description of existing and seasonal conditions, including best available information. Where applicable to the subject proposal, the following should ~~shall~~ be included if already part of information submitted for another federal or state agency. ~~Note: information regarding wind conditions, current flows and flushing rates (items 3-5) will generally not be applicable to shellfish aquaculture applications.~~

Define "best available information" and where it comes from. This is language obfuscation.

a. Water quality;
b. Tidal variations;
~~c. Prevailing storm wind conditions;~~
~~d. Current flows at each tidal cycle;~~
~~e. Flushing rates;~~

Why delete c-e? In the case of Zangle Cove, naturally occurring native eelgrass (DNR was monitoring and very interested because it was the furthest south in Puget Sound that native eelgrass had been found) was completely gone after a winter of harvesting on a geoduck operation up current from the area of eelgrass. Items c-e are important in terms of determining impacts of the geoduck harvest operations and the siltation that occurs as a result of the harvest methods.

f. Littoral drift;
g. Sediment dispersal, including areas of differing substrate composition;
h. Areas of aquatic, intertidal and upland vegetation complexes; a vegetation habitat survey (see Section 8.10, Biological and Habitat Surveys) must be conducted according to the most current WDFW eelgrass and macroalgae survey guidelines;
i. Aquatic and benthic organisms present, including forage fish, and spawning and other lifecycle use of, or adjacent to, the site;
j. Probable direct, indirect and cumulative impacts to items B.1. - B.9. above; and
k. Visual assessment, including photo analysis / simulation of the proposed activity demonstrating visual impacts within 1,500 feet of the proposed project site. Where predator exclusion devices are proposed, the assessment shall include an analysis of visual impacts of proposed predator exclusion devices at mean high and mean low tides.

If the operator (Taylor Shellfish in the case of Zangle Cove) does not abide by the permitted tide height on the operation, then all bets are off for visual impact. When Taylor's tide height permit violation was reported to the County and substantiated by a professional survey, the County did nothing about it, in fact apparently completely ignored it. So what is the meaning and purpose of visual assessment analysis if County personnel don't actually give any credence to this issue?

3. An operational plan, which includes the following, when applicable should be included if already part of information submitted for another federal or state agency.:

What is the meaning of the phrase "when applicable"? That is an unintelligible phrase that makes the sentence incomprehensible. Also, this sentence makes it appear that an operational plan is not a requirement if NOT already part of information submitted for another federal or state agency. This item should be re-written to clarify its meaning.

There should be a requirement that the "operation plan" be submitted to the immediate neighborhood—any household that can see the operation, not just within 1500 feet.

a. Species, and quantity to be reared;
b. Source of aquatic product;
c. Implementation methods, including density, schedule, phasing options, time of day, and anticipated lighting and noise levels;

d. Number of employees/workers necessary for the project, including average and peak employment;
e. Methods and location of waste disposal and sanitation facilities;
f. Methods for planting and harvest;
g. Methods for predation control, including types of predator exclusion devices;

"Predator Exclusion" is improper language. This should be "wildlife exclusion"

h. Food and equipment storage;

There are rules about where barges and boats can be anchored in marine waters and for how long and the necessary permits. One operator in Zangle Cove, when complaints were made, simply moved his barge from one side of the Cove to the other every 3 days. What are the rules. This should be addressed here.

i. Anticipated use of any feed, herbicides, antibiotics, vaccines, growth stimulants, antifouling agents, or other chemicals and an assessment of predicted impacts;

Sounds like this is giving general permission to use feed, herbicides, antibiotics, etc. Is that what your intention is? If so, it should be stated clearly. If this is not allowed in Puget Sound, then there should be a link to the specific language in this document that refers where feed, herbicides, antibiotics, vaccines, etc. are allowed and where they are not allowed..

j. Methods to address pollutant loading, including biological oxygen demand (BOD);
k. A schedule for water quality monitoring, where required; and
l. Other measures to achieve no net loss of ecological functions consistent with the mitigation sequence described in WAC173-26-201(2)(e).

Please explain to us how putting 7 miles of PVC/HDPE weighing approximately 16 tons along with heavy duty plastic netting on an acre of tideland (especially in an estuary), is consistent with "no net loss of ecological functions." This type of language and the reality of industrial aquaculture is exactly why citizens in the County view with disbelief and incredulity any idea that the County wants to help preserve Puget Sound for the orcas and the salmon.

4. Other applications and reports, when applicable or requested depending on site specific details determined during permit review, to ensure compliance with permit conditions, which may include:

a. An accepted Washington Department of Natural Resources lease application, including a waiver of preference rights to access for navigation from the upland property owner, if applicable;
b. An accepted Washington Department of Ecology National Pollutant Discharge Elimination System (NPDES) permit, if applicable;
c. An accepted Washington Department of Health beach certification number;
d. An accepted WDFW aquatic farm permit, and/or fish transport permit;
e. Water quality studies;
f. Reports on solids accumulation on the bottom resulting from the permitted activity along with its biological effects;

g. Report on growth, productivity, and chemical contamination of shoreline plants and animals within or adjacent to the proposed site;

Clarify what you are talking about here. Growth and productivity on the shoreline or on the tideland—be specific about what you mean. Chemical contamination from the upland or from the aquaculture operation—again, be specific about what you mean. This is an incoherent sentence. Please clarify

h. Noise level assessments, including mitigation measures to ensure compliance with Chapter 10.36 & 10.38 TCC; and/or

i. Monitoring and Adaptive Management Plan for introduction of aquatic species not previously cultivated in Washington State.

Point to the section that talks about the rules related to "introduction of aquatic species not previously cultivated in Washington State." This item makes it sound like there is no regulation of this. Is this true?

C. Development Standards

1. General Standards.

a. Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, shall be a preferred use.

This document fails to mention other preferred uses, giving the impression that aquaculture is the only preferred use or "the" preferred use. For example, in 19.600.165-C:

12. As required by RCW 90.58.100(4), applications providing for wilderness beaches, ecological study areas, and recreational uses for the public on state-owned shorelines shall be considered a preferred use.

On the Department of Ecology website "preferred use" for the shoreline is defined: https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Management-Act-SMA

Shoreline use

The SMA establishes the concept of preferred shoreline uses. These uses are consistent with controlling pollution, preventing damage to the natural environment, or are unique to or dependent upon use of Washington's shorelines. Preferred uses include:

- Single-family residences
- Ports
- Shoreline recreational uses
- Water-dependent industrial and commercial developments
- Other developments providing public access opportunities

As much as possible, shorelines should be reserved for "water-oriented" uses, including those that are "water-dependent," "water-related," and for "water-enjoyment."

Preferred uses for shorelines of statewide significance are designed to:

- Recognize and protect statewide over local interests
- Preserve the natural character of the shoreline
- Result in long-term rather than short-term benefits
- Protect shoreline resources and environment
- Increase public access to publicly-owned shoreline areas
- Expand recreational shoreline opportunities for the public

Our comment: even though in the Thurston County SMP document aquaculture is continually referenced as a "preferred use", the fact that writers of the document do not mention other "preferred uses" gives a skewed understanding of the importance of aquaculture. There are obviously several other "preferred" uses.

The question remains: can converting our natural tidelands to industrial geoduck aquaculture prevent damage to the environment. If it can't, then it is NOT a preferred use according to the Department of Ecology.

We also do not believe that industrial geoduck aquaculture on the tidelands of Puget Sound is a "statewide interest" that should be protected. It is a tiny industry that makes money selling live geoduck to wealthy Asians because of their belief that consuming geoducks enhances virility—something along the lines of rhino horns. This is, in fact, local interest, not statewide interest, which would be more appropriately defined as preserving Puget Sound and its tideland habitat for our orcas and our native salmon. Nobody wants to talk about this—but its something that needs to be discussed.

b. Proposed residential subdivisions and other land uses and developments which may impact aquaculture operations shall provide facilities to prevent any adverse water quality impacts to such operations.

c. Site preparation and construction in the vicinity of aquaculture operations shall not result in off-site erosion, siltation, or other reductions in water quality.

Citizens of this County WANT to protect the environment and to keep Puget Sound clean for our orcas and our salmon and for our children and grandchildren. But when citizens realize that the push for clean water is so that their neighbor can put in a geoduck operation with 7 miles/16 tons of PVC/HDPE per square acre, so that he/she can make a lot of money selling live geoduck to the wealthy in Asian nations who believe that geoducks are an aphrodisiac, we feel rightly betrayed by our county officials.

b. When a shoreline substantial development or conditional use permit is issued for a new aquaculture use or development, that permit shall apply to the initial siting, construction, and planting or stocking of the facility or farm. Authorization to conduct such activities shall be valid for a period of five years with a possible extension per Section 19.500.105(H) of this Program. After an aquaculture use or development is established

under a shoreline permit, continued operation of the use or development, including, but not limited to, maintenance, harvest, replanting, restocking or changing the culture technique shall not require a new or renewed permit unless otherwise provided in the conditions of approval, or if required pursuant to permit revision criteria in WAC 173-27-100 or this Program. Changing of the species cultivated shall be subject to applicable standards of this Program, including, but not limited to, monitoring and adaptive management in accordance with standard g, below.

This is unclear and contradictory. First this item says that an initial permit is valid for 5 years, but than it says "after an aquaculture use or development is established under a shoreline permit, it doesn't require a new or renewed permit unless otherwise provided..." This sounds like it was written by the shellfish industry. So once the tideland is given over to the industry, then they can basically do what they want forever?

Given the dramatic rejection of the current science and cumulative impact analysis by a federal judge in the action with the Army Corps, it makes no sense to automatically renew permits.

c. Aquaculture shall not be permitted in areas where it would result in a net loss of shoreline ecological functions, or where adverse impacts to critical saltwater and freshwater habitats cannot be mitigated according to the mitigation sequencing requirements of this Program (see Section 19.400.100(A)).

A site-specific cumulative impact analysis should be prepared and take into account exiting and anticipated future aquaculture development.

d. Aquaculture shall not significantly conflict with navigation and other water-dependent uses.

e. Aquaculture activities proposed within Shorelines of statewide significance shall first be subject to the policies for shorelines of statewide significance contained in Chapter 19.300 (General Goals and Policies) of this Program, and then the policies and regulations contained in this section, in that order of preference.

f. In general, when considering new aquaculture activities, refer to policies at Section 19.300.130(E-K) for siting and design preferences.

g. Project applicants proposing to introduce aquatic species that have not previously been cultivated in Washington State are responsible for pursuing required state and federal approvals relating to the introduction of such species, as determined by applicable state and federal agencies. A plan for monitoring and adaptive management shall also be submitted for County review, unless the operation is conducted in a fully contained system with no water exchange to the shoreline. The County shall provide notice and time to comment for appropriate agencies in accordance with County procedural requirements, and shall circulate the monitoring and adaptive management plan. Upon approval, the plan shall become a condition of project approval.

h. Over-water structures and/or equipment, and any items stored upon such structures such as materials, garbage, tools, or apparatus, shall be designed and maintained to minimize visual impacts. The maximum height for items stored upon such structures shall be limited to three feet, as measured from the surface of the raft or the dock, unless shoreline conditions serve to minimize visual impacts (for example: high bank environments, shorelines without residential development), but in no case shall the height exceed six feet. Height limitations do not apply to materials and apparatus removed from the site on

a daily basis. Materials that are not necessary for the immediate and regular operation of the facility shall not be stored waterward of the OHWM.

Aquaculture barges should be included in this category.

i. Aquaculture structures and equipment used on tidelands below ordinary high water shall be of sound construction, with the owners' identifying marks where feasible, and shall be so maintained. Abandoned or unsafe structures and/or equipment shall be promptly removed or repaired by the owner.

j. No processing of any aquaculture product, except for the sorting and culling of the cultured organism and the washing or removal of surface materials or organisms after harvest, shall occur in or over the water unless specifically approved by permit. All other processing and related facilities shall be located on land and shall be subject to the regulations for Commercial) and Industrial Uses (Section 24.10.100), in addition to the provisions of this section.

k. No garbage, wastes or debris shall be allowed to accumulate at the site of any aquaculture operation, except for in proper receptacles.

l. All floating and submerged aquaculture structures and facilities in navigable waters shall be marked in accordance with U.S. Coast Guard requirements.

m. The rights of treaty tribes to aquatic resources within their usual and accustomed areas are addressed through direct coordination between the applicant/proponent and the affected tribe(s). Thurston County will notify affected tribes of new shoreline permit applications utilizing the applicable notification process in Title 20.60 TCC.

n. In order to avoid or limit the ecological and aesthetic impacts from aquaculture siting and operations, the following shall apply:

   i. Predator exclusion devices shall be firmly attached or secured so as not become dislodged.

   ii. Predator exclusion devices shall blend with the natural environment.

There is no way to make "predator exclusion devices" blend in with the natural environment. This might be called "wishful thinking" if it were not so ridiculous. There is nothing about PVC or HDPE that correlates with the "natural environment." In the case of geoduck aquaculture, we are talking about approximately 7 miles of PVC/HDPE weighing up to 16 tons on a single acre of tideland, covered by plastic netting. The industry uses the tubes over and over and eventually they crack, chip and probably release microchips of plastic onto the tideland. We previously sent photos of such tubes to the County planners.

   iii. Aquaculture operators shall routinely inspect and maintain predator exclusion devices.

   iv. Predator exclusion devices such as rubber bands, small nets, and area netting can be dislodged and pose a hazard to birds, marine mammals, and other wildlife and domestic animals, and thus are subject to Thurston County Public Nuisance regulations (Chapter 10 TCC).

   v. Predator exclusion devices shall be removed as soon as they are no longer needed to perform protective functions.

vi. Predator exclusion methods shall not be designed to intentionally kill or injure wildlife. Predator exclusion methods shall comply with federal and state regulations as determined by applicable federal and state agencies.

So it is OK if "predator exclusion devices" (i.e., wildlife exclusion devices) inadvertently kill or injure wildlife. We just want to make sure that the killing of native wildlife is not intentional. This is irrational.

vii. When determined necessary to minimize aesthetic and habitat impacts of large-scale projects, the County may require a phased approach to operation. This includes planting and harvesting areas on a rotational basis within the same tideland parcel.

So with a phased approach we get a basically permanent view of the PVC/HDPE plastics and nets—potentially, forever, because after 5 years, no permits are required.

o. Where aquaculture occurs on state owned aquatic lands, the project proponent shall contact and adhere to Washington Department of Natural Resources requirements.

2. Additional Standards for Commercial Geoduck Aquaculture.

a. In addition to the general development standards above, commercial geoduck aquaculture shall only be allowed where sediments, topography, land and water access support geoduck aquaculture operations without significant clearing or grading.

What is the definition of "significant" in this sentence and who determines what type/amount of clearing or grading is "significant." The Thurston County planners have told us that they don't have enough staff to do any monitoring of the geoduck farms they permit. The one employee who spoke to us about this went on to say that they rely on citizens such as ourselves to monitor the aquaculture installations. Yet when we report violations of the permit, we are ignored.

b. All permits shall take into account that commercial geoduck operators have the right to harvest geoduck once planted.

There is no need for this type of statement in the SMP

c. All subsequent cycles of planting and harvest shall not require a new CUP, subject to WAC 173-27-100.

As noted earlier, the operators can just use the tidelands for industrial aquaculture forever. Doesn't sound like a well-thought out plan for saving Puget Sound, our orcas and our salmon.

d. A single CUP may be submitted for multiple sites within an inlet, bay or other defined feature, provided the sites are all under control of the same applicant and within the Program's jurisdiction.

e. Commercial geoduck aquaculture workers shall be allowed to accomplish on-site work during low-tides, which may occur at night or on weekends. Where such activities are

necessary, noise and light impacts to nearby residents shall be mitigated to the greatest extent practicable.

Please define "mitigated to the greatest extent practicable." Sounds like you are saying the operators can do whatever they want.

4. Additional Standards for Net Pens. Fish net pens and rafts shall meet the following criteria:

After the net-pen disaster in Puget Sound, it should be obvious that they should be banned—that is if we want to save our orcas and our native salmon.

a. Fish net pens shall meet, at a minimum, state approved administrative guidelines for the management of net pen cultures. In the event there is a conflict in requirements, the more restrictive shall prevail.
b. Alternative facilities and technologies that reduce ecological and aesthetic impacts shall be preferred to traditional floating net pens.
c. Anchors that minimize disturbance to substrate, such as helical anchors, shall be employed.
d. Net pen facilities shall be located no closer than 1,500 feet from the OHWM, unless a specific lesser distance is determined to be appropriate based upon a visual impact analysis or due to potential impacts to navigational lines.
e. Net cleaning activities shall be conducted on a frequent enough basis so as not to violate state water quality standards.
f. In the event of a significant fish kill at the site of the net pen facility, the facility operator shall submit a timely report to the Thurston County Environmental Health Section and the Thurston County Department of Resource Stewardship stating the cause of death and shall detail remedial action(s) to be implemented to prevent reoccurrence.
g. New floating net pens shall be prohibited in Thurston County's South Puget Sound jurisdictional area until updates to Ecology's guidance on *Recommendations for Managing Commercial Finfish Aquaculture* is completed and can be reviewed by county staff to evaluate possible environmental benefits and impacts.

Other Notes:

In Andrew Deffobis' analysis of the GMHB's decisions regarding the Pierce County SMP, for most of the items you refer to you say that "This is unlikely to be an issue in Thurston County." We would specifically like to know how you determined what is important to the citizens of Thurston County and why you would so peremptorily write off any concern about these issues.

1. The petitioner (Taylor Shellfish) continually used the argument that Pierce County's prohibitions related to aquaculture were "unsupported by science and technical information". Judge Lasnik, in the recent ACOE ruling, appears to agree that there is not enough science, but his conclusion is opposite to that of the shellfish industry, i.e., he basically states that there is not enough science to determine that there are no impacts from shellfish aquaculture and that impacts are obvious to the observer.

2. Petitioner also states in "A" that "prohibition of aquaculture activities in areas abutting the Natural shoreline…fails to foster and give preference to aquaculture." As we list above from the Department of Ecology website, aquaculture is not "THE" preferred use, as this statement from the industry implies. Other preferred uses include:

   - Single-family residences
   - Ports
   - Shoreline recreational uses
   - Water-dependent industrial and commercial developments
   - Other developments providing public access opportunities

3. In most of the issues outlined by Andrew Deffobis of Thurston County, the Petitioner, Taylor Shellfish, uses or attempts to use the arguments of "lack of science and technical information" and "preferred use of aquaculture."

We wonder if the members of the GMHB looked at the concept of "preferred use" as outlined on the Department of Ecology website. Again, shellfish aquaculture may be "a" preferred use that apparently falls under the category of "water-dependent industrial and commercial developments" but it is not listed specifically as such on at least this page of the DOE website. It is not "the" preferred use that the industry wants everyone to buy into.

https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Shoreline-coastal-planning/Shoreline-Management-Act-SMA

Polly Stoker

From: Kathryn Townsend <kath.townsend@gmail.com>
Sent: Wednesday, December 04, 2019 9:08 AM
To: Andrew Deffobis; PlanningCommission
Cc: Patrick.Townsend@townsendsecurity.com; Anne Van Sweringen; Phyllis Farrell
Subject: Judge Bjorgen and Judge Tabor rulings
Attachments: 20110121_ThurstonCnty_HearingExaminer_Order_SDP.pdf; 20111021 _TaylorArcadia_vs_ThursCnty_Superior_Tabor.pdf

Hi Andrew,

Attached are the rulings by Judge Thomas Bjorgen and Judge Gary Tabor related to the AG Opinion that you posted on the SMP website.

We suggest that it would be honest and principled to include these rulings in your list of important documents for tonight's meeting. Ironically, Thurston County prosecuting attorney, Jeff Fancher, argued these cases and won against the shellfish industry. Now the County appears to support the shellfish industry. Please explain.

Please add the following Power Point to citizen concerns related to shellfish aquaculture.
https://protectourshoreline.org/slideshow/POS_ShellfishAquacultureConcerns.pdf

Kathryn and Patrick Townsend

Polly Stoker

From: Kathryn Townsend <kath.townsend@gmail.com>
Sent: Wednesday, December 04, 2019 9:08 AM
To: PlanningCommission
Cc: Patrick.Townsend@townsendsecurity.com; Anne Van Sweringen; Phyllis Farrell
Subject: Protect Our Shoreline Shellfish Aquaculture Powerpoint

Dear Thurston County Planning Commission,

Following is a link to the Protect Our Shoreline powerpoint detailing citizen concerns related to Shellfish Aquaculture. This powerpoint was created in 2006 and gives visual information about shellfish aquaculture in Puget Sound. As you can imagine, the tideland acreage being used for these activities is greater now than it was in 2006.

https://protectourshoreline.org/slideshow/POS_ShellfishAquacultureConcerns.pdf

Thanks,
Kathryn and Patrick Townsend

From:	Clayton Hill
To:	Polly Stoker
Subject:	Public Comment - Comp Plan, Parks Level of Service Amendments
Date:	Thursday, April 09, 2020 8:28:41 AM

I wish to provide public comment on the amendments to the Comp Plan as described in the Memo of March 4 to the Thurston County Planning Commission related to Parks Level of Service. This memo was part of the packet for the March 4 meeting of the Planning Commission.

1. Please request amendment language regarding playgrounds, not just parks and open space.

It is insufficient to describe a level of service for parks without specifying a level of service specifically for playgrounds. Folks in the greater Grand Mound/Rochester area should not have to drive to Tenino to find publicly accessible playground equipment, but that is what happens today. The equipment at the Rochester community center is ancient and hazardous and the facility has no shade. So, please amend the Comp Plan **to specify a level of service that requires a shaded playground meeting contemporary equipment safety standards with restrooms suitable for children up in each community, and specifically in the Grand Mound/Rochester unincorporated area.**

2. Please request amending language regarding "Trails" and the linkages that should be part of a long-term vision.

Current draft amending language says: "Work with other jurisdictions to establish and protect open space and habitat corridors with linkages to regionally significant open spaces and areas of diverse habitat."

We should work with other jurisdictions to **link trail systems** not just open spaces and habitat corridors. Please also consider adding that Thurston County should work with other jurisdictions, explicitly, to link the Western Chehalis Trail to the Willapa Hills Trail (East-West link from Chehalis to the Coast). When it comes to important linkages that require work with other jurisdictions like Lewis County, this item should not fail to be mentioned in our Comp plan. We should be working to connect the trails from Centralia up to Grand Mound/Rochester and over to Tenino. This would help south Thurston economic development and property value by securing a great recreation amenity for our area, thus improving the County tax base.

3. **Expediting non-motorized trail access north to urban areas from Rochester/Grand Mound should be part of the comp plan**. There is some language being offered that talks generally about the priority for non-motorized trails on page 13. I'm grateful to see that. However, my request is that you would please consider making this more explicit and concrete that non-motorized trails north-south from Rochester/Grand Mound need to be a priority for planning. Frankly, there are inequities in the distribution of non-motorized trail access in the County. Secondly, there are public safety considerations. It is too dangerous to run or bike along 183rd, Sargent Rd, Littlerock Rd, and Case Rd. The shoulder is too narrow if it exists at all. Non-motorized trail access from this area of the County is far less than in other areas.

Thank you for considering these comments and thank you for your service on the Planning Commission.

Clay Hill

From:	Patrick Townsend
To:	Brett Bures
Cc:	Brad Murphy; Kathryn Townsend; PlanningCommission; Sanguinetti, Pamela NWS; michelle.walker@usace.army.mil; Perry Lund; Gary Edwards; John Hutchings; Ty Menser; theresa.nation@dfw.wa.gov
Subject:	Sohn / Taylor permit violations (please confirm)
Date:	Wednesday, March 18, 2020 9:47:44 AM
Attachments:	01 20200317_Townsend_Sohn_GeoduckOp_PermitViolations.pdf Permit violations attachments.zip

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Dear Brett,

Please find attached our response to the permit violations related to the ChangMook Sohn geoduck operation in Zangle Cove and to the Taylor Shellfish letter dated 8/1/2019 which defends those permit violations. As we mentioned before we never received a copy of that letter until you sent it to us on 3/5/2020. I have also sent our response via mail.

I hope you are all staying safe.

Patrick and Kathryn Townsend

Patrick Townsend
CEO

Patrick and Kathryn Townsend
7700 Earling Street NE
Olympia, WA 98506
360-357-9082

March 17, 2020

Brett Bures, Building and Development Manager, Community Planning and Economic Development
Brad Murphy, Senior Planner, Thurston County Planning Department
Jennifer Davis, Community Planning Manager
John Hutchings, Thurston County Commissioner
Gary Edwards, Thurston County Commissioner
Tye Menser, Thurston County Commissioner
Thurston County Planning Commission
2000 Lakeridge Drive SW
Olympia, WA 98502-6045

Subject: ChangMook Sohn Commercial Geoduck Farm Shoreline Substantial Development Permit Violations
Project Number : 2014108800
Property: Parcel Number 12911440102

Dear Messrs. Bures and Murphy, Ms. Davis and Commissioners Hutchings, Edwards and Menser and Thurston County Planning Commission:

Contrary to the Taylor Shellfish letter dated August 1, 2019, the ChangMook Sohn geoduck operation is not in compliance with the Thurston County permit issued for the operation

The letter from Taylor Shellfish dated 8/1/2019 (8/1/19 Taylor Letter) is not a legitimate response to our specific complaints but is a "throw in the kitchen sink" attempt to obfuscate the specific issues raised. The 8/1/19 Taylor Letter discusses everything from stormwater permit requirements, possible impacts to wells and septic systems on the upland property, delivery of a copy of the Lease Agreement and every other conceivable topic related to substantial development permit for a geoduck operation.

Additionally, the 8/1/19 Taylor Letter was never sent to us by County personnel, by mail or email, and there was never any communication about it from the Thurston County Planning Department until sent to us by Mr. Bures on March 4, 2020. Apparently the County also, related to our complaint, met with Taylor on the Sohn tidelands on 7/29/2019 without informing us. In fact, it was indicated by Mr. Bures that based on the 8/1/2019 Taylor Letter the case had been closed. We did not receive any communication as to that fact.

At one time, the County personnel told us that they did not have the resources to monitor shellfish operations In Thurston County and that they relied on citizens to monitor for them. We have done that but our information and observations have been ignored.

The ChangMook Sohn commercial geoduck operation was authorized by Thurston County's Resource Stewardship Department on May 3, 2016 under Project No. 201408800. The required Shoreline Substantial Development Permit was issued based upon a Mitigated Determination of Nonsignificance (MDNS) under the State's Environmental Policy Act (SEPA) The operation was fully installed on May 7, 2019. Our tideland property is immediately adjacent to the ChangMook Sohn tideland property.

Following are the permit violations that we continue to bring to your attention:

1. Condition 11 of the MDNS states:

"Shellfish culturing shall not be placed above the tidal elevation of +3 MLLW in order to minimize potential impacts to forage fish habitat. If herring spawn is observed, then those areas shall be avoided until the eggs have hatched."

8/1/19 Taylor Letter Response re: Condition 11

> "Following standard practice, the upper limit of the farm was staked out at a +3 tidal height when the farm was laid out. Tidal heights, including those observed by the complainants, are highly variable depending on impacts including surface floor, weather and air pressure.
>
> "For reference and a link to additional information:
> Based on www.tidesandcurrents.NOAA.gov, The vertical datum is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. The datum was derived for surveys from a general adjustment of the first-order leveling nets of both the United States and Canada. In the adjustment, mean sea level was held fixed as observed at 21 tide stations in the United States and 5 in Canada. The year indicates the time of the general adjustment. A synonym for Sea-level Datum of 1929. The geodetic datum is fixed and does not take into account the changing stands of sea level. Because there are many variables affecting sea level, and because the geodetic datum represents a best fit over a broad area, the relationship between the geodetic datum and local mean sea level is not consistent from one location to another in either time or space. For this reason, the National Geodetic Vertical Datum should not be confused with mean sea level. See North American Vertical Datum of 1988 (NAVD 88). NGVD 29 should not be used as Mean Sea Level. NGVD 29 is no longer supported by NGS.
>
> "We understand the goal of the condition is to protect forage fish spawning habitat. Therefore, to meet this condition, a forage fish survey by a WDFW approved biologist was completed during installation of the farm and for three subsequent weeks during the completion of the install process. See attachment 2. Herring spawn surveys are completed by trained farm crews during the herring spawning months identified by WDFW. Attachments 3 & 4"

Townsend Comments Regarding Tidal Datums

> **This is a deliberate attempt by Taylor Shellfish to obfuscate the facts regarding the conditions of the permit. The method cited by Taylor in the above response to determine the maximum height of the aquaculture operation is incorrect.**
>
> It is true that there are different methods used by NOAA and others to determine base elevations for water depth calculations. These are generally categorized as vertical datums. There are two vertical datums commonly used in coastal and shoreline areas: geodetic datums and tidal datums.

- The Mean Sea Level (MSL), Lowest Astronomical Tide (LAT) and Highest Astronomical Tide (HAT) are examples of geodetic datums.
- Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW) are examples of tidal datums.

Both geodetic and tidal datums are well defined by NOAA. See the attached NOAA reference document.

Thurston County aquaculture permits use MLLW to specify the maximum height of planting of geoduck farms and other aquaculture activities. MLLW is also used for nautical charts and for other uses because it is well defined, standardized and predictable. It does not vary by weather or atmospheric pressure. Thurston County does not use geodetic datums for permit specification, nor does the county make use of random measurements of periodic tides.

The Taylor Shellfish response that refers to geodetic datums, mean sea level, NAVD 88, and NGVD 29 is therefore completely irrelevant.

Hatton Godat Pantier (HGP), a Washington State licensed surveyor with expertise in tideland surveys, has provided a formal survey of several points of the ChangMook Sohn geoduck operation and has marked the location of +3 MLLW as well as other points that indicate this operation has extensively violated its upper boundary. Please see the attached HGP survey dated 9/5/2019.

Townsend Comments Regarding Variability of Tides

Taylor states that the tidal elevations in Zangle Cove are "highly variable." This is an attempt by Taylor to explain why they planted the operation to a +5.63 rather than the permitted +3 MLLW.

The waters in South Puget Sound are generally quiet, coming in and going out without so much as a wave—just a gentle creeping up and down of the water. Only passing boats (few in number) and wind bring waves, insufficient for Taylor to cry "high variability" of the tidal elevations. The idea that there is a 2.63 foot variability in the tidal height in South Puget Sound is ridiculous.

We have lived on Zangle Cove for 30 years and have found the NOAA tide table charts for Dofflemyer Point, next to the Boston Harbor Marina (about a half mile from Zangle Cove) to be a reliable source for determining tidal elevations in Zangle Cove.

Looking out at the ChangMook Sohn tideland every day and observing the tides, we simply have not seen the "highly variable" tides that Taylor claims. We believe that is a bogus argument.

Our tide table statistics are taken from the NOAA Tide Charts for Dofflemyer Point, https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9446800

Tidal statistics are also found at https://deepzoom.com. This site gives minute-to-minute statistics on the tidal elevations for specific locations. On this site you will have to scroll on the map to South Puget Sound and locate the station for Dofflemyer Point, a small yellow box next to the Boston Harbor Marina. Click on that box and the current tidal information will appear to the right of the map, labeled as Dofflemeyer Point.

As mentioned above, we have had a professional marine surveyor mark the tidal elevations involved and he did not indicate at any time that there is routinely "high variability" in the tidal elevations. See attached Hatton Godat Pantier survey conducted on 9/5/2019.

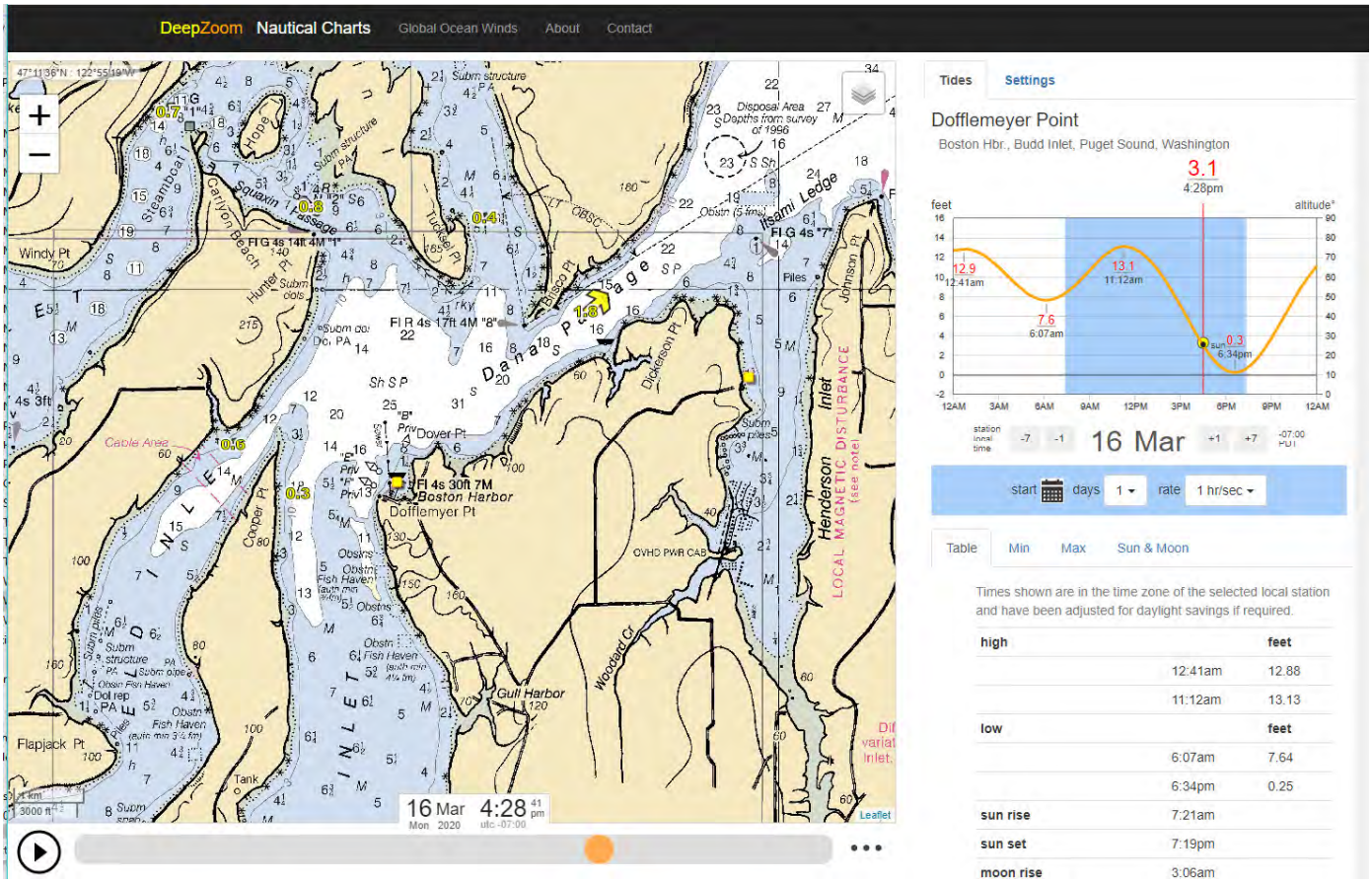
1) The photo below of the ChangMook Sohn geoduck operation was taken on June 26, 2019 at 8:17 am at a tidal elevation of +3.6 MLLW (lowest tide during daylight hours). The Sohn geoduck operation is planted well above the permitted tidal elevation of +3 MLLW.

   See attached Hatton Godat Pantier Survey of 9/5/2019 of the Sohn operation that shows that the tubes were planted to +5.63 tidal elevation.

2) The photo below of the ChangMook Sohn geoduck operation was taken on July 7, 2019 at 6:32 pm at a tidal elevation of +3.6 MLLW. It shows, once again, that the operation was planted well above a +3 tidal elevation. It would not have been visible at all if it had been planted to a +3 MLLW tidal elevation.

3) The photo below of the ChangMook Sohn geoduck operation was taken on March 16, 2020 at 4:28 pm at a tidal elevation of +3.1 MLLW, lower than the tidal elevation in the above photos and closer to the +3 MLLW that should have been the upper limit of the operation. The visible portion of the planting in this photo is not allowed by the permit issued by Thurston County.

The Deep Zoom chart shows the +3.1 tidal elevation at Dofflemeyer Point, approximately one half mile west of Zangle Cove next to the Boston Harbor Marina, on March 16, 2020 at 4:28 pm.



2. Condition 9 of the MDNS states

Installed gear must be counted and compared against gear removed from the site through farming practices or debris patrols.

8/1/19 Taylor Response

Review of Condition 9. Nursery tubes installed: (may-June 20-19): 23,876 (1000 mesh)
Nets Installed: 32 (edges overlap)

Townsend Response related to number of tubes:

There are huge discrepancies between information cited in the ChangMook Sohn permit and current explanations by employees of Taylor Shellfish.

The "Mitigated Determination of Nonsignificance", Project Number 2014108800, dated 5/3/2016, for the application for a Shoreline Substantial Development Permit, dated 12/18/2014, states:

"The proposed project consists of a 1.1 acre commercial geoduck farm on private tidelands….In this phase, a 1- inch length of 4-6 inch diameter PVC pipe will be placed on end and buried in the substrate with 2-3 inches exposed. Tubes are placed at the density of one per square foot (approximately 47,900_ while seeds are planted three per tube….The are netting will be made 50' x 50' durable nets. A total of 16 nets will cover the growing area…"

There is a large discrepancy between the 8/1/19 Taylor Response citing 23,876 tubes versus the MDNS citation of 47,900 tubes.

There is also a large discrepancy between the 8/1/19 Taylor Response citing 32 nets installed versus the MDNS citation of 16 nets.

There is also the question of the number of tubes planted above the permitted tidal elevation of +3 MLLW.

Taylor Shellfish must explain these discrepancies and/or correct their errors in writing to the County.

3. Condition 9 of the SDP states:

All activities related to the proposed geoduck bed shall be in substantial compliance with the site plan submitted and made part of the Staff Report, including modification as required by this approval. Any expansion or alteration of this use will require approval of a new or amended Shoreline SDP.

8/1/19 Taylor Letter Response

Review of Condition 9. Tubes are installed with approximately 3" remaining out of the sand. The marine environment is dynamic and sand regularly shifts and moves around the tubes. The farm is routinely

monitored when gear is present, and crews will continue to ensure gear is secured and in compliance with the condition.

Townsend Response.

Most of the ChangMook Sohn geoduck operation tubes were installed with 5-7 inches remaining above the sand and sometimes more. (See photos above.) We do not see the dynamic shifts in sand around the tubes that Taylor claims. If there are any changes, they are so gentle that they would be difficult to define by even long-time observers.

Townsend Response related to exposure of tubes:

Although a few of the tubes on the Sohn operation are only 2-3 inches above the sediment, the vast majority of tubes average 5-7 inches above the sediment and many are higher, a few as much as 8 inches. Please see photos below taken with a measuring tape in view.

June 18, 2019. Photos of PVC tube heights on ChangMook Sohn geoduck operation in Zangle Cove.

4. Condition 4 of the MDNS states:

"All tubes, mesh bags, and nets used on the tidelands below the ordinary high water mark (OHWM) shall be clearly, indelibly, and permanently marked to identify the permittee name and contact information (e.g., telephone number, email address and mailing address). On area nets, if used, identification markers will be placed with a minimum of one identification marker for each 100 square feet of net."

8/1/19 Taylor Letter Response re: Condition 4

The 8/1/19 Taylor Letter re-states Condition 4 as:
All [aquaculture gear] shall be clearly marked to identify permittee and contact information.

Taylor states:
Mesh tubes and nets are individually marked with barlocks imprinted with "TAYLOR SHELLFISH 360-432-6178", pvc nursery tubes are scribed with "TSF, or www.taylorshellfish.com". See photo 2 for installation documentation. Depending on abrasion of tags by substrate, or fouling by barnacles, these tags require replacement at a rate individual to each farm. Managers will monitor and replace as labels as appropriate to ensure information is readable.

See photo 2 for installation documentation.

Townsend Response:

There is only a small patch of mesh tubes, maybe 5% or less of the entire operation.

Based on our observations during the summer of 2019 during low-low tides, there are no obvious identifying markings on any of the PVC tubes. Thurston County should verify the claim that the tubes are marked. There is nothing that identifies Sohn and his contact information or Taylor Shellfish and its contact information other than the small sign at the bottom of the hillside. There are no obvious identification markers on any of the nets, much less every 100 square feet of net. The tubes are old, obviously previously used and quite a few are cracked or chipped. (See photos below)

5. Condition 7 of the MDNS states:

"Weekly patrols of tidelands within a half mile of the geoduck farm shall be conducted. During those patrols, all geoduck debris must be collected regardless of its source."

Townsend comment:

Access to private tidelands in Thurston County has often been shared within neighborhood communities of shoreline property owners. However, with the advent of commercial shellfish farming on private tidelands, the community sharing of access to the tidelands has changed. The County, as in the Sohn MDNS, is granting access to unknown parties to routinely trespass on private property. This would be unheard of for upland properties and it should be no different for tideland properties.

- Shellfish aquaculture employees must refrain from trespassing on tidelands belonging to owners who do not choose to allow access.
- **For owners who do choose to allow access, the County should get a signed letter of agreement from each participating property owner stating that unknown parties will be coming on to their private property and waiving any liability of the property owner.**
- The County should also sign this agreement.
- On request of anyone in the tideland community within a half mile of the operation, the County should do background checks and train all such persons who will be going onto private property to the satisfaction of each individual property owner.
- This also presumes that Thurston County knows specifically where tideland property lines occur and can transmit that specific information to those it is granting access to so that those grantees will not be in danger of trespassing on non-participating property owners.

6. Condition 14 of the MSDN states:

The permittee shall maintain a record of Pacific herring spawn surveys.

8/1/19 Taylor Letter Response

Review of Condition 14. Spawn surveys have been performed. A record of surveys is included. Attachment 4.

Townsend Response

Biologists who performed the Pacific Herring spawn survey are employees of Taylor Shellfish, not independent biologists. This is an obvious conflict of interest.

Conclusion

Given the above facts we again ask that Thurston County enforce the permit as it was written and approved. In particular, the areas planted outside of the permit boundaries should be removed immediately and shoreline restoration should be mandated.

If the county has questions about the methods and techniques of the HGP survey they should contact HGP to discuss this, or contract with a different licensed surveyor for an evaluation.

The operator of the ChangMook Sohn geoduck operation, Taylor Shellfish, has a history of violating permit boundaries. Please see the attached reference to violations of Washington State permits and the $225,000 penalty that was levied against Taylor Shellfish in Totten Inlet in June, 2010. Apparently they didn't learn anything from the Totten Inlet fiasco. It would be appropriate in the current case to levy equivalent fines and to require that any revenue generated by the area in violation be remitted to the county.

The unauthorized and unprofessional nature of these permit violations naturally raises the question of how many other Taylor Shellfish operations are in violation of their permits. As the county does not inspect or monitor these operations, all other aquaculture operations in Thurston County are also suspect. The county

must immediately inspect all Taylor Shellfish operations and other active aquaculture operations to verify permit compliance.

It makes no sense to have a system of permits with specific conditions in order to protect Puget Sound if in the end, the permittee can do whatever he/she wants to do without consequences.

Lastly, we were shocked to learn that Thurston County closed this case in August of 2019 without informing us. We understand the county has limited resources. However, the Puget Sound ecosystem is in danger of losing iconic Pacific Northwest species such as Orcas and endangered salmon. The county should cease processing, issuing or renewing aquaculture permits until it has the resources and internal knowledge needed to inspect and monitor aquaculture operations properly.

We continue to review the responses by Taylor Shellfish and may have additional comments.

Thurston County issued the permit for this operation and is responsible for its enforcement. Therefore, we request that Thurston County take immediate action to ensure compliance with every requirement of the permit and that the County engage in ongoing inspections to ensure compliance not only of Mr. Sohn's operation, but all commercial geoduck and other shellfish operations within the County for similar lack of compliance with permit requirements.

We look forward to your response.

Sincerely,
Patrick and Kathryn Townsend
Olympia, Washington

Cc: Ms. Michelle Walker, Army Corps of Engineers
Ms. Pamela Sanguinetti, Army Corps of Engineers
WA Department of Fish and Wildlife
WA Department of Ecology

Resources:
The following links document past trespass of Taylor Shellfish and other shellfish companies on State tidelands.
https://www.protectourshoreline.com/i_new.html
http://protectourshorelinenews.blogspot.com/2013/02/seattle-shellfish-going-to-bank.html
http://protectourshorelinenews.blogspot.com/2011/11/trespass-settlement-terms-disputed.html

Attachments:

- 5/3/2016 Thurston County Mitigated Determination of Nonsignificance, Project Number 2014108800, ChangMook Sohn, 930 76th Avenue NE, Olympia, WA 98506
- June 2000 NOAA NOS, Tidal Datums and Their Applications
- 6/25/2010 The Olympian. Shellfish growers settle suit
- 9/5/2019 Hatton Godat Pantier survey with MLLW markings

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Center for Operational Oceanographic Products and Services

TIDAL DATUMS AND THEIR APPLICATIONS

NOAA Special Publication NOS CO-OPS 1

NOAA Special Publication NOS CO-OPS 1

TIDAL DATUMS AND THEIR APPLICATIONS

Silver Spring, Maryland
June 2000

noaa National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

Center for Operational Oceanographic Products and Services
National Ocean Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

The National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) collects and distributes observations and predictions of water levels and currents to ensure safe, efficient and environmentally sound maritime commerce. The Center provides the set of water level and coastal current products required to support NOS' Strategic Plan mission requirements, and to assist in providing operational oceanographic data/products required by NOAA's other Strategic Plan themes. For example, CO-OPS provides data and products required by the National Weather Service to meet its flood and tsunami warning responsibilities. The Center manages the National Water Level Observation Network (NWLON) and a national network of Physical Oceanographic Real-Time Systems (PORTS™) in major U.S. harbors. The Center: establishes standards for the collection and processing of water level and current data; collects and documents user requirements which serve as the foundation for all resulting program activities; designs new and/or improved oceanographic observing systems; designs software to improve CO-OPS' data processing capabilities; maintains and operates oceanographic observing systems; performs operational data analysis/quality control; and produces/disseminates oceanographic products.

NOAA Special Publication NOS CO-OPS 1

TIDAL DATUMS AND THEIR APPLICATIONS

This special publication was prepared under the editorship of:
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FOREWARD

The United Nations declared 1998 to be the International Year of the Ocean. This declaration provides an opportunity to raise public awareness of a fundamental boundary defined by the intersection of the ocean with the land. This intersection is not as simple as it may seem. It is determined by a plane called a tidal datum, and refers to an average height of the water level at particular phases of the tidal cycle. This vertical reference surface is derived from water level measurements recorded along coastlines, estuaries, and tidal rivers of the United States. Tidal datum planes, referenced to a system of bench marks, are fundamental to the determination of the spatial coordinates of latitude, longitude, and elevation relative to mean sea level.

Tidal datums are chiefly used to determine horizontal boundaries, and for estimating heights or depths. The legal determinations of private and public lands, state owned tide lands, state submerged lands, U.S. Navigable waters, U.S. Territorial Sea, Contiguous Zone, and Exclusive Economic Zone, and the High Seas, or international waters, depend on the determination of tidal datums and their surveyed intersection with the coast. Navigation in U.S. Harbors, shipping channels, and intracoastal waterways requires an accurate knowledge of the depth of the ocean and submerged hazards at the low-water phase of the tidal cycle. Passage underneath bridges requires knowledge of the clearance at the high water phase of the tide. In addition, coastal construction and engineering requires knowledge of the tidal cycle; significant wave heights, periods, and directions; the heights of storm surges, or tsunami waves; and, the frequency and horizontal extent of flooding in the coastal zone. Organizing these environmental data into meaningful, decision-making contexts requires the establishment of tidal datums, and their reference to the geodetic control network.

Other countries publish tidal datums that may differ significantly from those of the U.S. In fact, there are hundreds of local datums used throughout the world. This has led to efforts to define a global vertical datum. The ellipsoid serves as a suitable candidate because of its horizontal and vertical accuracy, its relative ease of calculation, and its global accessibility via GPS. A set of vertical transformation functions are required to translate the vertical coordinate provided by GPS into a coordinate referenced to a tidal datum plane. Preliminary research suggests promising results in the construction of a seamless vertical reference system.

This document has been prepared by NOAA's Center for Operational Oceanographic Products and Services Division to provide background information about tidal datum planes. The chapters present overviews of the history of tidal datums in the U.S., domestic and international legal regimes, water level measurement system and bench marks, derived products available from NOAA, and examples of the practical and legal applications of tidal datums.

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LIST OF ACRONYMS

ADR	Analog-to-digital recorder
AFOS	Automation of Field Operations and Services
ATWC	Alaska Tsunami Warning Center
AWIPS	Advanced Weather Interactive Processing System
CBN	Cooperative Based Network
CO-OPS	Center for Operational Oceanographic Products and Services
CORMS	Continuous Operational Real-time Monitoring System
CORS	Continuously Operating Reference Stations
CZM	Coastal Zone Management
DAC	Damage Assessment Center
DAD	Damage Assessment Division
DCP	Data Collection Platform
DEM	Digital Electronic Model
DGPS	Differential GPS
DHQ	Mean Diurnal High Water Inequality
DLQ	Mean Diurnal Low Water Inequality
DOD	Department of Defense
DOE	Department of Energy
DPAS	Data Processing and Analysis Subsystem of NGWLMS
EEZ	Exclusive Economic Zone
ECDIS	Electronic Chart Display and Information Systems
EPA	Environmental Protection Agency
ESI	Environmental Sensitivity Index
ESSA	Environmental Science Services Administration
FBN	Federal Based Network
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Studies
GIF	Graphics Interchange Format
GIS	Geographical Information System
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GRS80	Geodetic Reference System 1980
GT	Great Diurnal Range of Tide
IGLD 85	International Great Lakes Datum of 1985
IJC	International Joint Commission
ITIC	International Tsunami Information Center
HAZMAT	Hazardous Materials Response and Assessment Division
HWI	High Water Interval
LAT	Lowest Astronomical Tide
LHW	Lower High Water
LLW	Lower Low Water
LLWD	Lower Low Water Datum

LW	Low Water
LWD	Low Water Datum
LWI	Low Water Interval
MHW	Mean High Water
MHHW	Mean Higher High Water
MHHWL	Mean Higher High Water Line
MHWL	Mean High Water Line
MHWS	Mean High Water Springs
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MLLWL	Mean Lower Low Water Line
MLWL	Mean Low Water Line
MLWS	Mean Low Water Springs
MMS	Minerals Management Service
Mn	Mean Range of Tide
MSL	Mean Sea Level
MTL	Mean Tide Level
NAD27	North American Datum of 1927
NAD83	North American Datum of 1983
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act of 1969
NESDIS	National Environmental Satellite, Data and Information Service
NFIP	National Flood Insurance Program
NGS	National Geodetic Survey
NGWLMS	Next Generation Water Level Measurement System
NGVD 29	National Geodetic Vertical Datum of 1929
NIMA	National Imagery and Mapping Agency
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRC	National Research Council
NSRS	National Spatial Reference System
NTBMS	National Tidal Benchmark System
NTDE	National Tidal Datum Epoch
NWLON	National Water Level Observation Network
NWLP	National Water Level Program
NWS	National Weather Service
OAR	Office of Oceanic and Atmospheric Research
OCRM	Office of Ocean and Coastal Resource Management
OCS	Office of Coast Survey
ORR	Office of Response and Restoration
QC	Quality Control
PMEL	Pacific Marine Environmental Laboratory
PORTS	Physical Oceanographic Real-Time System
RAM	Random Access Memory
RTK	Real Time Kinematic GPS

RTU	Remote Terminal Unit
SFHA	Special Flood Hazard Areas
SOP	Standard Operating Procedure
USACE	U.S. Army Corps of Engineers
USC&GS	U.S. Coast and Geodetic Survey
USCG	U.S. Coast Guard
USC	U.S. Code
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
WGS84	World Geodetic System
YSI	Yellow Springs Instruments Corporation

1. INTRODUCTION

Purposes of Water Level Observations

Water level measurements are made by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service's (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) to serve the needs of the mariner, the engineer, the scientist, and the general public. This work began with the charting of coastal waters and the need to establish a uniform level, or datum plane, to which observed water depths could be referred, the soundings being taken at different water level stages or phases during hydrographic surveys. In addition to satisfying the charting requirements of NOS, water level measurements are made for the following purposes. The list is meant to be illustrative, not exhaustive. Some examples include:

- Real-time depth of water available in harbors, estuaries, and lakes. The mariner uses real-time water levels to estimate draft under keel while in transit.
- Determination mean sea level and other tidal datums for surveying and engineering purposes and to establish a system of tidal bench marks to which these datums can be referred, maintained, and recovered.
- Datum control of remote sensing (i.e. photogrammetry) surveys.
- Representation of the shoreline, defined as Mean High Water (MHW), on nautical charts.
- Datum control for dredging projects and coastal engineering projects.
- Data for production of tide and tidal current predictions.
- Investigation of variations of sea level and crustal movements of the earth.
- Information for special estuarine studies and numerical hydrodynamic models.
- Information for legal cases regarding marine boundaries — Private, State, Federal, and International.
- Data and datum reference for storm surge monitoring.
- Monitoring and datum reference for coastal wetland loss and restoration programs.

Tidal datums derived from water level measurements provide the salient points for baseline determinations of the offshore boundaries of State submerged lands at 3 nautical miles (nm) from Mean Low Water (MLW), the Territorial Sea and Contiguous Zone at 12 nm from Mean lower Low Water (MLLW)(the Territorial Sea and Contiguous Zone are coterminous in the U.S., but not necessarily so for other countries), and the Exclusive Economic Zone (EEZ), at 200 nm from MLLW. Beyond the EEZ lies international waters, often called the High Seas. (*NOAA Manual of Tide Observations, 1965; Shalowitz, 1962; Slade et al., 1997; U.S. Dept. Of State Dispatch Supplement, 1995*).

The most common boundaries are those defined by geological formations; including such features as mountain ridges, cliffs, rivers, and ocean shores. Geological features have the advantages of being easily recognizable by all parties concerned and are relatively permanent (*Hicks, 1980*). In recent times, series of artificial markers, parallels of latitude, meridians of longitude, and other lines recoverable by surveying techniques have been added covering the seas. However, these seemingly abstract offshore boundaries have their origins in the most logical of boundaries: the intersection of land and ocean.

Since the oceans (and continents) move up and down in both periodic and non-periodic motions, the location of the land-water intersection line moves up-the-shore-landward and down-the-shore-seaward as a function of time. If this intersection is to be used as a boundary (or the source of a boundary), it must be mathematically "fixed." The up-down motion of the water surface must also be mathematically fixed to obtain a reference for depths and depth contours on nautical charts and bathymetric maps; and, finally, a reference is needed for elevations of the predicted tide. A mathematically fixed elevation of the ocean surface at a particular phase of the tidal cycle is known as a tidal datum. It is determined by officially adopted definitions and procedures of the National Ocean Service (*Hicks, 1980*; *Federal Register, 1980*), and is recognized by the Department of State's Inter-Agency Task Force on the Law of the Sea (sometimes called the Baselines Committee).

For marine applications, a vertical datum is defined as a base elevation used as a reference from which to determine relative heights or depths. It is called a tidal datum when defined by a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements (*Marmer, 1951*). In order that they may be recovered when needed and be linked to land-fixed horizontal and vertical control points (e.g., geodetic datums), such datums are referenced to fixed points known as bench marks. The horizontal location of where a tidal datum intersects the land, at the exact elevation of the tidal datum, is usually called a "mark" or "line." For example, the horizontal location of the intersection of the tidal datum, MLLW, with land is called the Mean Lower Low Water Line, MLLWL. In legal terminology, this is sometimes called the "ordinary low water mark." Legal terminology is context specific and needs to be carefully understood before assigning it the value of a particular tidal datum. Indeed, different legal authorities, agencies, and international agreements have different terminology and methodologies associated with tidal datums. One of the goals of this report is to present the standard definitions of tidal datums adopted by NOS.

Report Purpose and Organization

The purpose of this report is to provide a general reference on the subject of tidal datums. This report explains, in brief, many topics — including the history of the NOS tides and water levels program, the domestic and international legal significance of the marine boundaries defined by tidal datums, the modern measurement program designed to support NOS's statutory authority, and the NOS products produced from the water level data. It also provides a discussion of the applications of tidal datums.

Chapter 2 discusses the general characteristics of the tides used in the determination of tidal datums. Chapter 3 discusses the history of the U.S. tidal program and the legal history and significance of tidal datums, respectively. Chapter 4 concerns a discussion of the National Water Level Program (NWLP), while Chapter 5 discusses the standard NOS analysis methods utilized to determine tidal datums. The output products produced from the NWLP are discussed in Chapter 6, and the applications of tidal datums are covered in Chapter 7. References, and Appendices follow. The publication ends with a glossary of terms appropriate for tidal datums. This companion glossary is an abridged edition of *Hicks (1989).* The full glossary is available on the internet at http://co-ops.nos.noaa.gov.

2. TIDAL OVERVIEW

Characteristics of the Tides

The word "tides" is a generic term used to define the alternating rise and fall of the oceans with respect to the land, produced by the gravitational attraction of the moon and sun. To a much smaller extent, tides also occur in large lakes, the atmosphere, and within the solid crust of the earth, also caused by the gravitational forces of the moon and sun. Additional non-astronomical factors such as configuration of the coastline, local depth of the water, ocean-floor topography, and other hydrographic and meteorological influences may play an important role in altering the range of tide, the times of arrival of the tides, and the time interval between high and low water. There are three basic types of tides: semidiurnal (semi-daily), mixed, and diurnal (daily).

The first type, semidiurnal (Figure 1, top), has two high waters (high tides) and two low waters (low tides) each tidal day. A tidal day is the time of rotation of the Earth with respect to the Moon, and its mean value is approximately equal to 24.84 hours. In Figure 2, semidiurnal tides are illustrated by the marigrams at Boston, New York, Hampton Roads, and Savannah. Qualitatively, the two high waters for each tidal day must be almost equal in height. The two low waters of each tidal day also must be approximately equal in height. The second type, mixed (Figure 1, middle), is similar to the semidiurnal except that the two high waters and the two low waters of each tidal day have marked differences in their heights. When there are differences in the heights of the two high waters, they are designated as higher high water and lower high water; when there are differences in the heights of the two lows, they are designated as higher low water and lower low water. In Figures 2 and 3, mixed-type tides are illustrated by the marigrams at Key West, San Francisco, Seattle, Ketchican, and Dutch Harbor. The third type, diurnal (Figure 1, bottom), has one high water and one low water each tidal day. In Figure 2, the marigram at Pensacola illustrates a diurnal tide.

The most important modulations of the tides are those associated with the phases of the moon relative to the sun (Figure 4). Spring tides are tides occurring at the time of the new and full moon. These are the tides of the greatest amplitude, meaning the highest and lowest waters are recorded at these times. Neap tides are tides occurring approximately midway between the time of new and full moon. The neap tidal range is usually 10 to 30 percent less than the mean tidal range. In addition to spring and neap tides, there are lesser, but significant monthly modulations due to the elliptical orbit of the moon about the earth (perigee and apogee) and yearly modulations due to the elliptical orbit the earth about the sun (perihelion and aphelion). Modulations in mixed and diurnal tides are especially sensitive to the monthly north and south declinations of the moon relative to the earth's equator (tropic tides and equatorial tides) and to the yearly north and south declinations of the sun(equinoxes and solstices).

There is another important longer period modulation in the amplitude of the tide due to orbital paths of the earth and moon. The apparent path of the Earth about the Sun, as seen from the Sun, is called the ecliptic. This path may be represented on a globe of the Earth by drawing a great circle about the Earth which makes an angle of $23^{o}\ 27'$ relative to the Earth's equator (Figure 5). Likewise, the apparent path of the moon about the sun may be referenced to the ecliptic, such that the moon's path about the sun makes an angle of 5° with respect to the ecliptic. When the moon's ascending node corresponds to the vernal (i.e., spring) equinox (the equinoxes are the two times of the year,

March 21 and September 23, when the sun crosses the earth's equator, and day and night have the same length), the angle of the path of the moon about the sun is about 28.5° (Schureman, 1941). When the moon's descending node corresponds to the vernal equinox, the angle of the moon's path about the sun is about 18.5° . This variation in the path of the moon about the sun has a period of about 18.6 years, and is called the regression of the moon's nodes. The regression of the nodes introduces an important variation into the amplitude of the annual mean range of the tide, as may be seen in Figure 6. It is the regression of the moon's nodes which forms the basis of the definition of the National Tidal Datum Epoch (NTDE) (see Chapter 6). Figure 6 also shows the monthly mean range which is due to seasonal and meteorological effects. Because the variability of the monthly mean range is larger than that due to the regression of the nodes, the NTDE is defined as an even 19-year period to obtain closure on a calendar year so as not to bias the estimate of the tidal datum.

Although the astronomical influences of the moon and sun upon the earth would seem to imply a uniformity in the tide, the type of tide can vary both with time at a single location (Figures 2 and 3) and in distance along the coast (Figure 7). The transition from one type to another is usually gradual either temporally or spatially, resulting in hybrid or transition tides. A good example in Figure 2 is Galveston which transitions from diurnal to semidiurnal to mixed. Key West (Figure 2) transitions from mixed to semidiurnal to mixed. Dutch Harbor (Figure 3) shows similar transitions. Figure 7 shows the gradual spatial transitions from mixed to diurnal to mixed and back to diurnal.

Photocopies of the NOAA pamphlet *Our Restless Tides* presents a layman's overview of tide producing forces and tidal observations and is available from CO-OPS.

DISTRIBUTION OF TIDAL PHASE

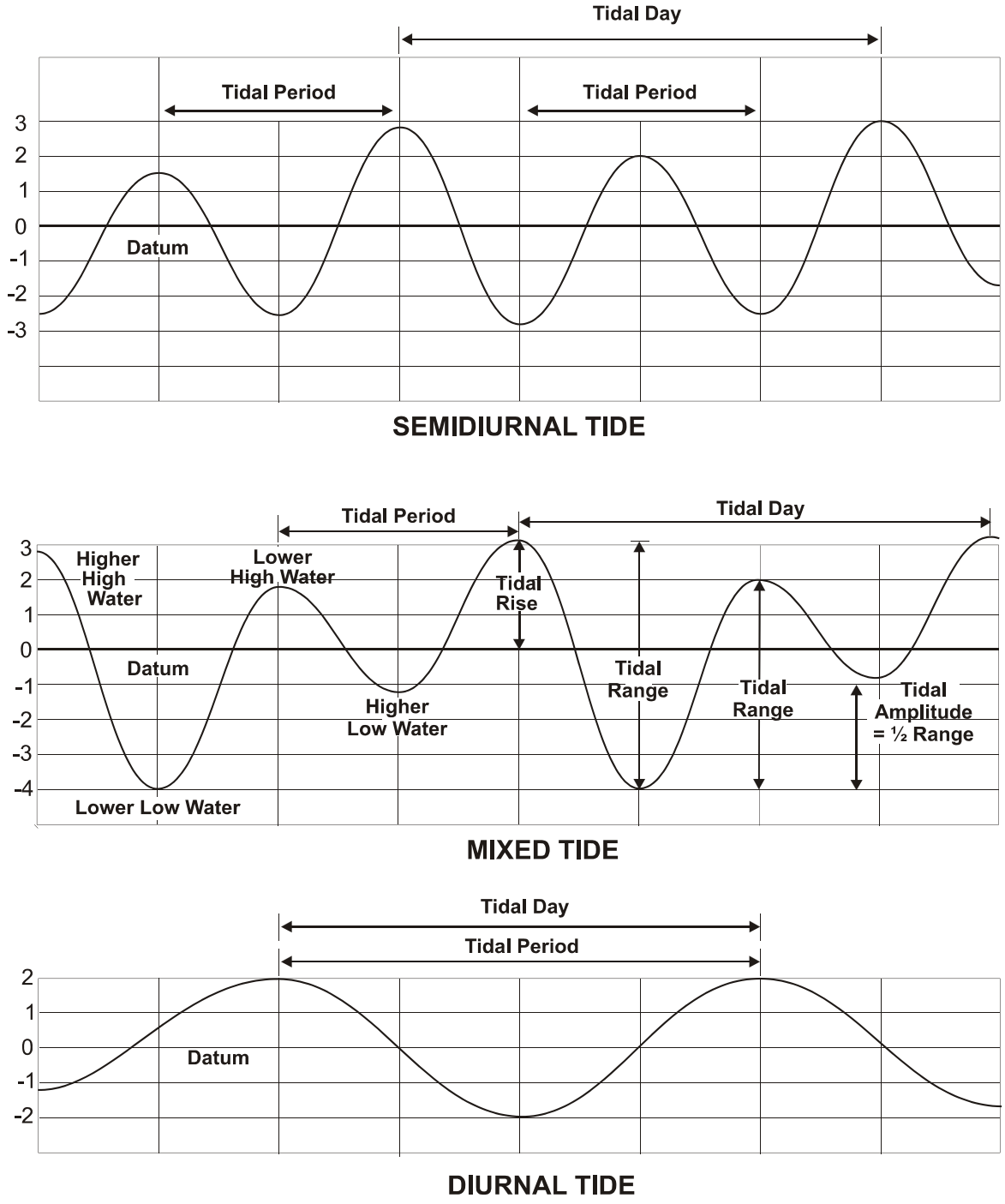


Figure 1. A depiction of the three primary kinds of tides. From the top panel downward they are semidiurnal, mixed, and diurnal. Standard tidal terminology is used to describe the various aspects of the tides. The zero on these graphs is illustrative of the relationship of the tides to Mean Sea Level (MSL).

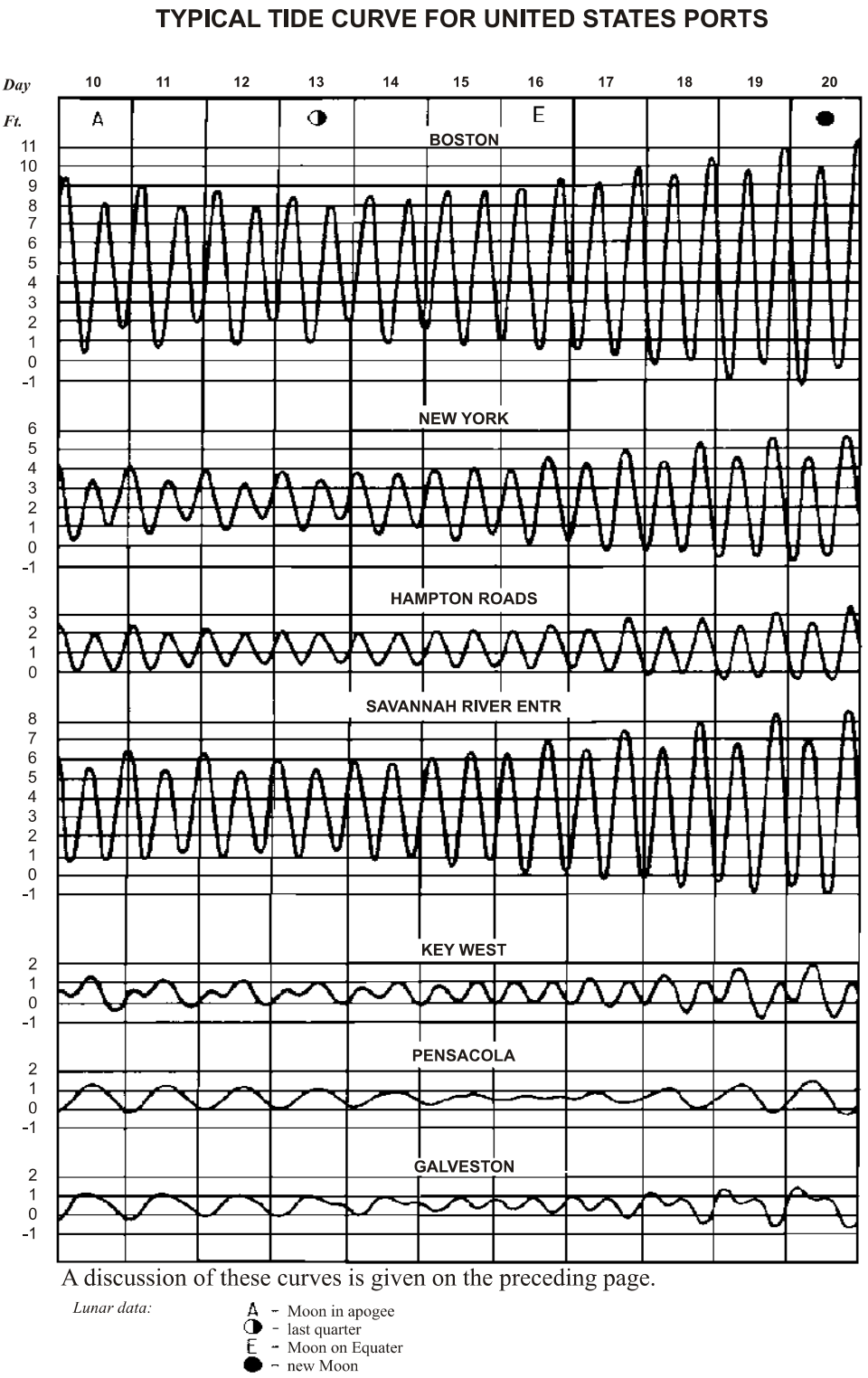


Figure 2. Characteristic tide curves near port facilities along the U.S. East and Gulf Coasts. The tides depicted are primarily semidiurnal along the East Coast. The tides at Pensacola are primarily diurnal. The effects of the phases of the moon are also illustrated. The elevations in feet of the tide are referenced to the tidal datum mean lower low water.

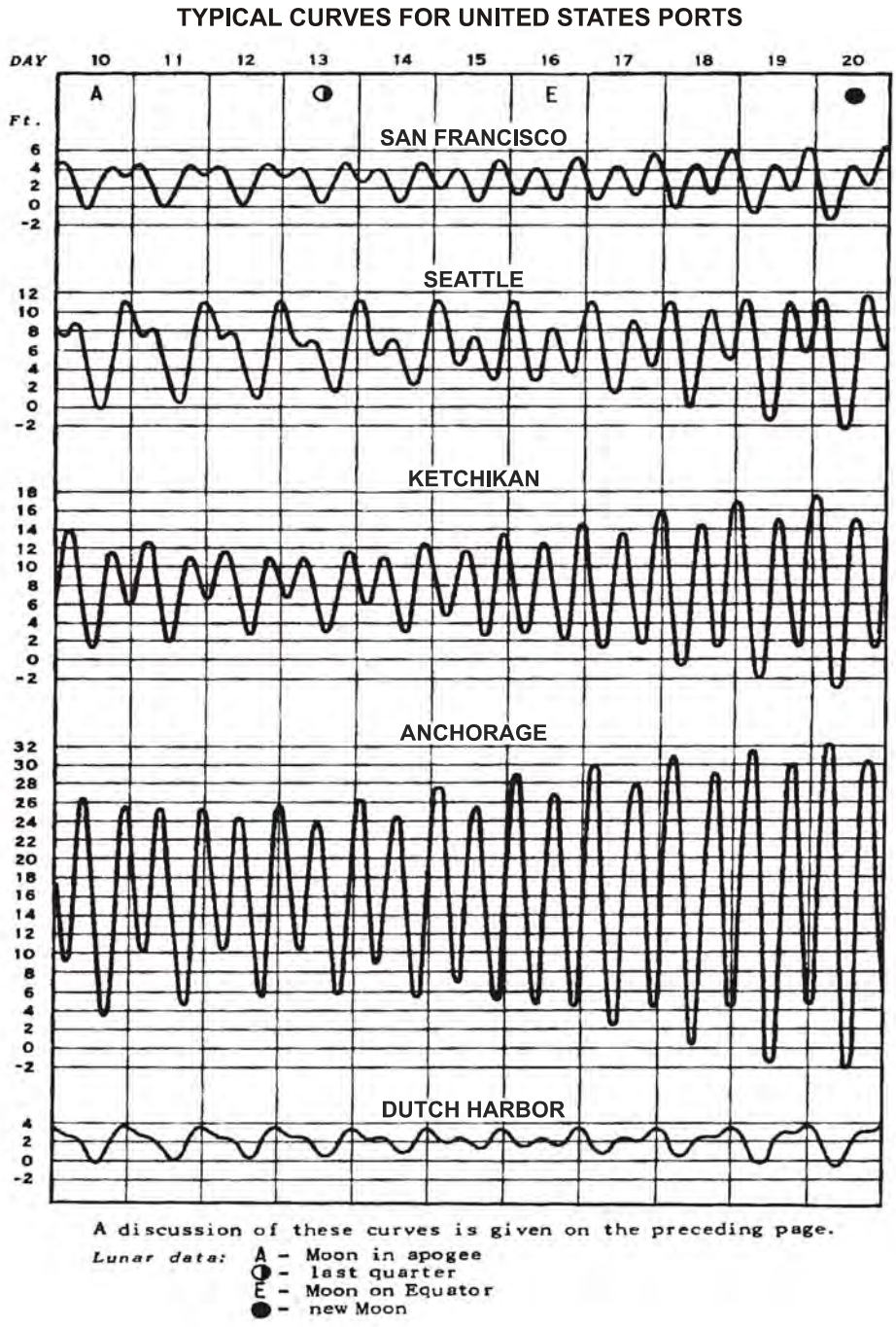


Figure 3. Characteristic tide curves for the West Coast. The tides depicted are primarily mixed. The tidal range at Anchorage is relatively large. The effects of the phases of the moon are also illustrated. The elevations in feet of the tide are referenced to the tidal datum, mean lower low water.

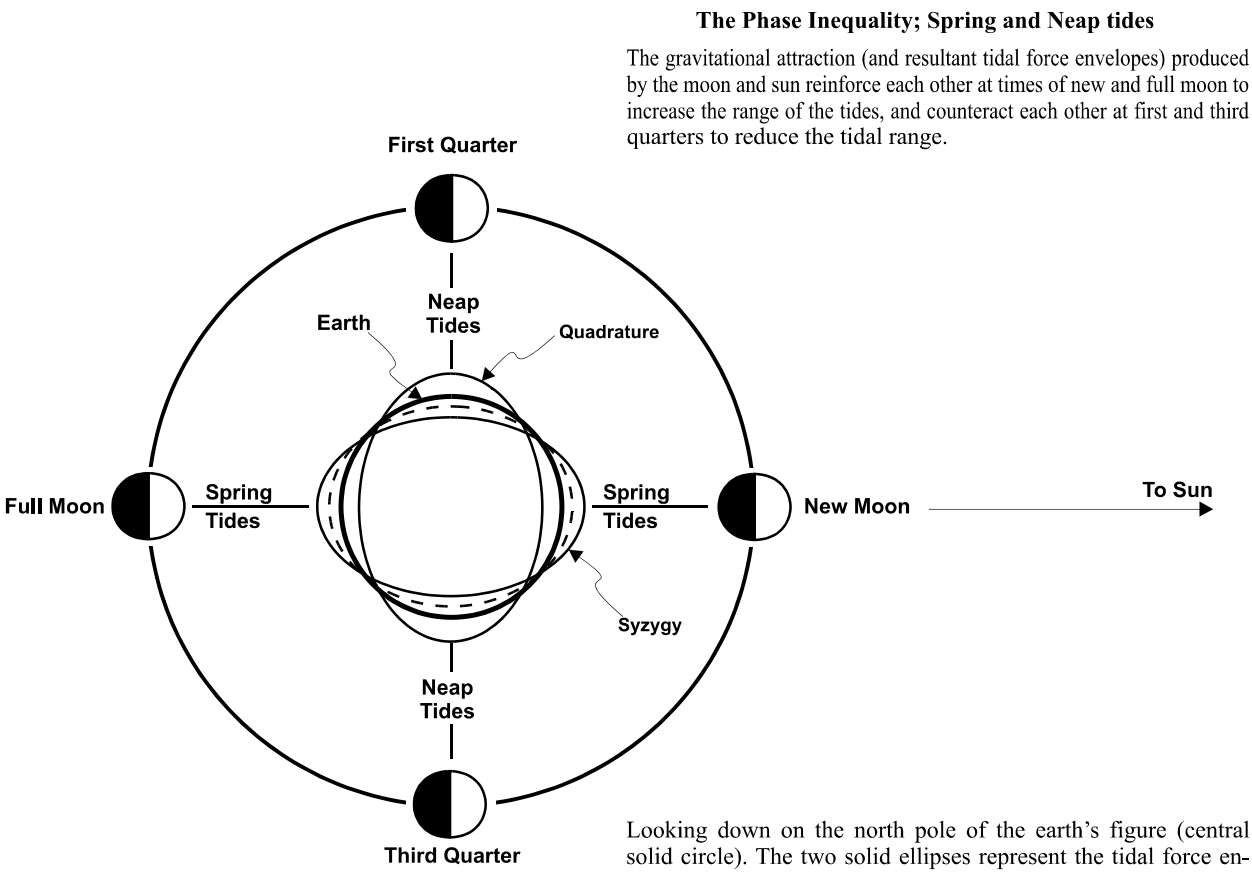
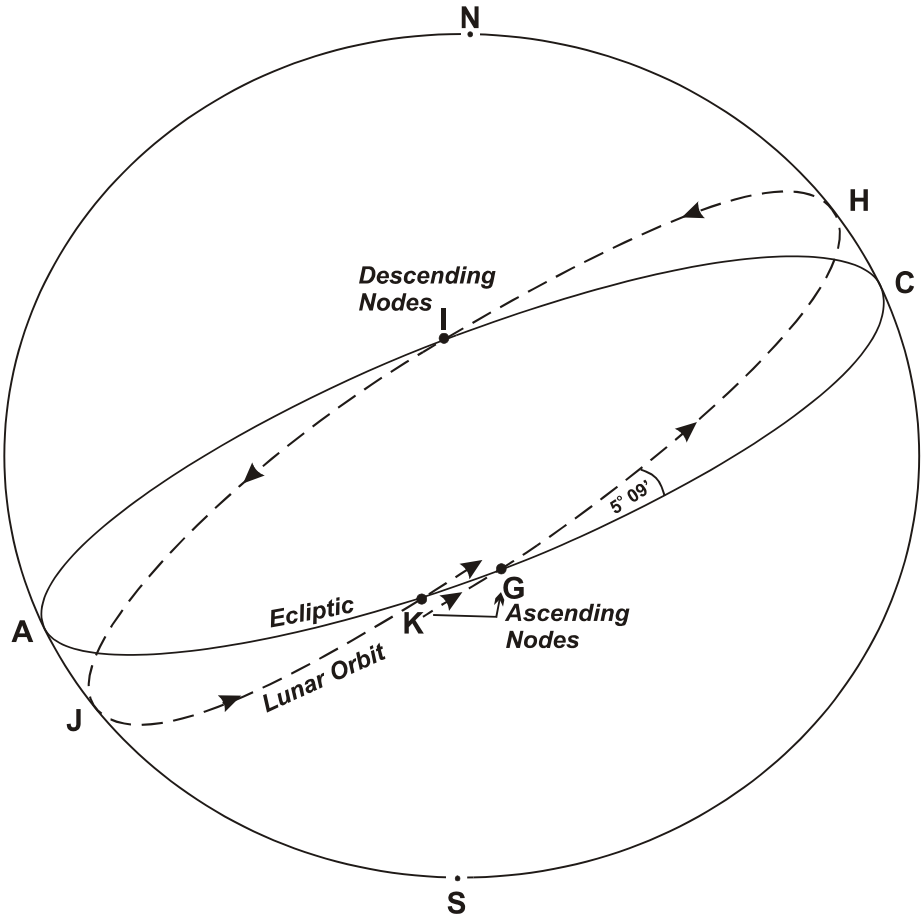


Figure 4. An illustration of solar and lunar tide producing forces. The largest tides, spring tides, are produced at new and full moon. The smallest tides, neap tides, occur during the first and third quarters of the moon.



Motion of the moon's nodes. The points where the moon's path crosses the ecliptic are called nodes; the point where the moon crosses the ecliptic from south to north at *G* is called the ascending node, while I is called the descending node. The moon's orbit from the ascending node G to the next ascending node K takes *27.2122* mean solar days (the Draconitic Period). Measured relative to a fixed star the moon takes *27.3216* mean solar days to complete its orbit (the Sidereal Period). The movement of the nodes westwards along the ecliptic is called the regression of the nodes; it is analogous to the precession of the equinoxes along the equator but is much faster, having a period of *18.61* years. This is equivalent to *27.3216-27.2122=0.1094* days per orbit; in the diagram it is represented by the distance KG.

Figure 5. A diagram illustrating the regression of the moon's nodes.

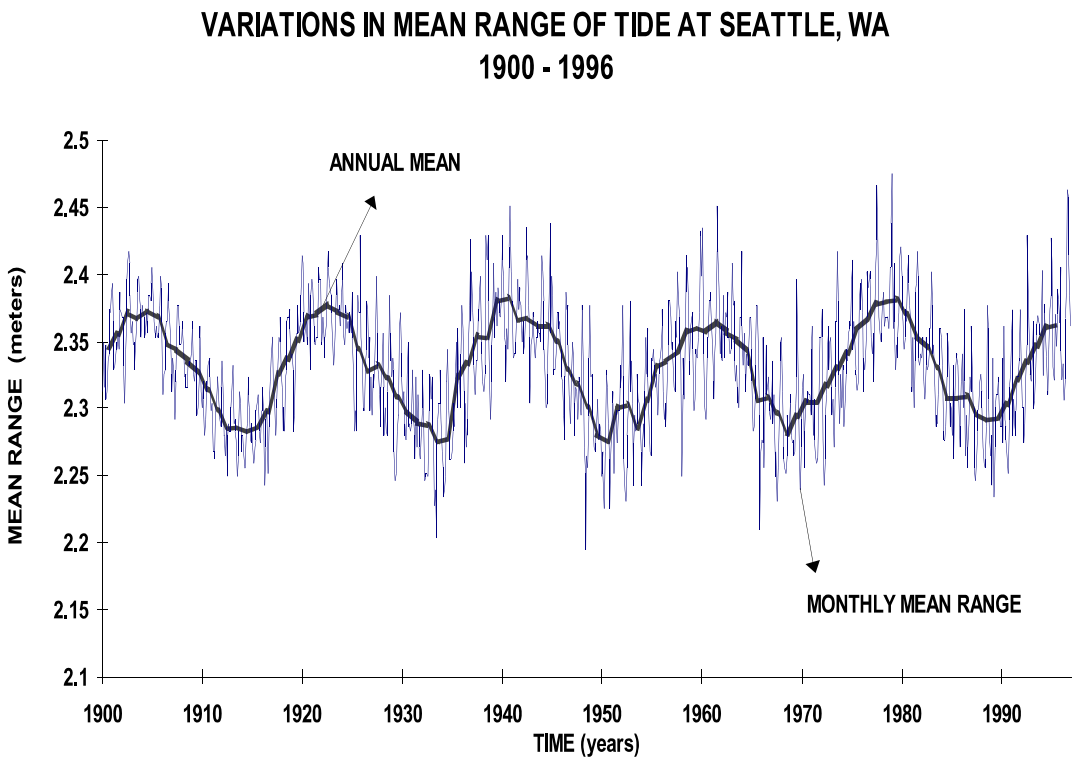


Figure 6. An illustration of the effect of the regression of the moon's nodes on the water levels at Puget Sound, WA. The heavy black curve is the annual mean range, or the difference in height between mean high water and mean low water. The time elapsed between trough to trough, or peak to peak, is the period of oscillation of the regression, and is about 18.6 years.

Tidal Analysis and Predictions

The routine prediction of tides is based upon a simple principle that for a linear system whose forcing can be decomposed into a sum of harmonic terms of known frequency (or period), the response can also be represented by a sum of harmonics having the same frequencies (or periods) but with different amplitudes and phases from the forcing. The tides are basically such a system (*e.g., Schureman, 1941*), due to their astronomical cycles imposed by the motions of the earth, sun, and moon. However, the system is not truly linear, and, in making tidal predictions, sums, differences, and harmonics of forcing frequencies are considered to approximately incorporate nonlinear effects (e.g., *Schureman, 1941*). For the open coastal regions, the tidal prediction capability requires only prior observations of the tides at the location of interest over a suitable period of time from which the amplitudes and phases of the major harmonic constituents can be ascertained by tidal analysis. For tide prediction reference stations, NOS generally uses a minimum one year of hourly water level observations to compute the semi-diurnal and diurnal tidal frequencies and a separate analysis of several years of monthly mean sea levels to compute the solar annual and solar semiannual, S_a and S_{sa}, terms. Resolving S_a and S_{sa} may require on the order of 10 years of water level data (*Scherer, 1990*). Typically, NOS uses up to 37 amplitudes and phases for important periods (period= 1/frequency) required to reconstitute a tidal signal.

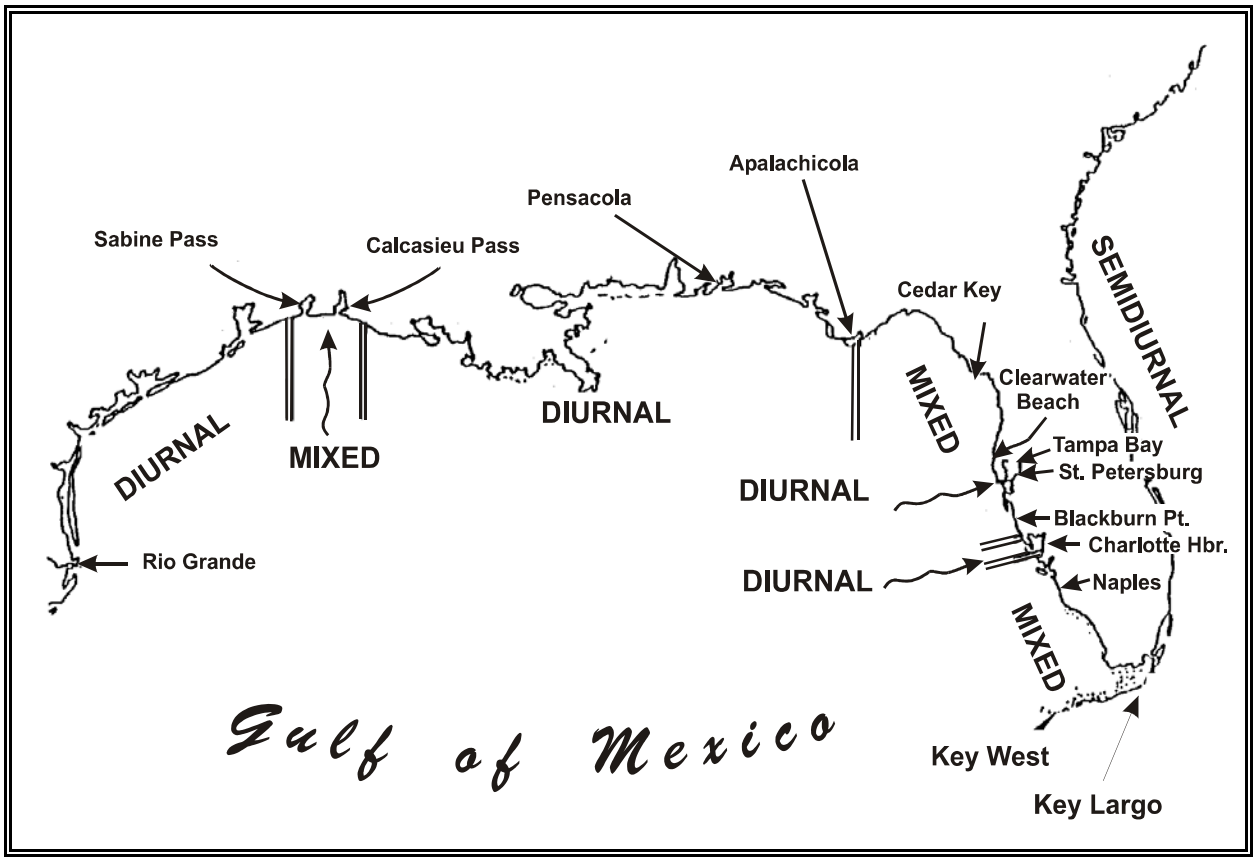


Figure 7. An illustration of the spatial variability of the type of tide in the Gulf of Mexico.

Harmonic Constituents

The component tides are usually referred to as harmonic constituents. The principal harmonic constituents of the tide (*e.g., Schureman, 1941*) are illustrated in Table 1.

Table 1. Principle harmonic constituents of the tides.

Species and name	**Symbol**	**Period Solar hours**	**Relative Size**
Semi-diurnal:			
Principal lunar	M_2	12.42	100
Principal solar	S_2	12.00	47
Larger lunar elliptic	N_2	12.66	19
Luni-solar semi-diurnal	K_2	11.97	13
Diurnal:			
Luni-solar diurnal	K_1	23.93	58
Principle lunar diurnal	O_1	25.82	42
Principle solar diurnal	P_1	24.07	19
Larger lunar elliptic	Q_1	26.87	8
Long period:			
Lunar fortnightly	M_f	327.9	17
Lunar monthly	M_m	661.3	9
Solar semi-annual	S_{sa}	4383	8
Solar annual	S_a	8766	1

The "relative size" column in Table 1 represents values from equilibrium theory presented by *Schureman* (1941) in his Table 2, expressed as a percent of M_2. Equilibrium theory assumes that the earth is totally water covered and does not consider frictional effects on tidal water motions. It is a simplified method to describe mass tidal characteristics. In addition, *Schureman's* Table 14 presents information on the effect of the longitude of the moon's node. His Table 14 shows that each of the above coefficients are gradually modulated over an 18.6 year cycle, and provides a coefficient which is a function of the year and multiplies the above coefficients to account for the regression of the nodes. The use of the constituents $(M, S, N, K)_2$, $(K,O,P)_1$, qualitatively illustrated in Figure 8, will generally be sufficient to predict the astronomical tide signal to about 90% at tide stations exposed to open ocean conditions. The difference between the astronomical tide signal and the water level measurements is generally attributable to the effects of local meteorological conditions. However, at different locations different constituents dominate, each site is different, and the relative size values from Table 1 above should not be used indiscriminately.

TIDAL PREDICTIONS

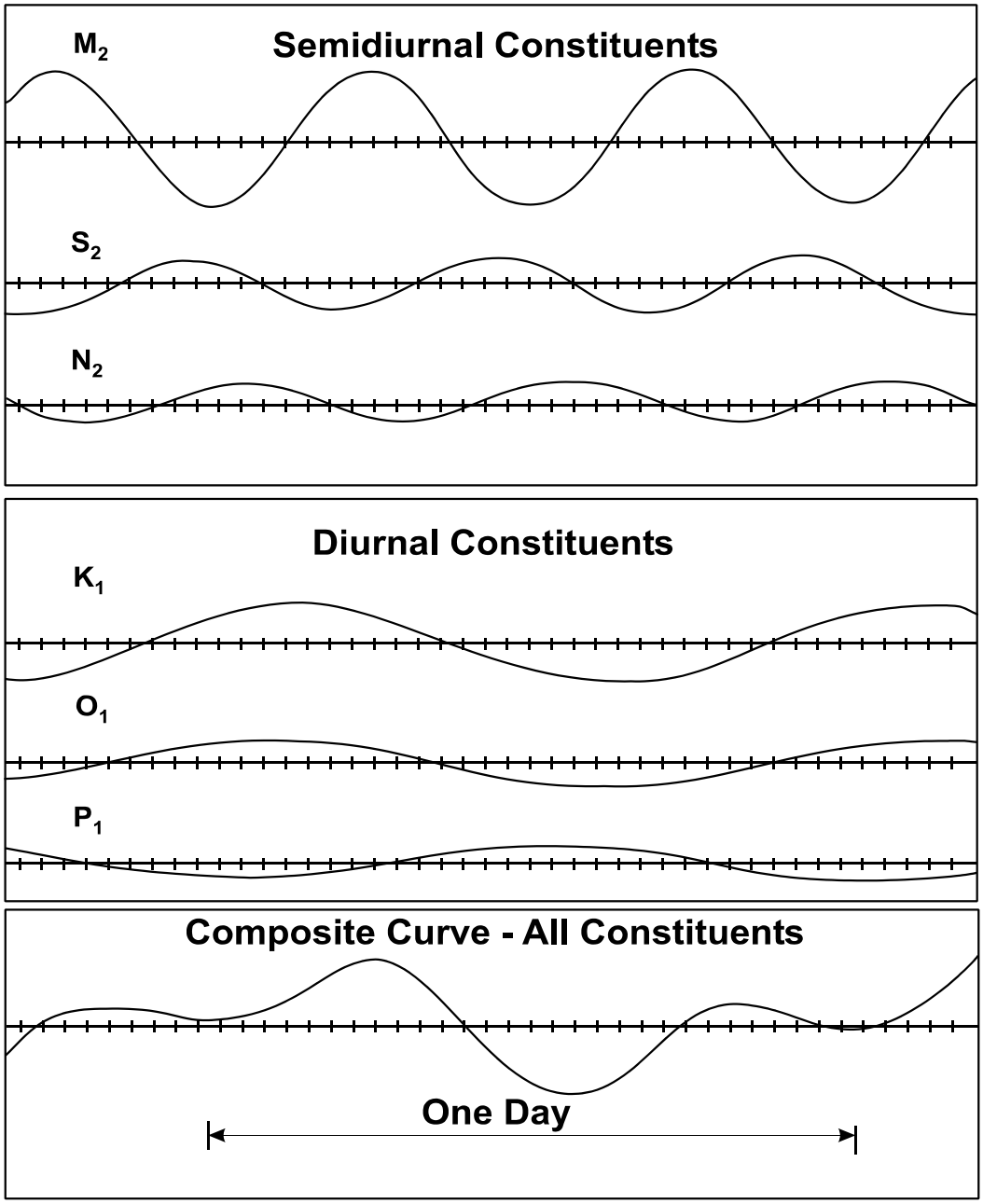


Figure 8. An illustration of the principle harmonic constituents of the tides. The periods and relative sizes of the constituents from Table 1 are suggested. The bottom panel qualitatively illustrates the result of summing the constituents to reconstruct the astronomical tidal component of water level measurements.

Other Signals in Water Level Measurements

Tides are not the only factor causing the sea surface height to change. Additional factors include waves and wind setup; ocean and river currents; ocean eddies; temperature and salinity of the ocean water; wind; barometric pressure; seiches; and relative sea level change. All of these factors are location dependent, and contribute various amounts to the height of the sea surface. Examples are: wind setup and seiche - up to about 1 meter (~3.2 feet); ocean eddies - up to about 25 centimeters (~0.8 foot); upper ocean water temperature - up to about 35 centimeters (~1.1 foot); ocean currents or ocean circulation - about 1 meter; and global sea level rise (about 0.3 meter (1 foot) per century).

Oceanographers, when determining tidal datums, use averaging techniques over a specific time period, the *tidal epoch* of 19 years. As mentioned, 19 years is used because it is the closest full year to the 18.6-year node cycle, the period required for the regression of the moon's nodes to complete a circuit of 360˚ of longitude (*Schureman, 1941*). Referring to Figure 1, the average of all the observed higher high waters over a specific 19 year period (i.e., a NDTE) is defined as the tidal datum *mean higher high water(MHHW)*. As suggested in Figure 1, MHHW will have a specific height, which is not necessarily equal to any higher high water observed during a given tidal day. The averaging technique defines a reference plane from which all the fluctuations in the sea level discussed here, except for global sea level change, have been removed. Thus, the policy of NOS is to consider a new tidal datum epoch every 20 to 25 years to appropriately update the tidal datums to account for the global sea level change and long-term vertical adjustment of the local landmass (e.g., due to subsidence or glacial rebound).

3. TIDAL DATUMS

A. Chronology from the 1800s to the Present

The NOS has had many names in the past. The organization was known as: The Survey of the Coast from its founding in 1807 to 1836, Coast Survey from 1836 to 1878, Coast and Geodetic Survey (USC&GS) from 1878 to 1970, National Ocean Survey from 1970 to 1982, and in 1982, it was named National Ocean Service. From 1965 to 1970, the Coast and Geodetic Survey was a component of the Environmental Science Services Administration (ESSA). The NOS is a component of the NOAA which became the successor to ESSA in 1970. The NOAA is a component of the U.S. Department of Commerce. See Appendix A, Table A1 for a detailed chronology of the significant events in the development of the products and instrumentation related to the analysis of tides and tidal datums by the NOS.

B. Legal History of Tidal Datums

Congress has conferred statutory responsibility to NOS. Congress legislated the task to survey the coast of the U.S. to predecessor agencies of NOS with subsequent legislation defining missions and responsibilities.

Other Federal agencies, such as the Department of Energy (DOE), the Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (USACE), the Department of the Interior's Minerals Management Service (MMS) and the Geological Survey (USGS), and NOAA's National Weather Service (NWS), recognize NOS' expertise in the computation of tidal datums and currently have or have had cooperative agreements with NOS to provide tidal datums. USACE and USGS also operate extensive water level observation networks, however, these agencies rely on NOS' expertise in tidal areas.

The pertinent legislation and statutory authority of NOS have evolved under these following key federal statutes in determining the federal role in regulatory, jurisdiction, and management functions in the coastal zone (*U.S. Department of Commerce Year of the Ocean Discussion Papers, 1998*). The Supreme Court rules on admiralty law cases in Territorial Seas, and also provides rulings on riparian rights, navigability, and the public trust doctrine. The Supreme Court has clarified legal terminology such as *ordinary mean high water* to have a precise scientific definition as a tidal datum (*Slade et al., 1997*). In addition, key federal authorities, treaties, and international agreements are summarized below (*Shalowitz, 1962, Graber, 1981; U.S. Department of State Dispatch Supplement, 1995; Slade et al., 1997; U.S. Department of Commerce Year of the Ocean Discussion Papers, 1998*).

C. Congressional Acts

Laws Relating to NOS Organic Authority

The following is a brief listing of laws which relate to NOS organic authority to measure tidal datums. The list is selective and is not intended to be comprehensive.

- **The Organic Act of Feb. 10, 1807 (2 Stat, 413)**

This act covered the founding of the Survey of the Coasts, in order "to cause a survey to be taken of the coast . . . for completing an accurate chart of every part of the coasts."

- **Appropriations Act of 1841**

This act included a "hydrographical survey of the northern and northwestern lakes. . . . ," now known as the Great Lakes.

- **Coast and Geodetic Survey Act, as amended, 33 U.S.C. §§ 883 a-k**

NOS is statutorily authorized, among other things, to collect, analyze and disseminate data on tides and water levels pursuant to 33 U.S.C. This act established the following NOS statutory authority :

33 U.S.C. 883a - Authorizes NOS to conduct hydrographic surveys; tide and current observations; and geomagnetic, seismological, gravity, and related geophysical measurements and investigations, and observations for the determination of latitude and longitude.

33 U.S.C. 883b - In order that full public benefit may be derived from the operations of NOS by the dissemination of data resulting from its authorized activities and of related data from other sources, Section 883b authorizes NOS to analyze and predict tide and current data; and process and publish data, information, compilations, and reports.

33 USC 883d - Authorizes NOS to conduct investigations and research in geophysical sciences, including oceanography, geodesy, seismology, and geomagnetism, to improve the efficiency of NOS and to increase engineering and scientific knowledge.

33 U.S.C. 883e - Authorizes NOS to enter into agreements with states for surveying and mapping.

- **Under the Submerged Lands Act of 1953 (43 U.S.C. §§ 1301 et seq.)**

Establishes title of the states to land beneath navigable waters up to but not above the line of Mean High Water and a distance seaward from the coast line of three nautical miles.

- **Outer Continental Shelf Lands Act of 1953 (43 U.S.C. §§ 1331 et seq.)**

To provide for the jurisdiction of the U.S. over submerged lands of the outer continental shelf. This act provides that the Secretary of the Interior shall administer the leases of mineral rights on the outer continental shelf.

- **Act of April 5, 1960 (74 Stat. 16)**

Amends Act of August 6, 1947 to remove geographical limitations on the activities of the Coast and Geodetic Survey, the predecessor organization to NOS.

- **Public Law 105-384 November 13, 1998 (112 Stat. 3451)**

Title III - NOAA Hydrographic Services Improvement Act of 1998 most recently addresses NOAA's role in acquiring tide and current observations in the context of providing hydrographic services to the nation and specifically authorizes appropriations: "is authorized for each fiscal year to implement and operate a national quality control system for real-time tide and current and maintain the national tide network, and . . . is authorized for each fiscal year to design and install real-time tide and current data measurement systems under Section 303(b)(4)."

Laws Relating to Present Regulatory Context

The following laws are important in the present regulatory context in which tidal datums control the jurisdiction of the act. The list is not intended to be comprehensive.

- **Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401 et seq.)**

In the navigable waters of the U.S., coastal construction, excavation, and filling must be proceeded by a permit from the U.S. Army Corps of Engineers. The act also prohibits the dumping of garbage and other substances into navigable waters.

- **Bridges over Navigable Waters (33 U.S.C. §§ 491 - 535)**

Bridges, dams, dikes or other forms of coastal construction are not allowed to interfere with navigable waters, except by permission from the Commandant of the Coast Guard.

- **Suits in Admiralty Act of 1920 (46 U.S.C. §§741-752)**

Under this act, the maritime public can sue the government for damages if negligence occurred during the preparation of charts and tables.

- **National Environmental Policy Act of 1969 (NEPA)**

This act is administered by the Environmental Protection Agency (EPA). This statute requires an environmental impact statement to be developed for "major Federal actions significantly affecting the quality of the human environment." The statements are to cover "(i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, and (iii) alternatives to the proposed action . . . "

- **Ports and Waterways Safety Act of 1972, as amended, (33 U.S.C. §§ 1221-1236)**

This act grants the Coast Guard regulatory authority over the movements of ships in hazardous areas or with hazardous cargoes, or in cases where adverse weather, poor visibility, and heavy vessel traffic affect the safety of operations. It also directs the Secretary of Transportation regulatory authority over ship design and maintenance for the purpose of protecting the marine environment.

- **Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. §§ 1251 et seq.)**

This act authorized the USACE to control the discharge of dredged materials in the coastal ocean. It prohibits the discharge of pollutants in either onshore or offshore vessels or facilities. It applies to the territorial sea and contiguous zone.

- **Marine Protection, Research and Sanctuaries Act of 1972, as amended, (16 U.S.C. §§ 1447 a-f)**

This act requires that a permit be issued prior to the dumping of any material in the territorial sea or contiguous zone. Depending upon the type of material, permits are either obtained from the Secretary of the Army or the Environmental Protection Agency.

- **Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 et seq.)**

Under this act, states are given an incentive to develop Coastal Zone Management Programs. The Office of Coastal Zone Management within NOAA administers the act. The act requires that policy be established on energy facilities, shoreline erosion, and beach access. In addition, the act specifies that states must catalog the coastal zones to be managed under the act, inventory the natural resources in these areas, and designate priorities for land and water use, and it places control on water use.

- **Deepwater Port Act of 1974 (33 U.S.C. §§ 1501 et seq.)**

A deepwater port is defined as "any fixed or floating manmade structures other than a vessel...located beyond the territorial sea of the U.S. and off the coast of the United States and which are used or intended for use as a port or terminal for loading or unloading and further handling of oil for transportation to any State..." The act prohibits the discharge of oil from a vessel within a safety zone established around a deepwater port, from a vessel that has received oil from another vessel at a deepwater port, or from a deepwater port. It imposes penalties and liability for violations.

- **Magnuson-Stevens Fisheries Conservation and Management Act of 1976 (16 U.S.C. §§ 1801-1883)**

Establishes a fisheries conservation zone (200 nautical miles) within which the United States assumes exclusive fisheries management authority. Measured from the low water line on largest scale chart. The law provides that fishing by a non-US vessel will not be authorized within the fishery conservation zone or for anadromous species or continental shelf fishery resources beyond that zone except under international fishery agreements and permits.

- **National Marine Sanctuaries Act (16 U.S.C. §§ 1431 et seq.)**

The Act establishes that the Secretary of Commerce may designate nationally significant areas as national marine sanctuaries. The national areas are selected on the basis of protection of national marine resources and habitats, scientific research and education of the public, tourism, and commercial and recreational fishing.

D. Supreme Court Decisions

The Supreme Court has shaped the legal context of the marine environment by its many decisions on navigable waters, marine boundaries, and the public trust doctrine. One of the most important decisions occurred in the 1936 case of *Borax, Ltd v. City of Los Angeles (Slade et al., 1997).* In this case, the Supreme Court recognized the importance of the averaging of all the high tides during the 19-year tidal datum epoch when determining the mean high tide line. Hence, the primary or first reduction datums computed by NOS must be computed for a specific 19-year lunar epoch. Similarly, the other principal tidal datums described later in this report must all be calculated over the specific tidal epoch.

E. National Agreement

National Tidal Datum Convention of 1980

The National Tidal Datum Convention of 1980 (*Federal Register, 1980; Hicks, 1980*), among other things, established a uniform system of tidal datums for all tidal waters in the U.S., its territories and trusts; and authorized the NOS definitions of mean high water, mean higher high water, mean low water, and mean lower low water as the official policy of the U.S. Government.

F. International Agreements

Boundary Waters Treaty of 1909

This act established the International Joint Commission (IJC) to manage and control the Great Lakes.

Convention on the Continental Shelf

In this convention, the phrase "continental shelf" is defined as "the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200m, or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas, to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands."

The convention gives the coastal nation exclusive sovereign rights over the continental shelf, subject to certain provisions to protect navigation, fishing and the conservation of living resources of the sea, "for the purpose of exploring it and exploiting its natural resources."

Convention on the Territorial Sea and the Contiguous Zone

This convention was adopted by the United Nations conference at Geneva 1958, establishing the sovereignty of the state beyond its land territory and internal waters "the normal baseline for measuring the breadth of the territorial sea is the low water line." The low water line according to U.S. policy is equivalent to the intersection of the tidal datum *mean low water* (MLW) with the coast (U.S. Department of State Dispatch, 1995). However, the Department of State's term "mean low water" refers to the NOS term Mean Lower Low Water. These conventions which are a part of the larger United Nations Law of the Sea Convention (U.S. Department of State Dispatch, 1995), will increasingly be relied upon as a legal framework for international treaties which concern

sovereignty, rights of passage and anchorage, seabed mining and exploration, fisheries management and conservation, and scientific research and exploration.

4. THE NATIONAL WATER LEVEL PROGRAM STANDARDS AND PROCEDURES

A. Water Level Stations

The NWLP provides unique water level and ancillary data sets and information to users in support of a wide variety of critical activities. A priority of the NWLP is to provide the basic data for the vertical, tidal datum control for the nation. The instrumentation of the NWLP consists of tide stations in a network called the National Water Level Observation Network (NWLON) and any short-term stations operating for special projects such as hydrographic surveys, photogrammetry, and USACE dredging activities. The NWLON is composed (as of 2000) of approximately 189 long-term stations distributed around the country and the world. Due to resource constraints and storm damage, not all stations are always operational. Alaska has 16 stations; Hawaii and Pacific Islands have 12 stations; the West Coast has 26 stations; the Gulf Coast and Caribbean have 31 stations; the East Coast has 55 stations; the Great Lakes have 49 stations (Figure 9).

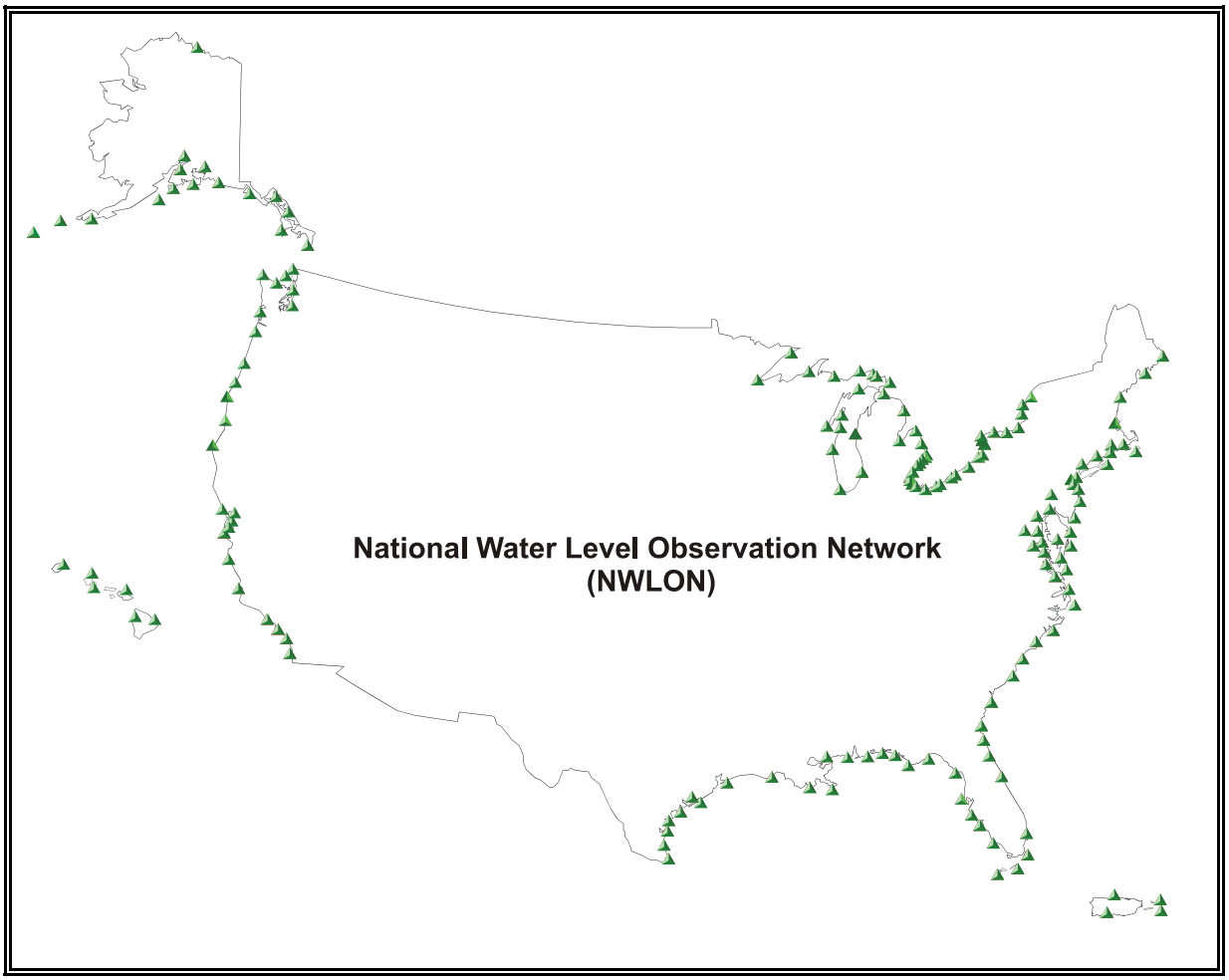


Figure 9. Locations of U.S. NWLON tide stations.

The programs supported by the NWLON include: real-time navigation safety, nautical charting, hydrography, photogrammetry, boundary determination, navigation products, channel dredging and harbor improvements, tsunami and storm surge warnings, tide predictions, environmental monitoring, global climate change, international lake level regulation, international treaty compliance, and international datum determination.

Additionally, the water level and geophysical data collected at these sites are frequently used to study the coastal environment, perform scientific studies of the dynamics of sea-level, and validate models of the geoid, tides, circulation, and satellite altimeter derived sea-surface height fields.

The locations of tide stations are organized into a hierarchy (Figure 10). Control (or primary) tide stations provide a continuously operating nationwide coarse network which is supplemented by denser networks of short-term operating secondary and tertiary networks necessary to provide total tidal datum coverage.

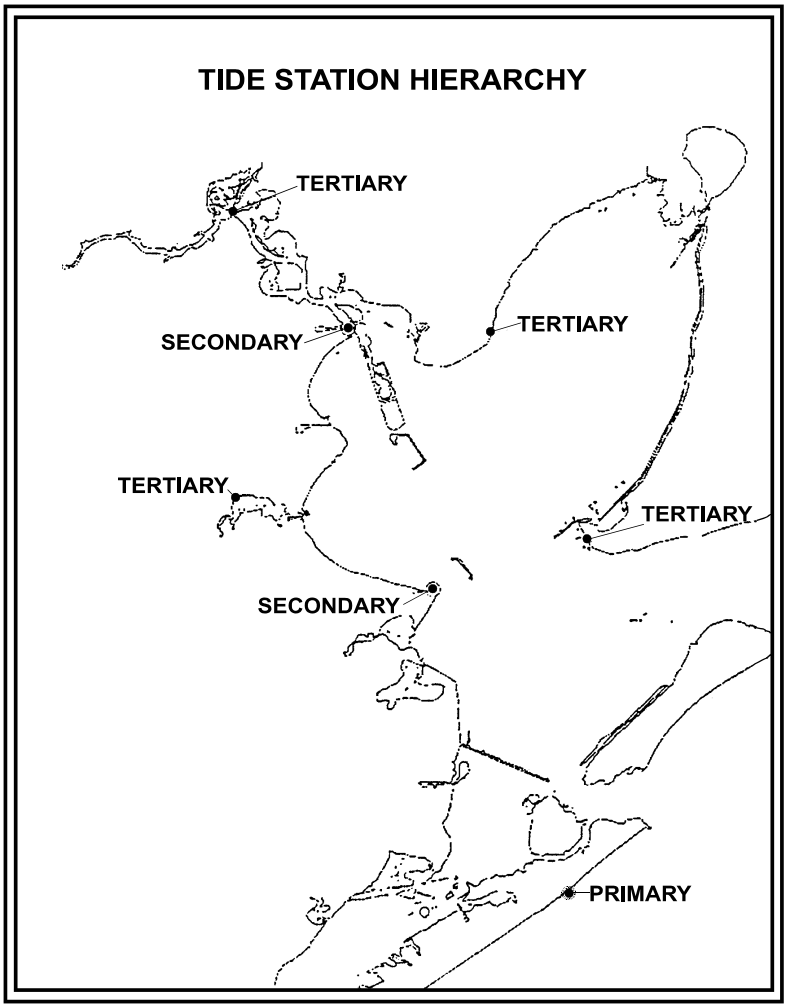


Figure 10. Illustration of tide station hierarchy.

Primary tide stations are generally those which have been operated for 19 or more years, are expected to continuously operate in the future, and are used to obtain a continuous record of the water levels in a locality. As the records from such a station constitute basic water level data for present and future use, the aim is to install and maintain the stations to obtain the highest degree of reliability and precision that is practical. This justifies detailed planning and site selection. The essential equipment of a control tide station includes an automatic water level sensor, protective well or sump well (as for Great Lakes stations), shelter, back-up water level sensor, ancillary geophysical instruments, and a system of bench marks.

Secondary water level stations are those which are operated for less than 19 years but for at least 1 year, and have a planned finite lifetime. Secondary tide stations are established for the purpose of obtaining general tidal information for a locality and also to obtain specific data for the reduction of soundings in connection with hydrographic surveys. Secondary stations also provide control in bays and estuaries where localized effects are not realized at the nearest control station. Observations at a secondary station are not usually sufficient for a precise independent determination of tidal datum, but when reduced by comparison with simultaneous observations at a suitable control tide station, very satisfactory results may be obtained.

Tertiary water level stations are those which are operated for more than a month but less than 1 year. Short-term water level measurement stations (secondary, tertiary, and seasonal) may have their data reduced to equivalent 19 year means through mathematical simultaneous comparison with a nearby control station. Short-term data, often at several locations, are collected routinely to support hydrographic surveying. In the Great Lakes, seasonal data are simultaneously compared to adjacent stations for datum determination in harbors.

The site selection criteria for tide stations include geographical and time-varying knowledge of the changes in Mean Tide Level (MTL) or MSL, changes in Mean Range of tide (Mn), and changes in time of tide. Additional factors are coverage of critical navigation areas and transitional zones, historical sites, proximity to the geodetic network, and the availability of existing structures, such as piers suitable for the location of the scientific equipment. Figure 11 is an example of the coverage of Chesapeake Bay, MD, where the tidal characteristics change rapidly. A control water level station is sited to provide datum control for national applications, and are sited in as many places as needed for datum control.

Site reconnaissance is performed prior to the installation of a new station. Field site visits are done to aid in the design, make measurements, and render technical drawings; to recover bench marks and/or plan for new bench marks; and to obtain permission, permits, agreements, etc. The field parties take into consideration the requirements for the installation and protection of the instruments. The most important considerations are the presence of a suitable structure, the necessary bench mark locations, adequate water depth, special materials that might be needed to prevent marine fouling and/or corrosion, availability of telephone and electrical service, site security, and lightening protection.

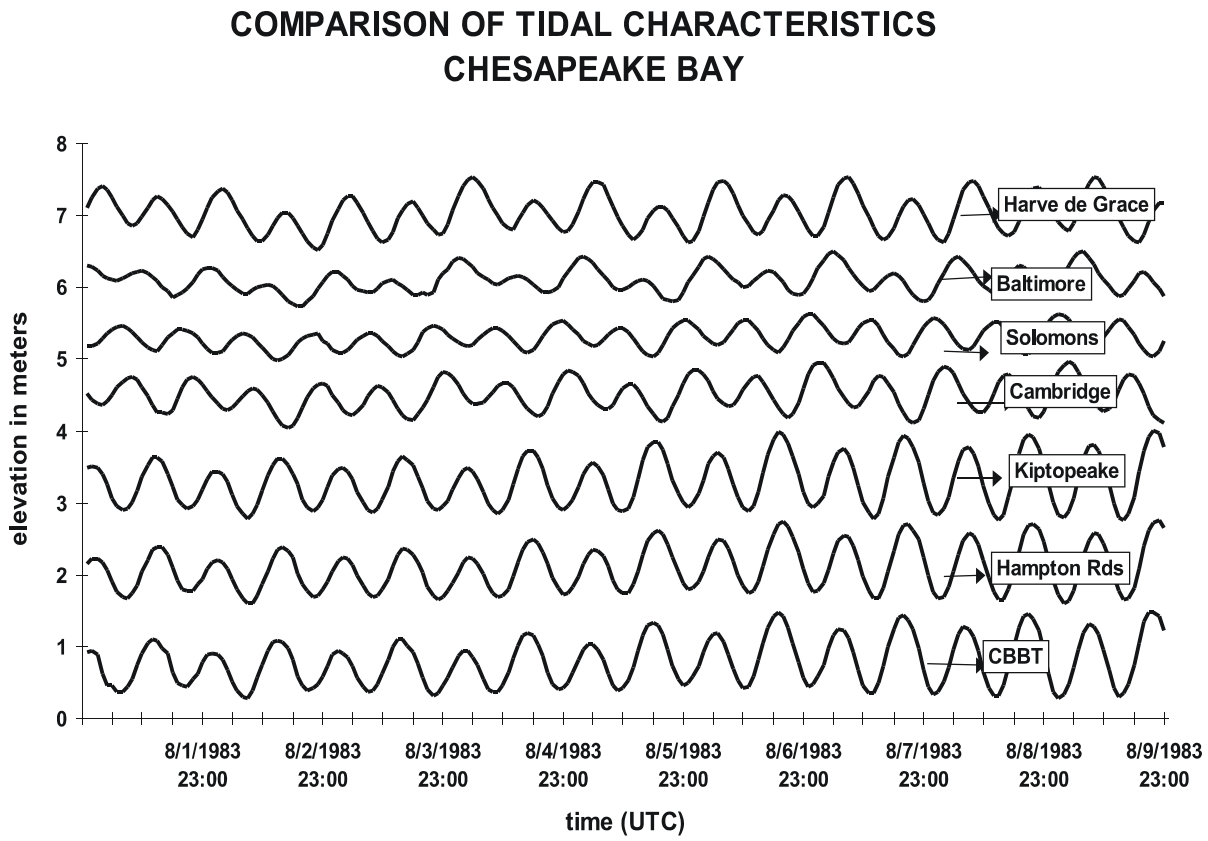


Figure 11. An illustration of the change in tidal characteristics as a function of location in Chesapeake Bay, MD.

B. Bench Marks and Differential Leveling

A bench mark is a fixed physical object or mark used as a reference for a vertical datum (Figure 12). A tidal bench mark is a mark near a tide station to which the tidal datums are referenced. A network of bench marks is an integral part of every water level measurement station. Since gauge measurements are related to the bench marks, it follows that the overall quality of datums is dependent on both the quality of the bench mark installation and the quality of the leveling between the bench marks and the gauge.

Bench marks have site selection considerations much like the tide stations they support. The first consideration is longevity; bench marks are sited to minimize susceptibility to damage or destruction. Bench marks are sited to ease future recovery (locating and leveling to the mark) and to ensure accessibility (open, overhead clearance). Bench marks must also be placed in the most stable structure for the locality. Preference should be given to disks set in bedrock, in large man-made structures with deep foundations, or set atop stainless steel rods driven to substantial resistance.

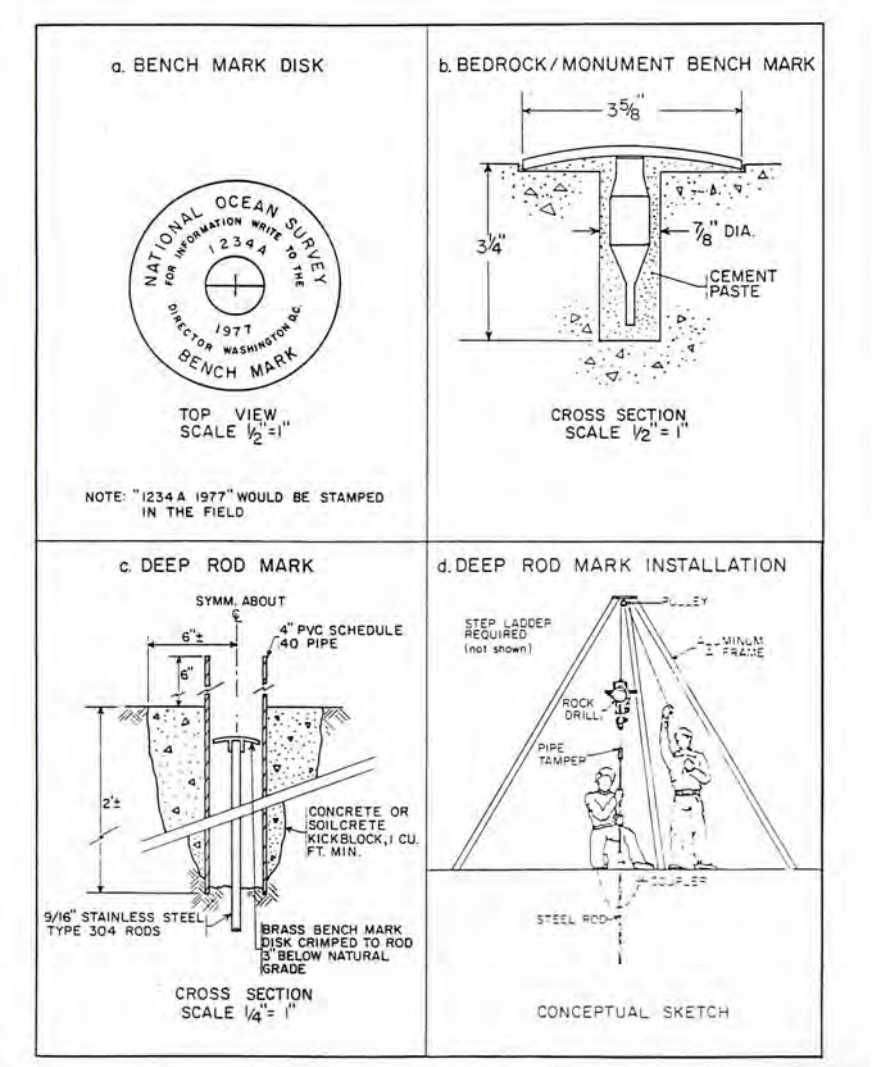


Figure 12. An illustration of an NOS bench mark and various installation methods.

Since bench marks are vulnerable to natural disturbances, such as geologic and soil activity, in addition to damage inflicted by man, more bench marks are installed around stations with longer term data series. At primary control stations, where 19 years of observations have been conducted or are planned, a network of 10 bench marks is installed in the vicinity of the station. Five bench marks are installed at secondary (1 year to less than 19 years) and tertiary (30 days to less than 1 year) stations. At least 3 bench marks are installed at short-term (less than 30 days) stations.

Differential levels (Figure 13) are used to check the elevation differences between bench marks, to extend vertical control, and to monitor the stability of the water level measurement gauge. The quality of leveling is a function of the procedures used, the sensitivity of the leveling instruments, the precision and accuracy of the rod, the attention given by surveyors, and the refinement of the computations.

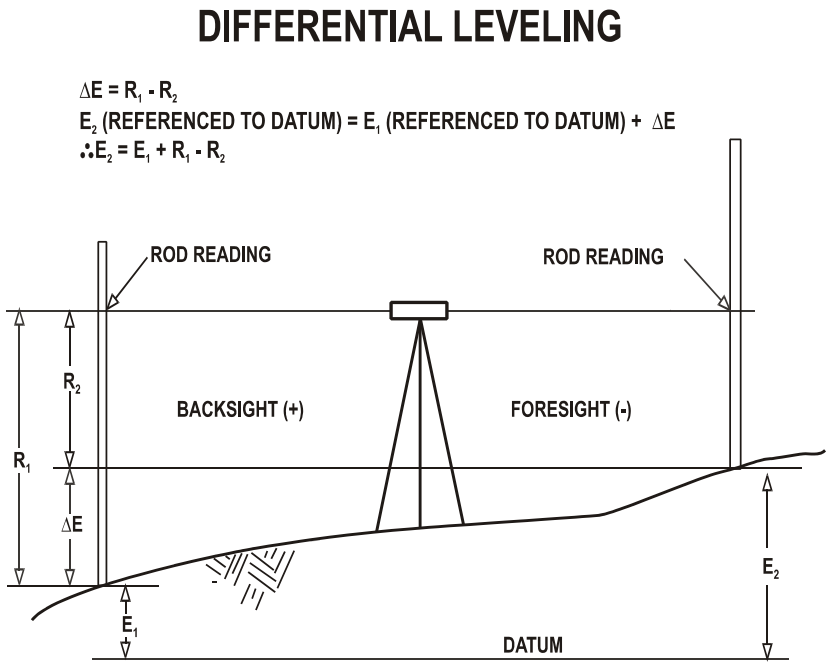


Figure 13. A schematic diagram of extending vertical control inland from the tidal datum by the method of differential leveling.

The User's Guide for the Installation of Bench Marks and Leveling Requirements for Water Level Stations (*Hicks et al., 1987*) provides detailed guidelines for bench mark installations and leveling. The Standards and Specifications for Geodetic Control Surveys includes interim Federal Geodetic Control Subcommittee specifications and procedures to incorporate electronic digital/barcode levels.

The National Tidal Benchmark System (NTBMS) provides datum information for previously and currently occupied tidal measurement locations. The number of stations in the NTBMS is approximately 6000. There are approximately 3000 along the U.S. East Coast, 500 installed on the Gulf Coast, 1000 along the West Coast, 1200 in Alaska, 150 in the Pacific Islands, and 177 around

the Great Lakes. Bench mark elevations may become invalid due to vertical movement of the structure or substrate or movement due to local construction. The established elevation of bench marks relative to tidal datums may also be invalidated by changes in local tidal characteristics due to dredging, erosion, and accretion. In many cases, bench marks in the NTBMS have not been releveled in many years, resulting in some uncertainty in their validity. At present, about 2000 stations have published values for bench mark elevations. An example of the bench mark elevation portion of a published bench mark sheet is shown in Figure 14.

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ALASKA 945 5760

NIKISKI, COOK INLET

Tidal datums at NIKISKI, COOK INLET are based on the following:

LENGTH OF SERIES	= 2 YEARS
TIME PERIOD	= January 1997 - December 1998
TIDAL EPOCH	= 1960-1978
CONTROL TIDE STATION	= SELDOVIA, COOK INLET (945 5500)

Elevations of tidal datums referred to mean lower low water (MLLW) are as follows:

HIGHEST OBSERVED WATER LEVEL (12/26/1976)	= 8.513 METERS
MEAN HIGHER HIGH WATER (MHHW)	= 6.239 METERS
MEAN HIGH WATER (MHW)	= 6.026 METERS
MEAN SEA LEVEL (MSL)	= 3.427 METERS
MEAN TIDE LEVEL (MTL)	= 3.330 METERS
*NORTH AMERICAN VERTICAL DATUM-1988 (NAVD)	= 2.088 METERS
MEAN LOW WATER (MLW)	= 0.634 METERS
MEAN LOWER LOW WATER (MLLW)	= 0.000 METERS
LOWEST OBSERVED WATER LEVEL (01/29/1979)	= -1.545 METERS

Bench mark elevation information:

	ELEVATION IN METERS ABOVE:	
BENCH MARK STAMP/DESIGNATION	MLLW	MHW
5760 K 1978	12.583	6.557
5760 L 1983	12.695	6.669
5760 M 1983	13.049	7.023
5760 N 1983	26.212	20.186
NIK 1964	11.090	5.064
NIKISKI 2	15.574	9.548
NIKISKI 3	34.642	28.616
NO 7 1973	35.746	29.720
NO 8 1973	33.451	27.425
NO 9 1973	35.736	29.710

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Figure14. A sample of a page from a published bench mark sheet for Nikiski, AK. This page illustrates information pertaining to tidal datums and vertical control. Note that for this station, the tidal datums were computed from a secondary reduction, the control station is indicated, and elevations of the tidal datums are relative to MLLW.

Bench marks are leveled by either a compensator leveling instrument or by an electronic digital/barcode system. Compensator-type leveling instruments require double running. However, under certain circumstances, electronic digital/barcode systems allow for single running. Bench marks are leveled whenever a new tide station is established or when data collection is discontinued at a tide station. Bench marks are also leveled before and after maintenance is performed at a station, and at least annually to perform stability checks. In addition, whenever new bench marks are installed, the existing bench marks are re-leveled.

The Global Positioning System (GPS) is emerging as a global vertical measurement system (*Milbert, 1995*). The NOS National Geodetic Survey (NGS) is implementing GPS into operations and is developing a nationwide Continuously Operating Reference System (CORS). GPS is being used to measure vertical crustal motion at water level stations at certain test sites. Differential GPS connection of bench marks (i.e., determination of ellipsoidal height of bench marks) enables the seamless integration of tidal datums with geodetic heights measured by GPS (*e.g., DeLoach, 1995; Wells et al., 1996; Defense Hydrographic Initiative, 1996*). Presently, work is underway to investigate using GPS to minimize the number of bench marks at each station, to provide tidal datums relative to the ellipsoid to facilitate standardization with a future "global" datum, and to better assess localized land movement as opposed to bench mark instability. These efforts will also facilitate understanding of the slopes or differences between tidal datums in different locations. NOS is also investigating the use of Real-Time Kinematic (RTK) GPS in hydrographic surveying, assuming that the relationship between Chart Datum (MLLW) and the ellipsoid is known.

C. Collection of Observations

Due to physical and environmental complexities, including spatial and temporal variability and severe environments in coastal zones, sophisticated instruments are necessary to measure instantaneous water levels, tides, storm surges, tsunamis, and long-term sea level trends. These instrument suites must be very accurate and reliable.

In past years, water levels were measured using float and wire sensors housed in stilling wells, first with analog strip chart mechanical gauges and later with punched-paper-tape to analog digital recorder (ADR) conventional tide gauges (*e.g., Schureman, 1941)*. Tide observers and tide staffs were used to connect the measurements to the local bench mark networks. This technology was suitable for most traditional monitoring requirements for surveying and mapping, however present instrumentation and computer technologies used by NOS enable more accurate, flexible, and automated tide gauge systems to be applied towards eliminating the sources of uncertainty in measurement that the older systems exhibited and towards the emerging programmatic real-time automated needs of NOAA programs (NRC, 1986). A more accurate system of measurement also supports the requirement of the long term measurements to estimate relative sea level trends with amplitudes of a few millimeters.

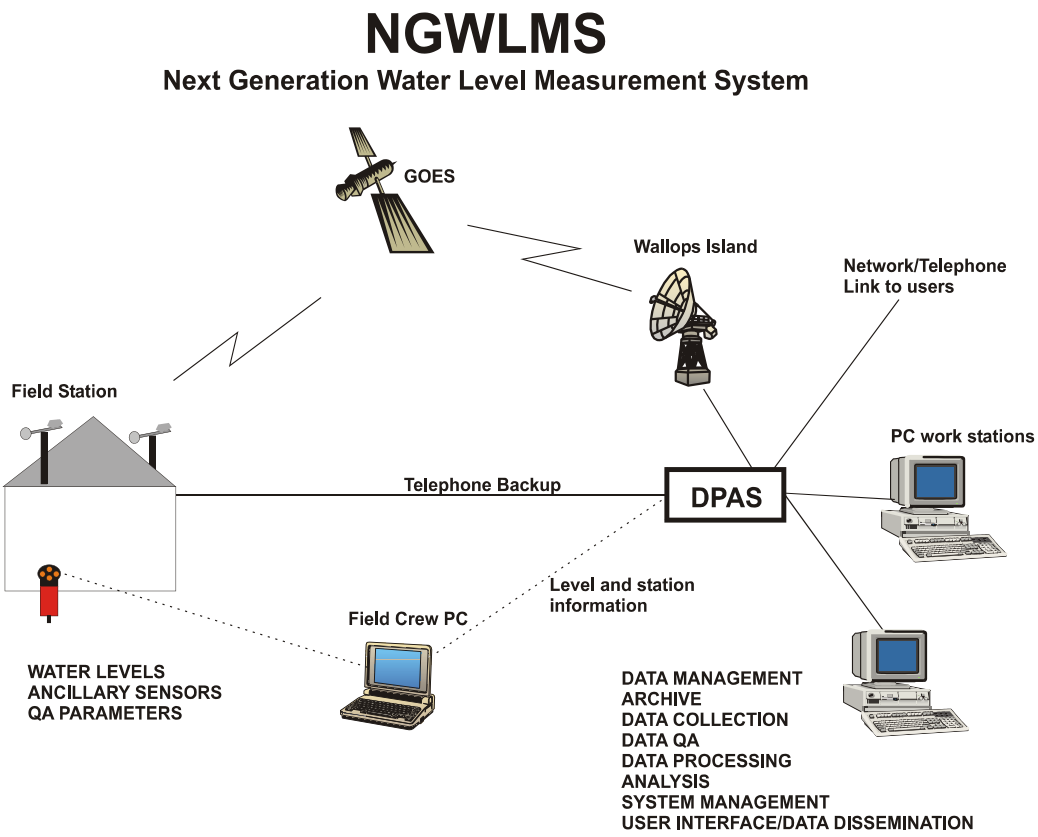

Figure 15. A schematic diagram of the main systems associated with NGWLMS.

The NWLON Station and Its Equipment

Present water level stations use modern sensor technology (*NRC, 1986*), improved instruments, digital recording, satellite communication, modern database programming and management techniques, and additional geophysical instruments (Figure 15). Many stations also measure wind speed and direction, barometric pressure, air and water temperature. These are used to interpret the sea level records, perform scientific analyses of the natural phenomena in the coastal zone, and when disseminated to mariners through the Physical Oceanographic Real-Time Systems (PORTS™), provide real-time environmental conditions suitable for navigational decision making (*NRC, 1986; 1996*).

The system that accomplishes these tasks is known as the Next Generation Water Level Measurement System (NGWLMS). The NGWLMS equipment was developed by NOS to modernize the NWLON (*e.g., Scherer, 1986; Mero and Stoney, 1988*). A NGWLMS is a stand alone system that acquires, stores and transmits water level, weather and other data from the field unit (*Edwing, 1991*). The main requirement for the unit is to accurately measure water level information with low power consumption, high reliability, and defined accuracy. The goal is to monitor waters levels with an accuracy of better than 1.0 cm, as the present global estimate of sea level rise is 0.15 cm per year. Considering all the variability in water level measurements, resulting from the contributions noted earlier, this level of accuracy presents a challenge for instrumentation

and research. The NGWLMS water level sensors have an accuracy of about 1.0 cm for each sample (*Schultz, et al., 1998*).

Instruments

The NGWLMS field unit is a fully automated, data acquisition and transmission system. It was developed and procured from off the shelf components in the mid-1980s, and underwent extensive evaluation prior to delivering data from which operational products are calculated. In addition, the internal firmware and some of the internal modules of the field unit have received periodic upgrades to maintain or enhance capabilities.

The data collection platform (DCP) (Figure 16) consists of a Sutron 9000 Remote Terminal Unit (RTU). This is a modular unit that contains power supply, communications controller, Geostationary Operational Environmental Satellite (GOES) satellite transmitter, central processor unit, memory expansion module, telephone modem, general purpose Input/Output (I/O) module, and an Aquatrak water level sensor controller manufactured by Bartex. The unit receives data from the sensors which measure the water level and geophysical parameters (*Edwing, 1991*). This measurement sub-system accommodates up to eleven additional instrument channels. The field unit is fully automated for remote installations. The unit's design and satellite data transmission streamlines the digital data relay and processing.

The NGWLMS field unit is a multi-tasking, programmable computer. The unit is fully automated, password protected, and is easily sited. The Sutron 9000 accommodates two water level

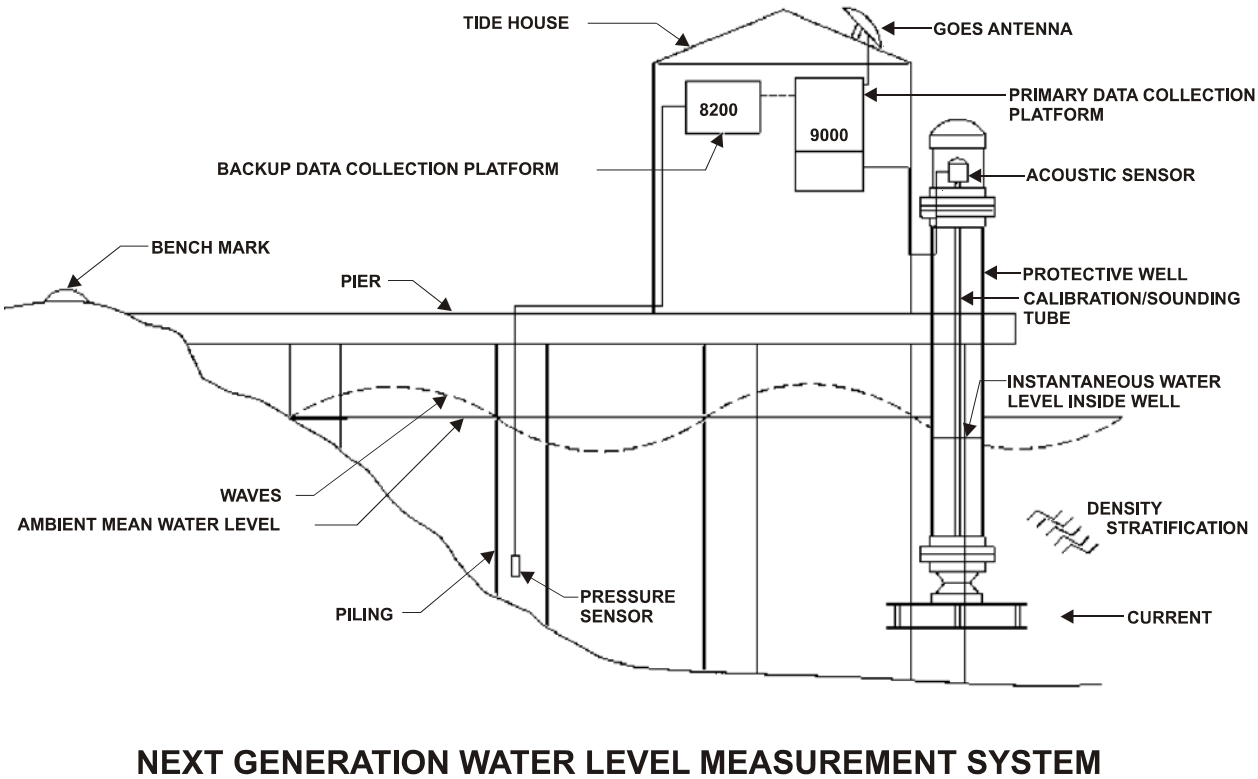

Figure 16. A schematic diagram illustrating the design of a standard NGWLMS.

instruments with the option of installing eleven additional instruments. The unit's telemetry capability includes satellite, radio, telephone and direct access for the dissemination of near real-time and real-time data, complete data custody, and recovery from system or communications malfunction. The Aquatrak is a downward-looking acoustic water level measurement sensor that returns data that can be directly referenced to the station datum at the site. (*Edwing, 1991*). Provisions are made within the data base processing system to convert water level data to local tidal datum references.

The instruments typically installed at an NWLON station are: the primary water level sensor (a Bartex "Aquatrak" acoustic sensor); a strain-gauge pressure transducer for back-up water level measurements; an R.M. Young anemometer for measuring wind speed, direction and maximum hourly gusts; a Yellow Springs Instruments Corporation (YSI) thermistor for measuring air or water temperature; a Seabird or Falmouth water conductivity instrument; and a Setra or Visalla barometer for measuring atmospheric pressure (*Edwing, 1991*). Since technology is constantly evolving, the mix of computers and sensors is subject to change in the future. The environment at the stations in the Great Lakes is such that shaft angle encoders and float/wire sensors are used instead of the acoustic sensors. NOS is also investigating new sensor technologies, such as laser and microwave sensors, to replace the acoustic sensor since it still requires a protective well.

Measurement of Water Levels

The primary requirement of a water level station is to accurately and reliably measure time varying water levels in often hostile conditions. The primary water level sensor is a non-contact sensor, i.e., the sensor consists of an acoustic transducer head connected to a ½ -inch diameter vertical PVC tube open at the lower end, which is in the water.

The water level in the tube moves up and down with the tide. The tube, and the sturdy environmental protective well housing which surrounds the tube, provide a limited damping effect. The protective well is a 6 inch diameter PVC well with and a 2 inch inverted cone orifice in the water. Typically, 12 inch diameter parallel plates at the orifice are also installed. This design reduces the unwanted filtering effects of a true stilling well while permitting the field unit to be sited in dynamic environments with wave action and high velocity currents and also reduces the errors due to wave motion and stream flow associated with currents on the internal water level. This arrangement, as far as possible, gives a linear response to exterior changes in sea level (*Scherer, et al., 1981*).

The acoustic head emits a sound pulse, which travels from the top of the tube to the water surface in the tube, and is then reflected up the tube. The reflected pulse is received by the transducer, and the Aquatrak controller, or water level sensor module. The Sutron 9000 unit then calculates the distance to the water level using the travel time of the sound pulse (*Sutron, 1988*) with corrections for air temperature and density effects (*Edwing, 1991*).

As well as the reflected pulse from the water level, there is also a reflection from a hole in the side of the sounding tube at an accurately known distance from the transducer head. This measured reflection is used by the Aquatrak controller to continually self-calibrate the measuring system. Temperature gradients in the protective well can introduce a source of systematic error. Two

temperature thermistors are installed at two locations in the sounding tube and a correction factor can be applied as required (*Edwing, 1991*). As mentioned, a system of tidal bench marks is in place to ensure the stability and continuity of the measurements and to recover the tidal datums (*Edwing, 1991; Mero and Stoney, 1988*).

Backup Water Level System

Each NGWLMS field unit has a backup system. This contains a stand alone backup data recorder which measures and stores water level data from a pressure transducer installed in a gas-purged/orifice configuration.

The backup water level readings are logged every six minutes into the memory of the Sutron RTU 8200 data recorder and are passed to the Sutron 9000 unit, via an optically isolated serial communication link. The 8200 is a fully-automated, multipurpose, programmable DCP that supports multiple sensors and satellite telemetry.

The memory of the Sutron 8200 can hold about two months of data (*Mero and Stoney, 1988*). Should there be problems with the primary data system, the data from the 8200 can be retrieved during an on-site visit. This backup system uses battery power with solar recharge and can operate unattended for over a year (*Mero and Stoney, 1988*).

Powering the NGWLMS Unit

The NGWLMS unit can use a variety of power sources, including electrical power, solar panels or batteries. Batteries provide about seven days of reserve operating power in case of loss of primary power. For installations where electrical power is not available, the system will run on batteries which are charged by solar panels (*Mero and Stoney, 1988*).

Data Sampling Rate

The sampling rate for the primary and backup water level measurements is 1 sample per second. However not all of these data are stored. The water level measurements are averaged over a three-minute period (*Scherer, et al., 1981*) and are stored in the memory at 6-minute intervals. Each weather parameter is stored hourly, and is the average of 2 minutes of sampling on the hour. The memory of the 9000 has a "rolling log" which retains the last 30 days of data (*Mero and Stoney, 1988*).

For primary water levels, an average of 181 samples is computed, 1 sample per second over three minutes. The standard deviation is then calculated, and any sample readings greater than 3 standard deviations from the mean are identified and termed outliers. The mean and standard deviation are then recalculated from the remaining samples after outliers are removed, and the values of the recalculated mean, the standard deviation, and the number of outliers are stored in the Sutron 9000 or 8200.

The NGWLMS station has the capacity to operate with various, site-specific combinations of sensors, averaging and sampling intervals. These combinations can be adjusted by using a personal computer connected to a communication port in the unit, either directly at the site, or remotely with

a "modem" through the normal public telephone network. Another feature of the 9000 field unit is that the system software can be modified remotely via telephone. This capability has proven to be useful during early system development and for software upgrades.

Data Retrieval

Data can be retrieved from the Sutron 9000 unit by (a) on-site retrieval, using a personal computer communication program, and (b) remote retrieval, where data is retrieved by automated modem dial-up or by automatic satellite transmissions every hour via the NOAA's Geostationary Operational Environmental Satellite (GOES) (*Mero and Stoney, 1988; Gill, 1997*).

Other Primary Sensors

NOS uses other sensor technologies as primary sensors where the acoustic system configurations cannot physically be installed or the acoustic systems are not appropriate due to operating conditions. Examples are in areas of Alaska and in the Great Lakes where seasonal ice conditions prohibit installation of protective wells and where acoustic sounding tube temperature gradients cannot be controlled. In Alaska, a dual orifice digital bubbler water level sensor system is employed configured with Paroscientific pressure transducers vented to the atmosphere. In the Great Lakes, float driven shaft angle encoder sensor systems are installed in sump wells that have underground horizontal pipe assemblies out to the water low enough to be unaffected by the ice.

D. Quality Assurance of Water Level Data

NOS has written Standard Operating Procedures (SOPs) for station instrumentation. The primary documentation is the "NGWLMS Site Design, Preparation, and Installation Manual" (*Edwing, 1991*). This document defines support for NGWLMS field unit deployment and operation, and includes system configuration and annual inspection procedures. Field Engineering Notes are issued as needed to provide updated field unit maintenance procedures. Project Instructions are issued annually and amended as required to provide specific station maintenance requirements.

The SOP for bench marks and leveling is entitled, "Users Guide for the Installation of Bench Marks and Leveling Requirements for Water Level Stations" (*Hicks et al., 1987*). This document presents SOPs for second order and third order leveling of the tide station bench marks.

The use of standardized documentation and procedures is a requirement for delivering data of known quality. The above documents define the procedures for facility maintenance, instrument maintenance, data quality monitoring, and stability monitoring.

Specific procedures are defined for inspecting and repairing water level station structures, inspecting and repairing utilities, maintaining underwater components, and cleaning marine growth (*Edwing, 1991*). There are specific procedures for calibration, inspection, and acceptance testing of system-wide components. These procedures include field verification of instruments and hardware, preventive maintenance and corrective maintenance procedures, how to modify and upgrade components, and how to install, test, and retrieve data collected from the back-up system (Edwing, 1991).

Field crews responsible for station installation and maintenance have software that enables them to run diagnostic tests on the system while on-site. In addition, each day CO-OPS obtains a preliminary daily review of the status of instruments from the GOES Daily Telemetry Status Report. Data tracking also occurs through the data base management system which performs a variety of data quality checks and can record flags for each point of data processed. Data are also reviewed by the Continuously Operating real-Time Monitoring System (CORMS) program on a 24 hour by 7 day basis.

The SOPs for bench marks and leveling instruct field parties in the installation and maintenance of bench marks to be used for tidal datum references. There are also detailed instructions on how to conduct differential leveling to monitor vertical stability of gauges and how to define a primary bench mark (*Smith, 1997*).

The documentation produced by the field parties are maintained in a site package filed at CO-OPS for each tide station. The report includes a nautical chart section of the area around the tide station, a bench mark sketch, directions on how to find the station and bench marks, bench mark descriptions and recovery notes, photographs of station components, bench mark settings, bench mark leveling records and abstracts, station installation and maintenance reports, and miscellaneous notes applicable to the station.

5. DATA PROCESSING AND TIDAL DATUM COMPUTATIONAL METHODOLOGIES

A. Data Processing and Analysis Subsystem (DPAS)

The Data Processing and Analysis Subsystem (DPAS) is the NOS database management system which receives water level and geophysical data from the water level station instrumentation, performs automated quality control, facilitates the processing and analysis of the data, generates resulting products to be disseminated to the public, maintains control over the data collection activities of the field units, provides mechanisms for the timely release of data, and archives the data.

DPAS Data Flow

Data from remote NGWLMS field units can be transmitted to DPAS by satellite, telephone, or diskette (*Gill et al., 1997*). The primary mode of data telemetry is by GOES satellite. Each field unit transmits data collected during the previous hour period once every hour. For water level from the primary water level sensor only, redundant data (i.e., several hours prior to the present period) are also sent in the satellite message. Quality control parameters such as standard deviations and outliers are also sent in the satellite message for the present time period, but not for the redundant data. The GOES satellite message includes 6-minute water level data, half-hour backup water level data, and hourly geophysical data. The satellite messages are sent to NOAA's National Environmental Satellite, Data and Information Service (NESDIS) downlink facility at Wallops Island, VA. DPAS automatically calls the NESDIS downlink facility once every hour to download new satellite messages. The satellite messages are decoded from pseudo-binary format into ASCII files, and the ASCII files are copied into the DPAS database. Automated Quality Control (QC) procedures are performed, and each time a QC flag is set, it is stored in the database. For example, a QC check is performed to test the water level against maximum and minimum physically-reasonable values. If the water level fails this check, the QC flag indicating a failed maximum-minimum range-test is set. Additional QC checks include a test to see if several consecutive values of the water level are the same; if this is true, the implication is that the sensor is not responding. A third difference check is done to detect discontinuities in the data. Checks are made of the two thermistor values that are installed within the protective well to ensure they do not exceed tolerances. Sensor and datum offset checks are compared against accepted values of these coefficients in the DPAS database. If discrepancies exist, the flags are set. For the geophysical data, only maximum and minimum checks are performed. Tolerance limits are individually set for each station and parameter.

Data acquisition by telephone call is the backup mode of data telemetry. Only a few stations do not have telephone connections. Phone calls to the field units may be made on demand or programmed into DPAS. In any event, DPAS makes automatic phone calls about every 2 weeks to test the phone connection. Data collected by phone undergo the same QC checking outlined above. When all else fails, the third mode of data recovery is to download the data from the Sutron 9000 by diskette. Depending upon the type of data collected, up to thirty days of data may be stored, which provides adequate time for data recovery by this means. This data is also edited and quality controlled in the manner outlined above.

A number of reports are generated by DPAS to document the data quality. The preliminary Data Quality Assurance Report summarizes the number of tolerance failures for each station for a

user-specified period of time. The Satellite Transmission Report provides a listing of all transmissions received at CO-OPS via NESDIS within the last 24 hours. The Sensor and Datum Offset Report lists all sensor and datum offsets used to process the data. This includes the offsets recorded at the field unit, telemetered to DPAS, and manually entered into DPAS. The Daily Telemetry Status Report is generated every 24 hours for all stations that were expected to transmit data. This is reviewed every day for flags which are indicative of malfunctioning sensors. The GOES Monthly Summary Report identifies problems that occur because of the satellite for NWLON stations. This report also includes the random reports produced from stations that were modified for either the Tsunami Warning Program and the Storm Surge Warning Program.

Processing and analyses of data within CO-OPS are done according to a set of SOPs which control human error by prescribing a step-by-step approach and operate on a defined set of inputs with a defined set of output products.

The SOP entitled "NGWLMS Preliminary Data Quality Review" (*Gill, 1994*) takes as input the unedited NGWLMS water level and geophysical data that has gone through the automated QC outlined above. Produced as an output is a preliminary data quality review with feedback to appropriate engineering personnel on instrument operation. This SOP is performed on a monthly basis during the last week of each month for that month's data. Data quality reviews occur more frequently for special projects such as hydrographic surveys, other short-term deployments, or NGWLMS stations that have chronic problems. The procedure of preliminary review consists of checking the data, relevant comparisons, scanning the DPAS Acquisition Report, checking outliers, and flags that have been set, and forwarding copies of the documented problems to engineering personnel.

A second SOP *(Gill, 1995),* operates on the raw unedited data and is entitled, "Processing of 6-minute Data for Hourly Heights, High and Low Waters, and Monthly Means." The input is the raw, QC-flagged water level data, standard deviations and outliers, sensor and datum offset information, and the inventories of time series in DPAS. Outputs of this procedure are the final edited versions of the 6-minute water level time series data, tabulation of the hourly heights, high and low waters, and monthly means referenced to a site-specific, arbitrary, station datum. This processing includes QC, editing, gap filling, and tabulation. This procedure first checks that all of the parameters for a station were entered into DPAS correctly. Inventories of the data are all checked. Normally, DPAS automatically loads the previous month's data around the third of each month. However, if there are gaps in the primary sensor data, this is performed manually. Data are plotted to examine the data quality and determine what kind of gap filling, if any, is required. If gaps are small, then linear interpolation is usually adequate. If gaps are up to 3 days, then the gaps may be filled with backup water level data, with predictions, or by comparison of data with a nearby station after amplitude and phase offsets are computed. Once the gaps are filled, and depending upon the type of station, several parameters may then be computed including generation of hourly heights, generation of high and low tides, and selection of higher highs and lower lows. Several diagnostic QC checks are defined for each step of the process. After this, the monthly means are produced. The time series data, hourly heights, high and low waters, higher highs and lower lows are marked complete, and subsequently marked verified after review by a senior analyst.

Tidal datums and associated tidal products are also computed using DPAS *(Smith, 1997)*. The procedure controlling the analysis is defined in "SOP for the Computation and Acceptance of Tidal Datums for NOS Tidal Stations Using DPAS." Tidal datums at control stations are computed by the first reduction or arithmetic mean method for a specific length of record, generally a tidal epoch *(Smith, 1997)*. The input for the procedure requires the monthly mean values for a tidal epoch. The current tidal epoch is defined to be from 1960-1978. Tidal datums at secondary stations are generally computed by comparison of monthly means between subordinate and control stations *(Smith, 1997)*. Tidal datums at tertiary stations are computed by comparison of monthly means or comparison of simultaneous high and low waters (if no calendar month of data) between the tertiary station and a control, or with an acceptable secondary station (*Smith, 1997*). The input for this procedure is the simultaneous means from the control and subordinate station in a region of similar tidal characteristics to produce an equivalent datum at the subordinate station with an adjustment to 19-year values. This SOP results in accepted values which consist of 1960-1978 epoch datums relative to the station datum and associated values of Greenwich High Water Interval (HWI), and Greenwich Low Water Interval (LWI), Mean Range (Mn), Great Diurnal Range (GT), Diurnal High Water Inequality (DHQ), and Diurnal Low Water Inequality (DLQ) (*Hicks, 1989*).

The tidal datum computation process involves QC of the data, review of preliminary datum tabulations and datum reference, benchmark and station stability, and computation of the standard tidal datums. Procedures include detailed instructions for publishing a bench mark sheet *(Smith, 1997)*. The elevation of the primary bench marks relative to the station datum, the elevation differences between the primary bench mark and the other benchmarks, bench mark descriptions, and bench mark locations are documented. Corrections pertaining to the bench marks are entered at this point. The output is an accepted set of tidal datums and published bench mark sheets for each station.

The SOP, "Formal Year-End Reviews of Tide Station Data" *(Gill, 1997)* provides a further level of data quality assurance. The input of the procedure is the most recent year of data from operating NGWLMS stations, tabulation packages for each station, copies of the data inventories of the digital data on DPAS, DPAS sensor and datum offset reports, and site packages. Reviews of the data occur after the December preliminary data quality review. The output from the procedure is the completed, documented, calender year-end review for all NWLON and special project stations. The data and products are reviewed for consistency, anomalous values, completeness, and documentation. Also reviewed are the water level time series, datums, harmonic constituents, and benchmark and leveling information.

B. First-Reduction Tidal Datum Computations

The attention to detail in the data quality assurance, mentioned in the previous sections on instrumentation and standard operating procedures, leads to water level data sets that are used to produce tidal datums. In this section, the standard tidal datums are defined.

The NTDE is defined as the specific 19-year cycle adopted by the NOS as the official time segment over which water level observations are taken and reduced to obtain mean values (e.g., mean lower low water) for tidal datums. Adoption of the NTDE averages out long-term seasonal meteorological, hydrologic, and oceanographic fluctuations. It provides a nationally consistent tidal

datum network by accounting for seasonal and secular trends in sea level that affect the adequacy of the tidal datums (*Marmer, 1951*). NOS operates the NWLON to provide the data required to maintain the epoch and to make primary and secondary determinations of the tidal datums. The present NTDE is 1960 through 1978. It is reviewed for revision at least every 20 to 25 years and implementation of a new NTDE is currently under consideration by NOS.

A vertical datum is called a tidal datum when it is defined by a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks.

A primary determination of a tidal datum is based directly on the average of observations over a 19-year period. For example, a primary determination of mean high water is based directly on the average of the high waters over a 19-year period. Tidal datums must be specified with regard to the NTDE (*Marmer, 1951*).

Mean Higher High Water (MHHW) is defined as the arithmetic mean of the higher high water heights of the tide observed over a specific 19-year Metonic cycle (the NTDE). Only the higher high water of each pair of high waters of a tidal day is included in the mean. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent of a 19-year value (*Marmer, 1951*).

Mean High Water (MHW) is defined as the arithmetic mean of the high water heights observed over a specific 19-year Metonic cycle (the NTDE). For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent of a 19-year value (*Marmer, 1951*). Use of the synonymous term, mean high tide, is discouraged.

Mean Low Water (MLW) is defined as the arithmetic mean of the low water heights observed over a specific 19-year Metonic cycle (the NTDE). For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent of a 19-year value (*Marmer, 1951*). Use of the synonymous term, mean low tide, is discouraged.

Mean Lower Low Water (MLLW) is defined as the arithmetic mean of the lower low water heights of the tide observed over a specific 19-year Metonic cycle (the NTDE). Only the lower low water of each pair of low waters of a tidal day is included in the mean. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent of a 19-year value (*Marmer, 1951*).

In addition, Mean Tide Level (MTL), Mean Range (Mn), Diurnal High Water Inequality (DHQ), Diurnal Low Water Inequality (DLQ), Great Diurnal Range (Gt), Diurnal Tide Level (DTL), and Mean Sea Level (MSL) have the following definitions: MTL is the average of MHW and MLW; Mn is the difference between MHW and MLW; DHQ is the difference between MHHW and MHW; DLQ is the difference between MLW and MLLW; Gt is the difference between MHHW and MLLW; DTL is a tidal datum which defines the midpoint between MHHW and MLLW; and MSL is defined as the arithmetic mean of hourly heights observed over a specific 19-year Metonic

cycle (the NTDE). Shorter series, such as monthly mean sea level and yearly mean sea level, are specified in the name (*Marmer, 1951; Hicks, 1985*). The Glossary of this document contains the definitions of additional tidal datums.

C. Equivalent Short-Term Datums

Due to time and resource constraints, primary determinations of tidal datums are not practical at every location along the entire coast where tidal datums are required. At intermediate locations, a secondary determination of tidal datums can usually be made by means of observations covering much shorter periods than 19 years if the results are corrected to an equivalent mean value by comparison with a suitable primary control tide station (*Marmer, 1951*).

A primary control station is one (*Marmer, 1951*) at which continuous observations have been made over a minimum of 19 years spanning the NTDE. The data series from this station serves as a primary control for the reduction of relatively short series from subordinate stations through the method of comparison of simultaneous observations and for monitoring long-period sea level trends and variations.

A secondary control tide station is a subordinate tide station at which continuous observations have been made over a minimum of one year but less than 19 years. The data series is reduced to equivalent 19-year tidal datums by comparison with simultaneous observations from a suitable primary control observation.

A tertiary control tide station is a subordinate tide station at which continuous observations have been made over a minimum of 30 days but less than 1 year. The data series is reduced to equivalent 19 year tidal datums by comparison with simultaneous observations from a suitable secondary or primary control tide station. NOS uses the following methods to perform comparisons of simultaneous observations for secondary (i.e., short-term) determinations of tidal datums.

Standard Method. This method is generally used for the West Coast, and Pacific Island stations. Values needed are MTL, MSL, Mn, DHQ, and DLQ as determined by comparison with an appropriate control. From those, the following are computed:

MLW = MTL - (0.5*Mn)

MHW = MLW + Mn

MLLW= MLW - DLQ

MHHW = MHW + DHQ

DTL = 0.5*(MHHW + MLLW)

GT = MHHW - MLLW

Modified-Range Ratio Method. This method is generally used for the East Coast, Gulf Coast, and Carribbean Island Stations. Values needed are MTL, DTL, MSL, Mn, and GT as determined by comparison with an appropriate control. From those, the following are computed:

MLW = MTL - (0.5*Mn)

MHW = MLW + Mn

MLLW= DTL - 0.5*GT

MHHW = MLLW + GT

DHQ = MHHW - MHW

DLQ = MLW - MLLW

Direct Method. Datums are determined directly by comparison with an appropriate control for the available part of the tidal cycle. It is usually used only when a full range of tidal values are not available. For example: Direct Mean High Water, when low waters are not recorded.

Figure 17 is an illustration of how these tidal datums are related to a typical beach profile and also illustrates how the various tidal datums are applied to marine boundary issues.

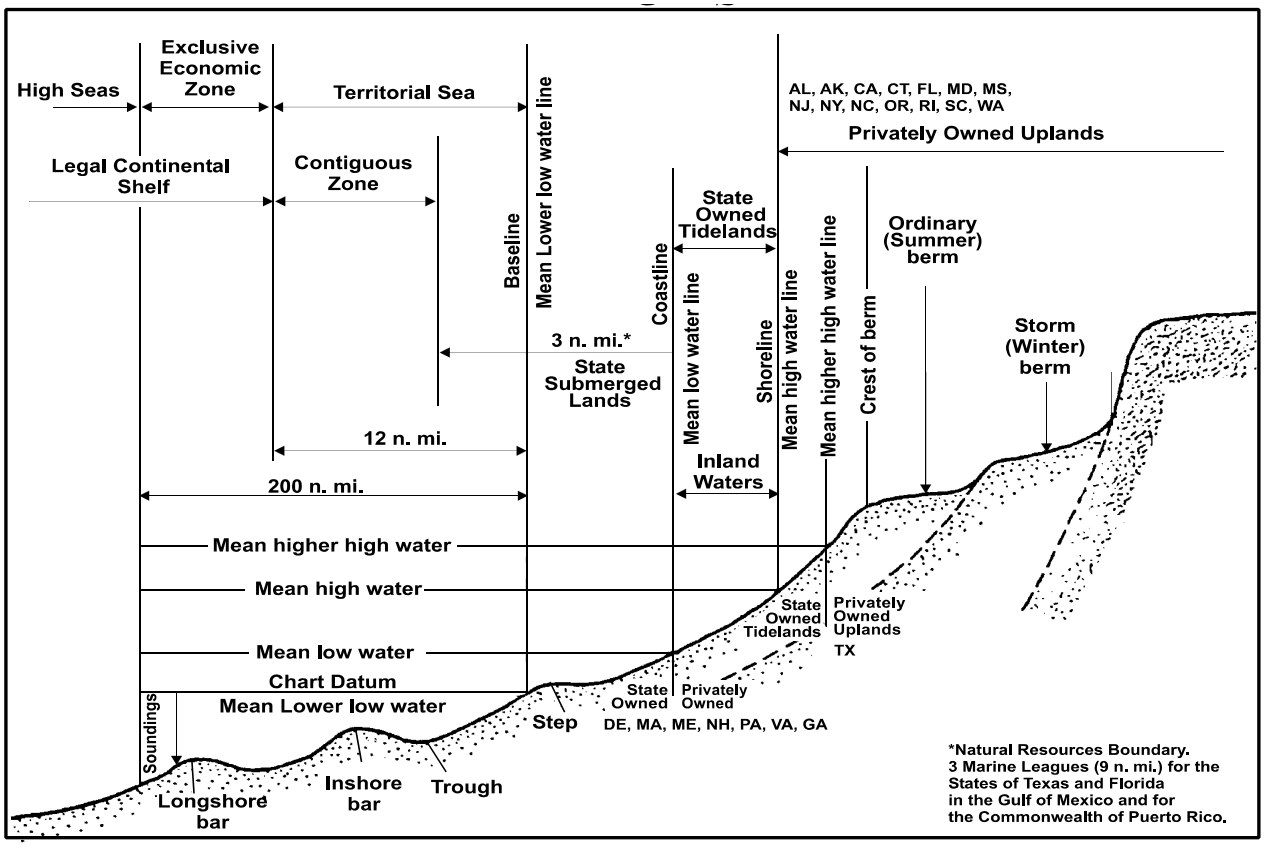

Figure 17. The principal tidal datums related to a beach profile. The intersection of the tidal datum with land determines the landward edge of a marine boundary.

D. Accuracy

Generalized accuracies *(Swanson, 1974)* for datums computed at secondary or tertiary stations based on the standard deviation error for the length of the record are summarized in Table 2. These values were calculated using control stations in the NWLON. The accuracies of the secondary and tertiary datums can be interpreted as known to within plus or minus the appropriate value in Table 2. That is, the values in Table 2 are the confidence intervals for the tidal datums based on the standard deviation.

Table 2. Generalized accuracy of tidal datums for East, Gulf, and West Coasts when determined from short series of record and based on +/- sigma. From Swanson (1974).

Series Length (months)	East Coast (cm)	(ft.)	Gulf Coast (cm)	(ft.)	West Coast (cm)	(ft.)
1	4.26	0.13	5.91	0.18	4.26	0.13
3	3.28	0.10	4.92	0.15	3.61	0.11
6	2.30	0.07	3.94	0.12	2.62	0.08
12	1.64	0.05	2.95	0.09	1.97	0.06

The uncertainty in the value of the tidal datum translates into a horizontal uncertainty of the location of a marine boundary when the tidal datum line is surveyed to the land (*Demarcating and Mapping Tidal Boundaries, 1970*). Table 3 expresses the uncertainty in the marine boundary as a function of the slope of the land. A slope of 1% means that the land rises 1 meter for every 100 meters of horizontal distance. In this table, the error is defined as (0.03 m)x[cotangent(slope)]. The greatest errors in the determination of the marine boundary occur for relatively flat terrain, which is characteristic of broad sections of the Atlantic and Gulf Coasts.

Table 3. Error in position of marine boundary as a function of the slope of the land.

% of Slope	Degree of Slope (degrees)	Error (meters)
0.1	0.05	32.3
0.2	0.1	14.9
0.5	0.3	6.1
1.0	0.6	3.0
2.0	1	1.5
5.0	3	0.61
10.0	6	0.30
15.0	9	0.18
20.0	11	0.15
30.0	17	0.09
50.0	27	0.06
100.0	45	0.03

6. TIDE AND WATER LEVEL PRODUCTS

A. Types

An extensive amount of tidal data is available from NOS. These data can be obtained in a variety of ways, such as historical data in either hard copy or digital formats; near-real-time data obtained through radio, telephone, or satellite link; and near-real-time and historic data obtained over the Internet. The acquisition of NOS-held historic data and data available over the Internet is discussed in the following sections.

B. Historic

A large volume of historic tide and water level data have been archived by NOS. Much of this information can be obtained in hard copy and electronic formats, as well as over the Internet. Recent efforts at digitizing historical hourly heights and monthly means form all NWLON stations is resulting in digital long term time series available to the user in digital form for the first time. General digital and hard copy data and information include raw and verified data, (tidal, oceanographic and meteorological), standard NOS publications, customized data, atlases, charts, reports, and memorandums. Listings of data availability and indices of water level stations are available from CO-OPS web pages and hard copies are available on request.

CO-OPS also provides expert consultation, including certification of observed and predicted water level data for court evidence and legal documents as requested. Special services include the preparation of customized tide and tidal current predictions; generating plots of hourly or 6-minute tidal heights; plots of daily, monthly, or yearly mean sea level; plots of daily mean observed versus predicted water level; and providing simultaneous plots of two stations or plots of observed water levels versus predicted tidal heights. Special services also include development of long-term tidal means and extreme water level data analysis; computation of long-term relative sea level trends; documentation of elevation of primary bench marks above summary datums; establishing tidal datums for previous time periods; tidal zoning; and providing technical advice on methods for conducting tidal surveys.

Other divisions of NOS also distribute products and services that contain tide and water level information provided by CO-OPS. The most well known of these are the nautical charts for the U.S. and its territories from the Office of Coast Survey (OCS). These charts are fundamental navigational tools required for safe passage of waterborne commerce. They can also serve as base maps for resource management, shoreline development planning, and other applications. Charts depict the location of the shoreline, minimum water depths referenced to tidal datums, aids to navigation, hazards to navigation, sediment notations, and other supplemental information. One valuable technique to estimate historic marine boundaries uses historic nautical charts of NOS. Historic NOS charts help to identify the geomorphology of the coast dating to 1834 at some locations.

Since the 1930s, precision aerial photography has been a primary source material for coastal survey maps. The main aerial photographic product produced by the NGS is a 9x9 inch color photograph, usually exposed at scales from 1:10,000 to 1:50,000. Aerial photography is also a valuable technique to estimate historic marine boundaries and the photogrammetric surveys

themselves are either tide-controlled to produce depictions of MHW or are taken at known stages of the tide.

Products available from NGS include coastal survey maps, also known as T-sheets. These maps are special use planimetric or topographic maps that accurately depict the shoreline and alongshore natural and manmade features, such as rocks, bulkheads, jetties, piers, and ramps. These maps range in scale from 1:5,000 to 1:40,000. Carefully controlled for tide variations (standardized to Mean Low Water), these maps represent the most accurate delineation of shoreline in the Nation.

NGS also maintains the National Spatial Reference System (NSRS) which is a consistent national coordinate system that defines latitude, longitude, elevation, scale, gravity, and orientation throughout the Nation, as well as how these values change with time. There are over 800,000 geodetic control survey points in the U.S. Approximately 3,700 of these form the highest accuracy core of the system. They include the Federal Based Network (FBN), Cooperative Based Network (CBN), and CORS sites covering the U.S. and its territories. Individual data sheets for all FBN, CBN, and CORS points are available from the NGS web site, http://www.ngs.noaa.gov. The NGS and CO-OPS bench mark databases have a dynamic linkage whereby the user can cross reference common geodetic bench marks with tidal bench marks.

C. Operational Support to Other Programs

Physical Oceanographic Real-Time System

Water level measurements and additional geophysical data from selected NWLON stations are used to support the CO-OPS managed PORTS™ program; an integrated real-time navigation system, delivering to the mariner in near-real remote data displays which range from simple numeric to graphics. Present technology enhancements include real-time water level data access, tabular or graphic display, and tide and tidal current prediction comparison. The real-time data can be obtained by the local user by interrogating the PORTS™ local data acquisition systems by telephone (*Bethem and Frey, 1991*). The water levels and additional geophysical data disseminated by PORTS™ and at other key installations are monitored by CORMS, a monitoring system that operates on a 24 hour, seven day per week basis. The purpose of the monitoring is to provide quality control of the data, stop dissemination of questionable data, and to provide for the prompt repair of key sensors in critical harbor locations (*Gill et al, 1997; Reilly et al, 1998*).

Tsunami Warning System

Data for tsunami warning and research is delivered by random transmissions, triggered by the water level measurements. The GOES satellite has an emergency report mode of operation, and the Sutron 9000 has been configured for this mode. This modification augments NGWLMS capabilities to meet the NWS Tsunami Warning Program needs and NOAA's Office of Oceanic and Atmospheric Research (OAR) Pacific Marine Environmental Laboratory (PMEL) Tsunami Research program needs. The NWS/PMEL cooperative program receives emergency reporting of water level data by the GOES event-triggered, random report capability. The trigger is water level rate of change in excess of a threshold value. The modifications include on site storage in the NGWLMS primary system of more than 20 days of 1 minute water level data, accessible by telephone. Further

on site storage is provided in the NGWLMS backup system for more than 5 days of 15 second water level data on removable RAM-Pack. These modifications are installed at 40 sites.

Storm Surge Warnings

Similar modifications used by the Tsunami Warning System have been made to the field unit to support the NWS Storm Surge Warning Program, especially on the east coast. Random satellite messages can be either manually triggered via phone call or automatically triggered by pre-configured limits and rate-of-changes being exceeded when a storm approaches the coast. The random messages are received in headquarters and the near real-time high rate data decoded, and predicted verses observed data become part of the NWS AFOS/AWIPS bulletins and are also disseminated using a Web site named "Tides Online" *(Burton, 2000)*

D. Internet

NOS maintains a World Wide Web site , http://nos.noaa.gov, which allows users to have direct access to NOS database holdings, as well as the ability to order selected specific products available from NOS. CO-OPS also maintains a web site, http://co-ops.nos.noaa.gov, where much of the historic and near-real-time data collected, analyzed, and disseminated by CO-OPS are made available. The CO-OPS home page provides direct access to the CO-OPS database and gives external users a wide range of choices of water level and environmental data. For example, data from CO-OPS water level stations are available directly from the web site. Historic monthly means, hourly heights, highs and lows, six minute water level data, six months of tide predictions for primary stations, and tidal datum information for NOS water level stations are available. Oceanographic and meteorological data such as wind speed, directions and gust, air and water temperature, and barometric pressure are available for selected sites. The web site also allows users to access and download bench mark descriptions and elevations for over 1700 NOS water level stations from all U.S. coastal states, view and/or download a list of stations for which data are available, access some CO-OPS documents and reports, and submit comments. An additional feature of the CO-OPS web site is the Tides Online feature which provides high rate near-real-time predicted and observed tidal information and meteorological data during storm events for those stations triggered by the event.

Also featured on the CO-OPS web site are selected data and plots from the PORTS™ program. PORTS™ provides data such as water levels, currents, and other oceanographic and meteorological data from bays and harbors through the Internet, as well as by telephone. Data are available for the following PORTS sites: Tampa Bay, San Francisco Bay, New York/New Jersey Harbor, Houston/Galveston, and Chesapeake Bay.

NOS also maintains the MapFinder which is a one-stop web site that provides direct Internet access to primary NOS imagery and data holdings for coastal photography, nautical charts, coastal survey maps, environmental sensitivity index maps, hydrographic surveys, water level stations, and geodetic control points. NOS MapFinder provides a spatial index that allows users to identify specific NOS products. Many of these are online as directly usable products that can be ordered from NOS. Water Level Station information from NWLON is also available through the MapFinder. As mentioned earlier, water level data are also available on the CO-OPS section of the

web site. Descriptions of the entire active continuous network of stations are available from the MapFinder.

7. APPLICATIONS OF TIDAL DATUMS

Significance of Datums in Modern Applications

For marine applications, tidal datums are the reference planes from which measurements of height and depth are made (*Hicks, 1985*), and from which marine boundaries are determined. However, since the sea surface moves up and down in time intervals from seconds to geological time, and in height from less than a millimeter to over 100 meters, this reference surface must be mathematically defined. When the sea surface is mathematically defined by a statistical averaging of the observed values of a particular phase of the tidal cycle (e.g., MLLW), it is called a tidal datum.

As discussed in Chapter 4, these tidal datums are based on water level observations from a water level measurement system, and transferred to land by differential leveling between the tide measurement system and local bench marks. The bench marks serve to preserve the tidal datum elevations in case the measurement systems are removed, to maintain the station reference "zero" for NWLON stations, and to be used by surveyors and engineers as vertical reference points. The following is a discussion of traditional and emerging applications of tidal datums.

A. Application to Hydrographic Surveys and Mapping Programs

Depths on Nautical Charts

The depths on nautical charts in U.S. coastal waters are referenced to MLLW. On a nautical chart, MLLW is called chart datum. The reference base of the heights of structures on nautical charts (e.g, bridge clearances) is MHW. Wrecks, obstructions, and navigational hazards are charted in depths below MLLW (see figure 18).

MLLW, the lowest tidal datum computed by NOS from observed values, is used as the reference plane to refer depths because of the practical advantages afforded to pilots (e.g., *Shalowitz, 1962; NOS Hydrographic Manual, 1976*). Using MLLW provides pilots with a margin of safety consistent with average meteorological conditions. At the lower low water phase of the tidal cycle, the depths in a navigation channel are at a minimum. Thus, at lower low water, the pilot is able to ascertain if the draft of the vessel approaches the minimum depth in a navigation channel. Using MLLW complements the dredging operations used by the USACE to maintain and chart the navigation channels.

Hydrographic Surveys

The purpose of a hydrographic survey is to determine the topography of the ocean floor and to locate and describe all hazards and aids to navigation. Horizontally, surveys are referenced to the North American Datum of 1983 (NAD 83) via measurements from GPS. Vertically, they are referenced to a tidal datum. Note that while GPS is based on the Department of Defense (DOD) adopted standard of the World Geodetic System (WGS 84), NAD 83 is the official horizontal datum of the United States.

TIDES-SUPPORT TO NAUTICAL CHARTING HYDROGRAPHY APPLICATIONS

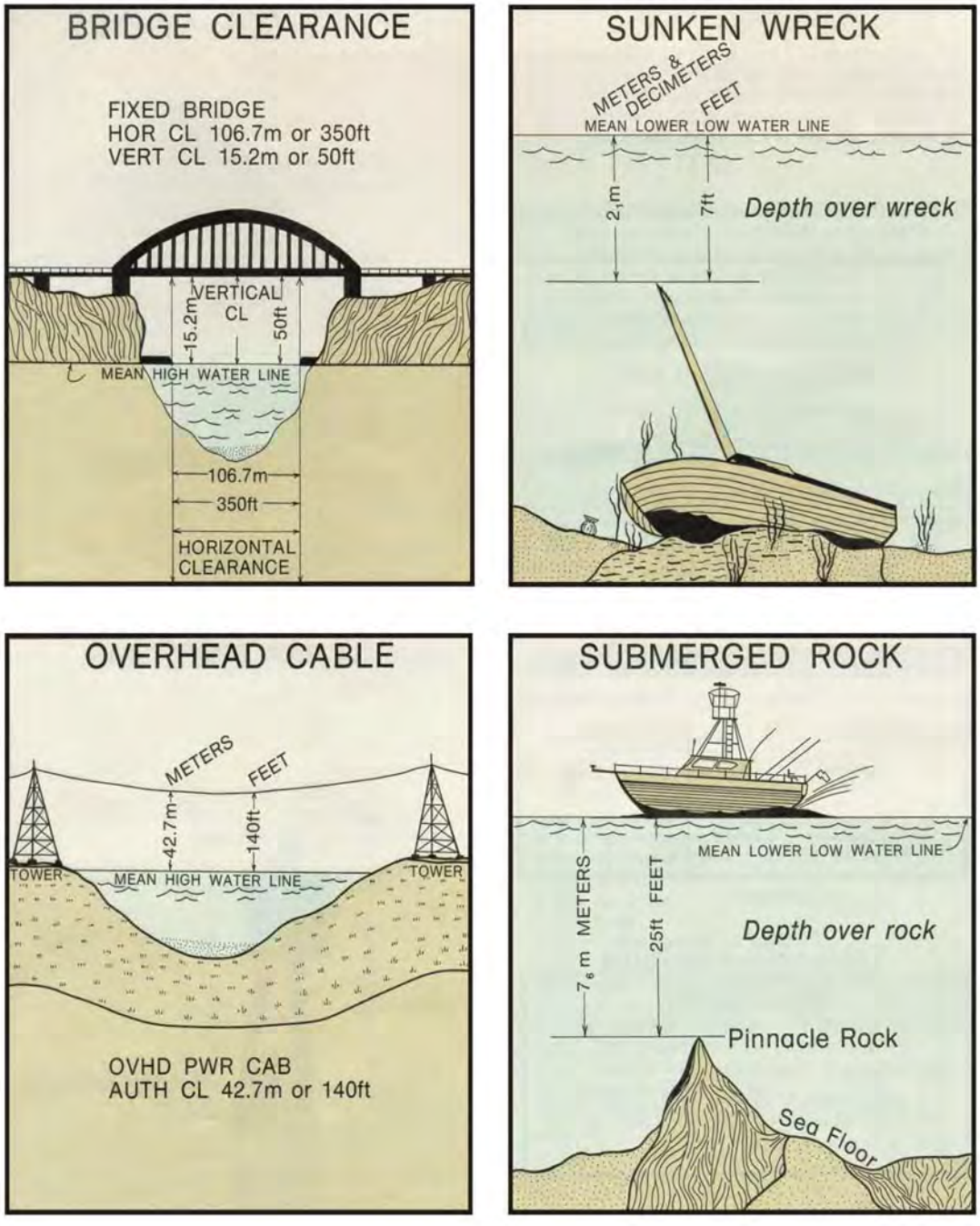

Figure 18. Applications of tidal datum references to nautical charting.

In hydrographic survey operations, *in situ* water level observations are required to reduce the soundings to chart datum, MLLW. Each sounding that the ship makes is corrected for its vertical and horizontal position at the time of the measurement. Corrected depths are depths of the water relative to chart datum (*NOS Hydrographic Manual, 1976*). Detailed specifications and deliverables for tides and water levels are found in the NOS Hydrographic Surveys Specifications and Deliverables (*NOAA, 2000*) document. The document expresses hydrographic sounding error budget considerations for the estimated allowable error contribution from all sources, including water level measurement error, tidal datum computation error, and error in the application of tidal zoning. The accurate computation of tidal datums at short-term stations installed during hydrographic surveys is a key ingredient to applying accurate tide reducers to each sounding.

Tidal zoning is the interpolation or extrapolation of a tide curve relative to MLLW away from a known observational point on the shore. NOS presently uses discrete geographical zones using MapInfo Geographical Information System (GIS) to estimate tides in the middle of estuaries or offshore on the continental shelf for hydrographic survey applications. NOS is conducting applied research into new methodologies for the necessary tide corrections using interpolation of tidal constituent amplitudes and phases and interpolation of residuals (*Hess et al, 1999*).

NOS is also investigating the use of RTK GPS for providing vertical control and reduction of soundings to chart datum during hydrographic survey operations. USACE has also started implementing the use of GPS for vertical control in their dredging operations and hydrographic surveys of dredged channels (*Deloach, 1995*).

Shoreline Mapping

Tidal datums are required by NOS for conducting shoreline mapping. MHW is the NOS defined shoreline on nautical charts (*Hicks, 1981*). However, given the uncertainty of this shoreline determination, NOS nautical charts should not be used for resolving property disputes. Aerial photography taken at the stages of MHW and MLLW are used to delineate the shoreline at these stages on nautical charts (see figure 19). The photographs taken at MLLW are used to delineate the State Submerged Lands, Territorial Sea, and Exclusive Economic Zone on NOS charts, T-sheets, and other output products. The delineation of marine wrecks and other navigational hazards are made at MLLW. The majority of these aerial surveys use predicted tide heights. However, in some surveys, the actual water level is used at the time of the photograph.

Two acts, the Rivers and Harbors Act and the Federal Water Pollution Control Act, give USACE and EPA jurisdiction in the Coastal Zone, respectively. Tidal datums are used to determine each agency's area of regulation, enforcement, and jurisdiction.

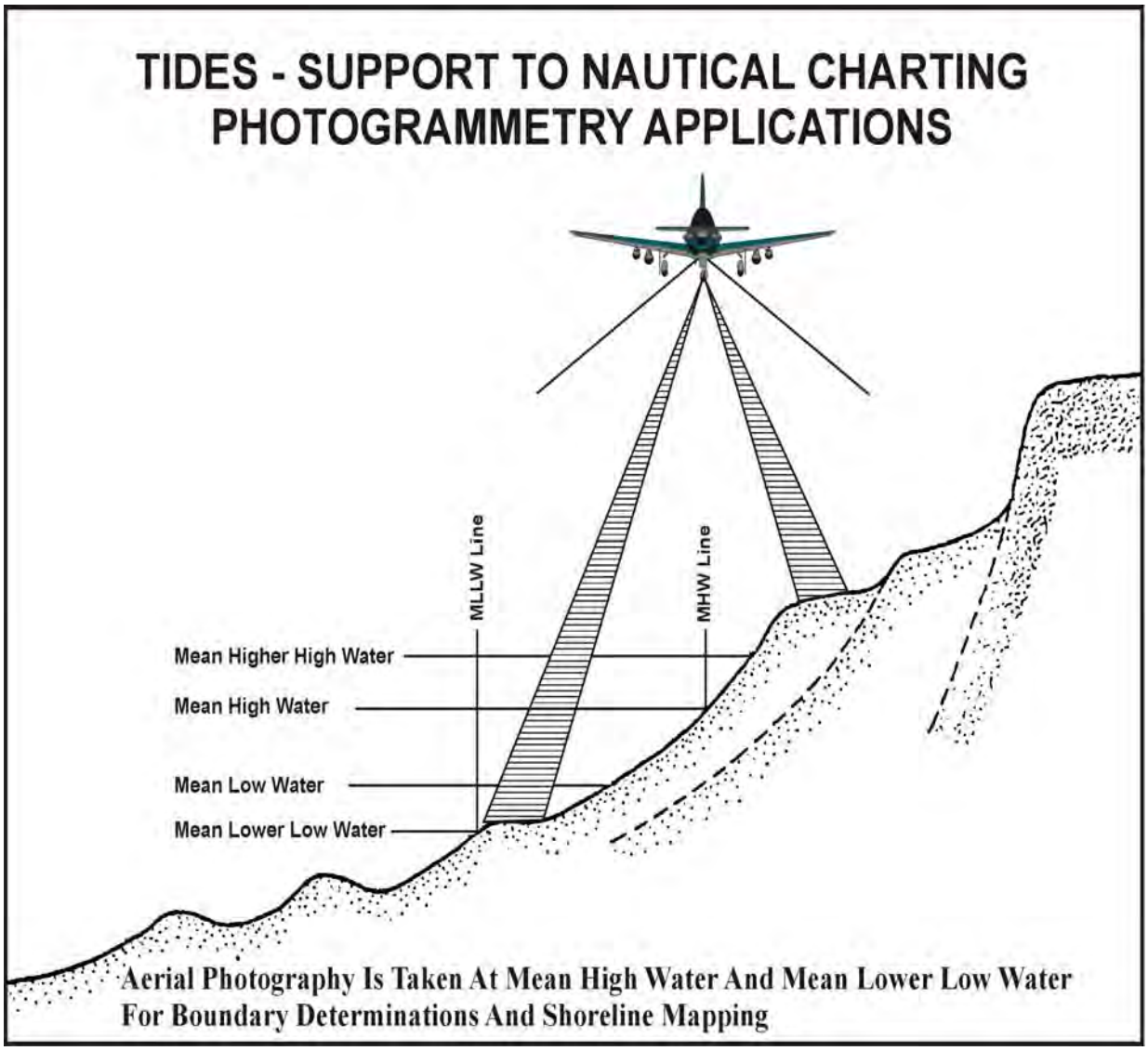

Figure 19. Applications of tidal datums to remote sensing for shoreline mapping.

B. Navigation

Mariners navigating coastal waters are expected to consider local tide and tidal current predictions, sea-state, and predictions of marine weather. Scheduling of the vessel may be adjusted so that the estimated time of arrival coincides with the most favorable conditions. Information may be obtained from commercial publications based on NOS tide prediction products.

NOS publishes nautical charts of the waters of the U.S. and its territories (*Coastal Mapping Handbook, 1978*). The charts are produced by taking into account the basic hydrographic and water level data produced by NOS. In addition, nautical charts are the principle means by which data from other agencies are organized and disseminated to the mariner in a relevant manner. The full benefit

of aids to navigation including improved channels and harbors, traffic separation schemes, and navigation regulations are obtained when organized on a nautical chart.

Nautical charts, in areas with slowly changing bathymetry, are revised every 4-12 years. More active areas may be revised every 2-3 years, and the most active areas, may be revised every 6 months. Charts are revised because of new aerial photographs of the region, field generated data on shoaling, dredging in channels, changes to visual or electronic aids to navigation, and natural or manmade changes to the shoreline or coastal structures.

The local nautical chart is the basis of decision-making in navigating a coastal region. On the nautical chart are printed the depths, tidal ranges, location of the dredged channels, obstructions and aids to navigation, and landmarks, which provide the visual information necessary for safe navigation and to determine location.

The predicted heights of the tides from the tide tables are referenced to chart datum on the local nautical charts, i.e., MLLW for U.S. Coastal waters. For foreign coasts, a datum approximating mean low water springs, Indian spring low water, or the lowest possible low water is generally used. In many countries, these datums are based on astronomical tide predictions, not observed water levels as is the practice of the U.S. The depression of the foreign datum below MSL is included in the Tide Tables. A new international chart datum has been proposed to be Lowest Astronomical Tide (LAT) which is defined as the elevation of the lowest predicted tide to occur over a 19-year period.

Since the depth of water on the nautical charts is referenced to MLLW, mariners use the height of the predicted tide is added to the depth shown on the chart to determine the predicted total water depth. If the sign of the predicted height is positive, it should be added to the charted depth; if the sign of the predicted height is negative, it should be subtracted from the charted depth. Use of MLLW in the U.S. is a conservative local reference plane at the lower low water phase of the tide to ensure that the depth of the water will at least approximately be the depth printed on the nautical chart.

Changes in sea level in the coastal zone are due not only to tides, but also to winds, barometric pressure, and freshets from river outflow. Onshore winds or low barometric pressure will cause the water level to be higher than the predicted tide, while offshore winds or high barometric pressure depresses sea level relative to the predicted tides. Freshets or drought conditions may cause height variations of more than plus or minus a foot, respectively, compared to the predicted tides.

The PORTS™ is an NOS program that provides real-time water level, wind speed and direction, current, water and air temperature data to vessels in the estuaries or harbors of San Francisco, New York/New Jersey, Houston/Galveston, Tampa Bay, and Chesapeake Bay. These variables provide detailed and local environmental conditions. Data quality assurance and control are exerted on the environmental sensors in PORTS™ (*Mero, 1998*). The CO-OPS program, CORMS, is a mechanism to monitor real-time data disseminated to the public on a 24 hour per day basis. If the data is valid as determined by CORMS personnel, it is disseminated to the public via the Internet (*Reilly et al, 1998*). Otherwise, data is withheld, and if necessary, sensor maintenance is performed (*e.g., Gill*

et al., 1997). A key to the correct application of real-time data is the knowledge of the MLLW reference. Without accurate knowledge of the tidal datum, the real-time water levels would have no practical meaning for real-time navigation users. As in traditional NOS tide prediction products, all PORTS™ water level information is disseminated (Internet text or graphic, or voice) referenced to MLLW.

Amphibious landings and exercises, as well as other coastal operations conducted by the military, require similar tidal information. NOS bathymetric data, nautical charts, and tidal predictions are utilized by the U.S. Army, Marine Corps, Navy and the U.S. Coast Guard (USCG) for planning and conducting these operations. NOS bathymetry and tidal predictions (or tidal constituents from which predictions are made) referenced to tidal datums, are incorporated into several military guides and decision aids. Applications include: determining clearances for landing craft, determining beach widths, operating wave and surf models that consider tidal effects on these important parameters, and taking advantage of total knowledge for efficient supply transfer from ships offshore over the beach.

C. Marine Boundaries

Although NOS is not responsible for the establishment of marine and coastal boundaries, it is required to provide the tidal datums necessary to support these boundaries *(Hull and Thurlow*). Chart datum, MLLW, is the elevation of the baseline for many marine boundaries, including most which are recognized by the United Nations Convention on the Law of the Sea (*U.S. Department of State Dispatch, 1995*). However, baselines may differ in position for the purposes of different statutes. The baselines (see Figure 17) usually consist of points or line segments on these tidal datum lines from which the marine boundaries are measured and constructed (e.g., *Shalowitz, 1962; Hull and Thurlow*).

The marine boundaries of the U.S. are:

1. Private U.S. property exists in most cases landward of MHW.

2. State-owned Tidelands exist between MHW and MLW in most cases. Refer to Fig. 18 for individual cases. U.S. Inland Waters are concurrently defined to exist between MHW and MLW for the purpose of marine navigation.

3. The State's Submerged Lands Boundary extends seaward 3 nautical miles from MLW, except for Texas and the Gulf coast of Florida where it terminates at 9 nautical miles. In this band, plus the state-owned tidelands, the states exercise the Public Trust Doctrine, subject to federal supremacy (*Putting the Public Trust Doctrine to Work, 1997*).

4. The Territorial Sea Boundary extends 12 nautical miles seaward of MLLW. It is also known as the Marginal Sea, Marine Belt, Maritime Belt, 12-Mile Limit, and Adjacent Sea Boundary. Historically, this boundary was 3 nautical miles; it was changed to its present 12 mile limit in 1988 (*U.S. Department of State Dispatch, 1995*). In the Territorial Sea, the sovereignty of the nation extends to the airspace above, the subsoil, the water, and the resources.

5. The Contiguous Zone Boundary occurs at 12 nautical miles from MLLW. In the U.S., the Territorial Sea and Contiguous Zone are coterminous (*U.S. Department of State Dispatch, 1995*). In the contiguous zone, the nation may exercise rights to protect its interests, but does not exert sovereign control. The main purpose of the contiguous zone is to exert control over shipping near a nation's coast. Referring to Fig. 20, under the United Nations Convention on the Law of the Sea, a coastal nation may declare a Contiguous Zone between 12 and 24 nautical miles.

6. The 200-mile Fishery Conservation Zone extends seaward from MLLW (*Hull and Thurlow*).

7. The Presidential Proclamation 5030 of March 1983, established the (EEZ), which claimed rights to living and mineral resources and jurisdiction of approximately 3.9 billion acres. The baseline for demarcation of the EEZ is the MLLW boundary of the Territorial Sea and extends 200 nautical miles. It should be noted that different coastal nations have different definitions of their ordinary low water. These definitions are not usually consistent with NOS definitions.

The Mean High Water Line (MHWL) is the coastal boundary between private and state property with the following exceptions (e.g., *Shalowitz, 1962; Maloney and Ausness, 1974*):

1. Maine, New Hampshire, Massachusetts, Pennsylvania, Delaware, Virginia, and Georgia use the Mean Low Water Line (MLWL).

2. Texas uses the Mean Higher High Water Line (MHHWL) when Spanish or Mexican grants are involved.

3. Louisiana has adopted the civil law boundary of the line of highest winter tide.

4. In Hawaii, the upland owner has title to the upper reaches of the wash of the waves.

Figure 20 illustrates the marine boundaries that are allowed by the United Nations Convention on the Law of the Sea (*U.S. Department of State Dispatch, 1995*). Figure 17 illustrates the application of the federal and state boundaries to the coastlines of the United States.

In order to map tidal boundaries such as MHWL or MLWL (e.g., *Shalowitz, 1962; Hull and Thurlow, 1981*), and determine the latitude and longitude coordinates of their intersection with the coast, the surveyor performs the following basic procedures:

1. Obtain the published bench mark information at or near the location.

2. Find the tidal bench marks and run a closed line or loop of differential levels from the bench marks to that part of the shore where the boundary is to be located, run levels along the shoreline, and mark or stake points at intervals along the shore in such a manner that the ground at each point is at the elevation of the tidal datum.

3. If the boundary is to be mapped, the horizontal distances and directions, or bearings, between each of these points and between those points or features in the area, and between the points and the horizontal control stations are measured so that the boundary may be plotted on a plat or map to the exact scale ratio and in true relation to other boundaries.

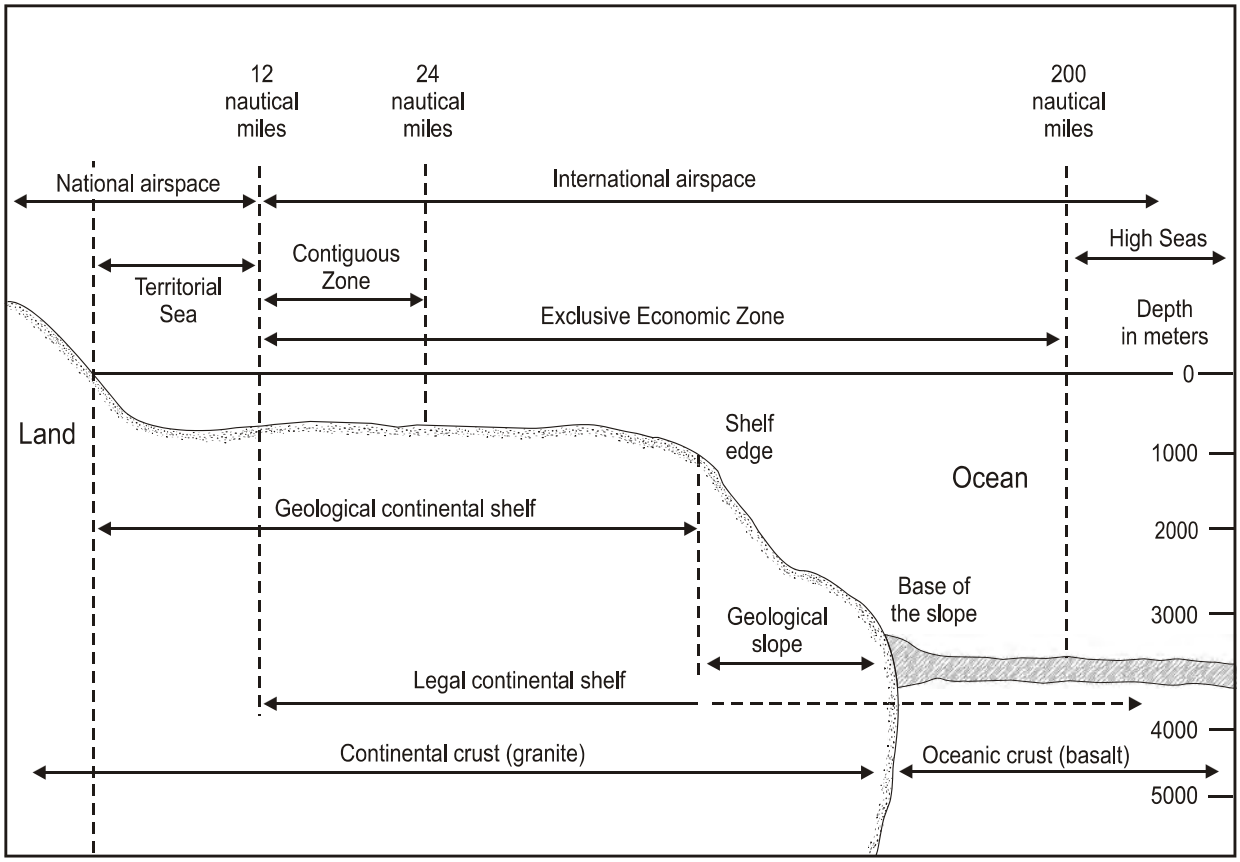

Figure 20. The marine boundaries allowed under the united Nations convention on the law of the Sea. The landward edge of the Territorial sea in the U.S. is the MLLW line (0 depth).

D. Sea Level

Estimates of Sea Level Change

The relative secular sea level change is readily seen (Figure 21) when the yearly mean sea level is plotted against time. For datum computation, the NTDE is used as the fixed period of time for determining tidal datums because it includes all significant tidal periods, is long enough to average out the local meteorological effects on sea level, and by specifying the NTDE, uniformity is applied to all the tidal datums. However, because of relative sea level change, as the years pass, tidal datums become out of date for navigational purposes (Figures 22 and 23). Thus, a new NTDE must be considered periodically (*Hicks, 1980*). NOS is reviewing the long-term sea level changes and potential elevation changes to tidal datums across the NWLON and will soon be updating to a new NTDE (*Gill, 1998*).

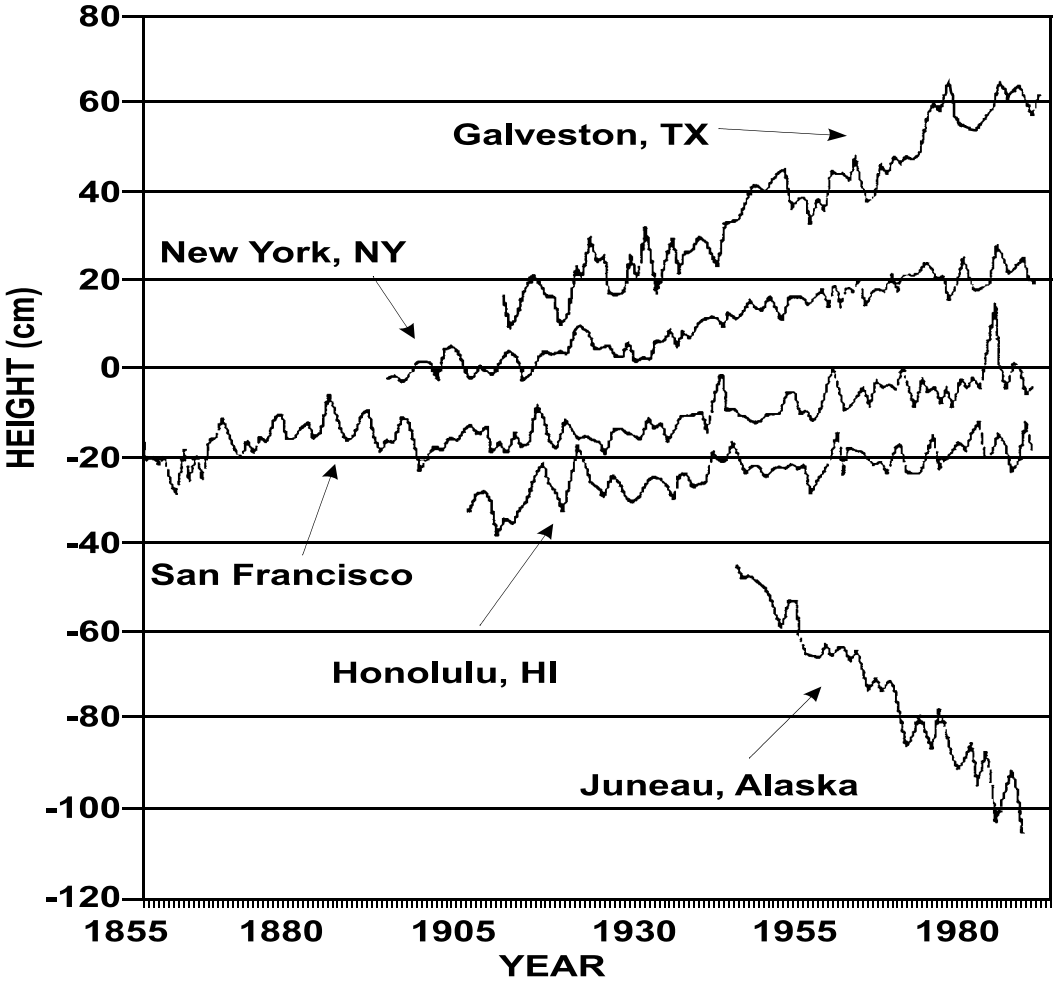

Figure 21. Relative sea level change at several locations in the U.S.

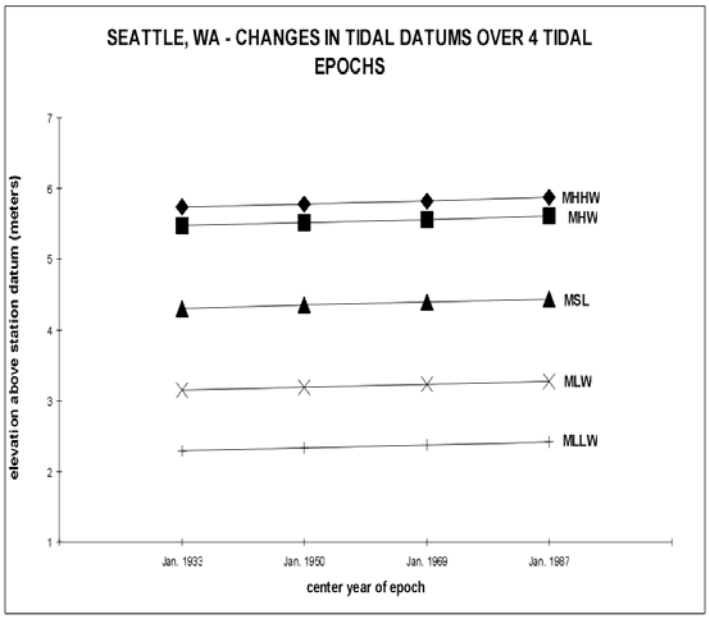

Figure 22. The change in the values of the principle tidal datums over four epochs at Seattle, WA. This represents a case where isostatic rebound nearly balances relative sea level rise.

NOS publishes relative sea level trends from stations in the NWLON (see http//co-ops.nos.noaa.gov under "publications") for both the entire series lengths and for a common period 1950-1993 for comparative purposes (see also *Lyles et al, 1988*). These sea level trends estimate the rate of change in sea level relative to the local land at each tide station. They are "relative" trends and are made possible by the routine quality assurance of the data, the careful routine surveying of the tide gauges to the local bench mark networks, and the monitoring of the vertical stability of individual bench marks and the tide gauge structures. By themselves, the trends provide no information as to what causes their magnitudes.

Relative secular sea level changes are composed primarily of two components; one is vertical land movement, the second is changes in the global water balance. Vertical land movement may be due to earthquakes, subsidence (downward) caused by the removal of oil or water or marsh compaction, glacial isostatic rebound (upward) caused by the melting of the glaciers from the last ice age of approximately 11,000 years ago, or by plate tectonics. The global water balance is influenced to the degree that water is either stored in or melting from polar ice caps, the Greenland ice sheet, and glaciers; stored in groundwater aquifers, lakes, and reservoirs; or changing in volume due to ocean thermohaline changes. In addition, there are long-term effects of the changes in the sizes of the ocean basins themselves due to crustal deformation. (*NRC, 1990*).

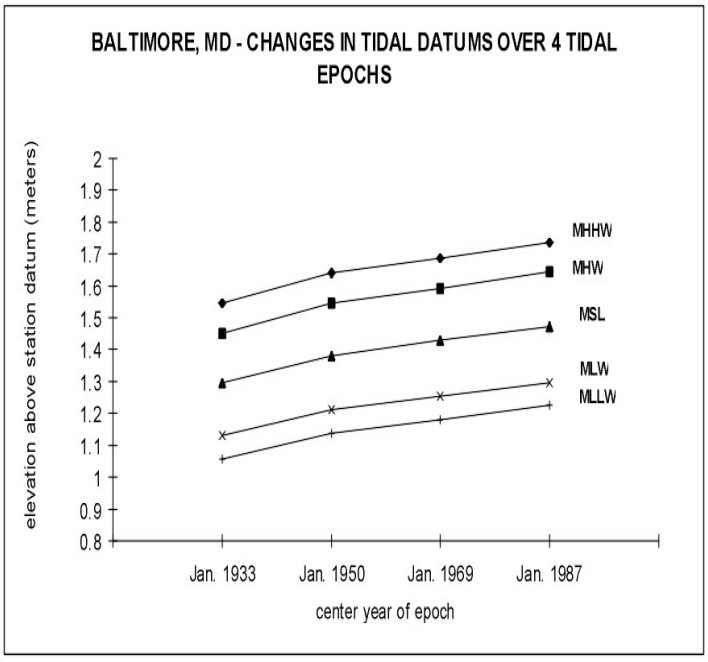

Figure 23. The change in the values of the principle tidal datums over four epochs at Baltimore. This represents a case where subsidence and relative sea level change require re-calculation of the tidal datums for the most recent epoch.

The vertical land movement component is known to dominate the relative sea level variations at many locations. For instance, at Skagway, Alaska, relative sea level is falling approximately 160 cm per century due to post glacial rebound of the land. At Grand Isle, Louisiana, relative sea level is rising at approximately 110 cm per century due to compaction of sediments and oil withdrawal in the Mississippi River delta region. Similarly, in the Galveston Bay, Texas region, the tide station record at Galveston indicates the relative sea level is rising at 75 cm per century.

Much of the active research in sea level analyses has been focused on the worldwide long- term tide gauge records and trying to determine what they can tell us about global sea level change. Various selection criteria and the use of post-glacial rebound models have been applied to the tide station data to attempt to take out the record the vertical land movement component so that the remaining signal would indicate true changes in global water balance (*Douglas, 1991 and 1992*). Current estimates of global sea level rise are between 10 cm and 20 cm per century (*Douglas, 1991 and 1992; Pilkey, 1981; NRC, 1990*).

The long-term effects of sea level rise are difficult to assess. For example, the present rate of 20 cm per century sea level change could result in a horizontal retreat of the shoreline of 500 to 1500 ft in the next 100 years over some stretches of the U.S. Coast. On East and Gulf Coast beaches, relative sea level rise is accompanied by lateral shoreline retreat orders of magnitude greater than the vertical rise in sea level because of the gentle slope of the coastal plain's surface. The extent to which shoreline retreat occurs is a function of the slope of the shore in low-lying areas. Cliffed shorelines retreat in catastrophic jumps. The evolution of coastal geomorphology is evident in the historical nautical charts of NOS, suggesting the erosional character of much of the U.S. shoreline, although the nautical charts should not be solely relied upon as proof.

E. Coastal Engineering

High water datums (such as MHW, MHHW) are applied to engineering design and construction of coastal structures such as seaports, harbors, navigation channels, turning basins, docking areas, bulkheads, sea walls, revetments, beach nourishment, breakwaters, offshore islands and platforms.

Carefully formulated design considerations, methodologies, and example problems are provided in the *U.S. Army Coastal Engineering Research Center Shore Protection Manual Vols. I-III (1998)*. The USACE also maintains a library of computer programs to assist in designing structures in the ocean environment, and distributes scientific and engineering guidance in *Coastal Engineering Technical Notes (1979-present)*. The USACE has historically contributed to applies research for the application of tidal datums to coastal engineering (see *Harris, 1981 and Harris, 1966*).

Coastal engineering begins with a thorough description and understanding of the marine environment at the site of the proposed construction. The physical environment requires detailed knowledge of the site location and conditions, bathymetry, and knowledge of water levels and currents. Wave conditions generated locally by the wind and swell, as well as the modification of waves by shoaling and refraction are considered. These shallow water wave modifications are often based on NOS bathymetric data and charts with consideration of tidal variations. Waves generated by extreme events such as hurricanes or tsunamis are often of importance. When currents are determined, such as for sediment transport calculations or to calculate current forces on structures,

NOS bathymetric data, charts, and tidal characteristics may be considered, especially if numerical circulation models are used. The design height of most coastal and ocean structures requires knowledge of the height of MLLW combined with the height of the astronomical tide, storm surge, and waves. The height of the highest and lowest observed tides relative to the engineering project datum are also valuable parameters.

The change in relative mean sea level may require that coastal engineers factor in effects of long-term sea level rise. Sea level change generally leads to increased erosion and wave-overtopping, both factors contributing to failure of a structure. Sea level change may be accounted for in two ways. The first is to build the structure with the projected sea level change as a design consideration. The second is to build the structure less expensively, and to factor in the future cost of structure modification as required (*NRC, 1987*).

F. Warnings and Hazard Mitigation

Tsunamis

Many stations in the NWLON in the Pacific are part of the Tsunami Warning Program (*NOS, 1983*). A tsunami wave is an ocean wave caused by an underwater earthquake, submarine landslide, or underwater volcano. In the open ocean a tsunami wave is about 100 miles long, a few feet high, and travels about 600 miles per hour. The speed of a tsunami is related to the depth of the ocean. When it approaches the shore, a tsunami's speed decreases, its length decreases, and its height increases. High tsunamis threaten lives and property in the coastal zone. A tsunami alert is first established through the seismographic network, mainly operated by the USGS. If an event is detected which could cause a tsunami, the tide gauges of the NWLON are monitored. Since tsunamis travel at predictable speeds, arrival times can be determined throughout the Pacific.

Tsunamis affect the entire Pacific Ocean. Tsunamis may also effect the Atlantic, however, the generally greater tectonic activity of the Pacific Basin makes the occurrence of tsunamis greater in the Pacific. According to the Alaska Tsunami Warning Center (ATWC) web site, http://www.alaska.net/~atwc/, tsunamis can travel across the Pacific in less than a day. A tsunami propagating from a nearby generation area may rise to height of over 30 m (100 ft), whereas a tsunami propagating from a distant generation area may rise to a height of 15 m (50 ft). Tsunamis of local origin may give communities only a few minutes to respond. More distant tsunamis increase the length of the warning time, but also increase the probability of a costly false alarm. The height of the tide may affect the severity of the tsunami.

Responding to the potential for natural disaster posed by tsunamis has caused elaborate interagency and international cooperative agreements. In the U.S., the interagency coordination includes NOAA's NOS and NWS, the USGS, and the Federal Emergency Management Agency (FEMA). NOS provides the water level data and tidal datums to measure the inundation parameters. NWS disseminates the warnings. USGS provides the seismic network to detect the tectonic disturbance. FEMA responds to the natural disasters caused by the flooding. On an international level, the International Tsunami Information Center (ITIC), located in Honolulu, Hawaii, coordinates dissemination of warnings and humanitarian aid. The 25 member nations are: Australia, Canada, Chile, China, Columbia, Cook Islands, Costa Rica, Democratic People's Republic of Korea,

Ecuador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Phillippines, Republic of Korea, Russian Federation, Singapore, Thailand, United States, and Western Samoa.

For the U.S., chart datum, MLLW, is the reference level to which the runup of the tsunami is measured, http://www.alaska.net/~atwc. Runup is defined as the maximum *height* of the water onshore observed above a reference sea level, usually measured at the horizontal inundation limit. The horizontal inundation limit is defined as the inland limit of wetting measured horizontally from the edge of the coast defined by mean sea level. In contrast, the horizontal inundation distance is defined as the distance that a tsunami wave penetrates onto the shore, measured horizontally from the mean sea level position of the water's edge. This distance is usually measured as the maximum distance for a particular segment of the coast. Inundation is defined as the depth, relative to a stated reference level, to which a particular location is covered by water.

Storm Surges

A storm surge (Figures 24 and 25) results from winds and reduced pressure in a hurricane, or a severe extra-tropical storm, (i.e., low-pressure system) traveling near the coast. By the inverse barometer effect, the elevation of the sea surface is raised by about one or two feet, and measures about 50 miles across (*e.g., Frazier, 1979*). Like the tsunami, as this dome of water approaches the shallow water of the coast, its amplitude increases. Added to the storm surge are the waves due to the onshore winds of the hurricane, plus the astronomical tides. During a storm surge event, the surge and high waves cause injury and death, property damage, damage to structures, avulsion, and erosion. In fact, during powerful northeasters, the NWLON stations, their instruments, stilling wells, protective wells, and piers may suffer varying degrees of damage. The surge may also propagate into estuaries and rivers, causing high waters and associated flooding inland.

One hundred and fifty-six NWLON stations are connected to the NWS' local forecast offices. Data are transmitted from the platform over the GOES satellite and then disseminated to NWS regional offices via the NWS Automation of Field Operations and Services (AFOS). In a non-storm event mode, data from all 156 stations are transmitted every hour. A new feature allows Internet access of event-triggered high rate GOES satellite data during storm events. NWS and CO-OPS web site users can obtain real-time graphical data of predicted and preliminary observed tides and meteorological parameters from stations where they are installed. CO-OPS provides a suite of automated products to NWS from the NWLON and from PORTS™ (*Burton, 2000).*

For simplicity, storm surge can be defined as the difference between the measured water levels and the elevation of the astronomically predicted tide. In most tidal areas, the maximum height reached by the storm surge is affected by the phase of the tide at the time of the surge and the stand of local mean sea level for that time of year. Spring tides may contribute to the overall damage and flooding effects of storms, while neap tides generally, though not always, tend to reduce the severeness. NOS publishes technical reports of damaging storms. Examples are given by *Deitemyer (1993)* and *Zervas et al , 2000.* The information included is date, time, and height of the maximum available water level above MLLW, MHHW, and National Geodetic Vertical Datum (NGVD 1929); the date and height of the maximum historical water above MLLW. These datums are referenced to the 1960-1978 epoch. About 5 hurricanes strike the United States coastline every 3 years. On

average, of these five, two are major hurricanes measuring a category 3 or higher (defined as having winds above 111 miles per hour) on the Saffir-Simpson Scale. These storms may cause billions of dollars in damages because of the construction of hotels, marinas, piers, homes, roads, bridges, and other forms of infrastructure, at elevation levels 10-15 ft above MSL.

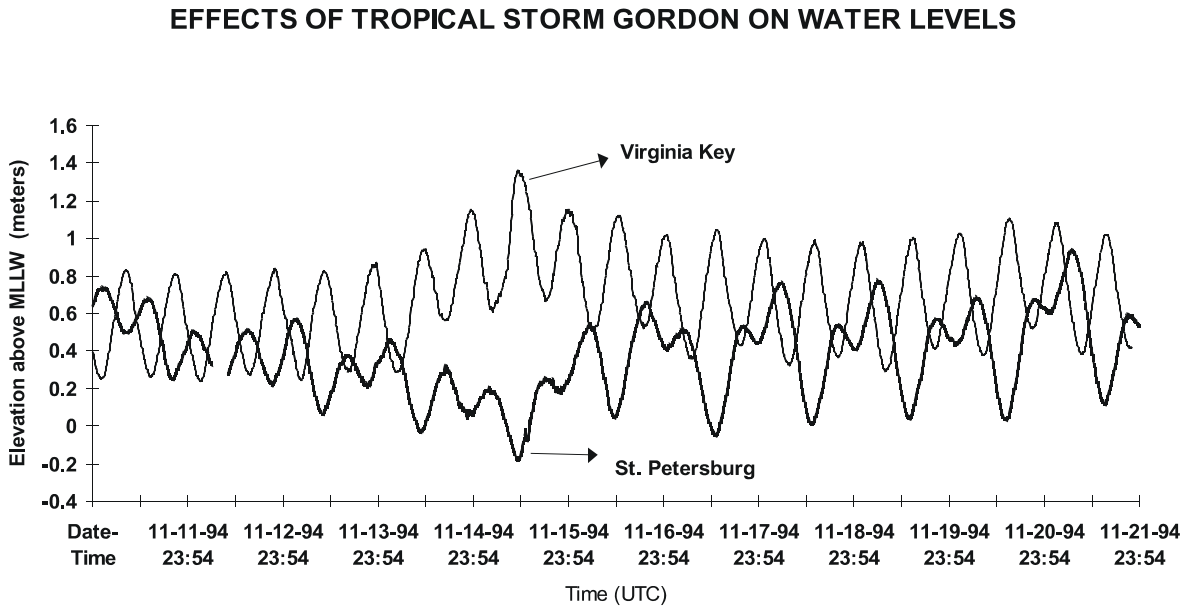

Figure 24. Elevated water levels due to the storm surge of tropical storm Gordon. In comparison to water levels at St. Petersburg, more pronounced effects are evident at Virginia Key.

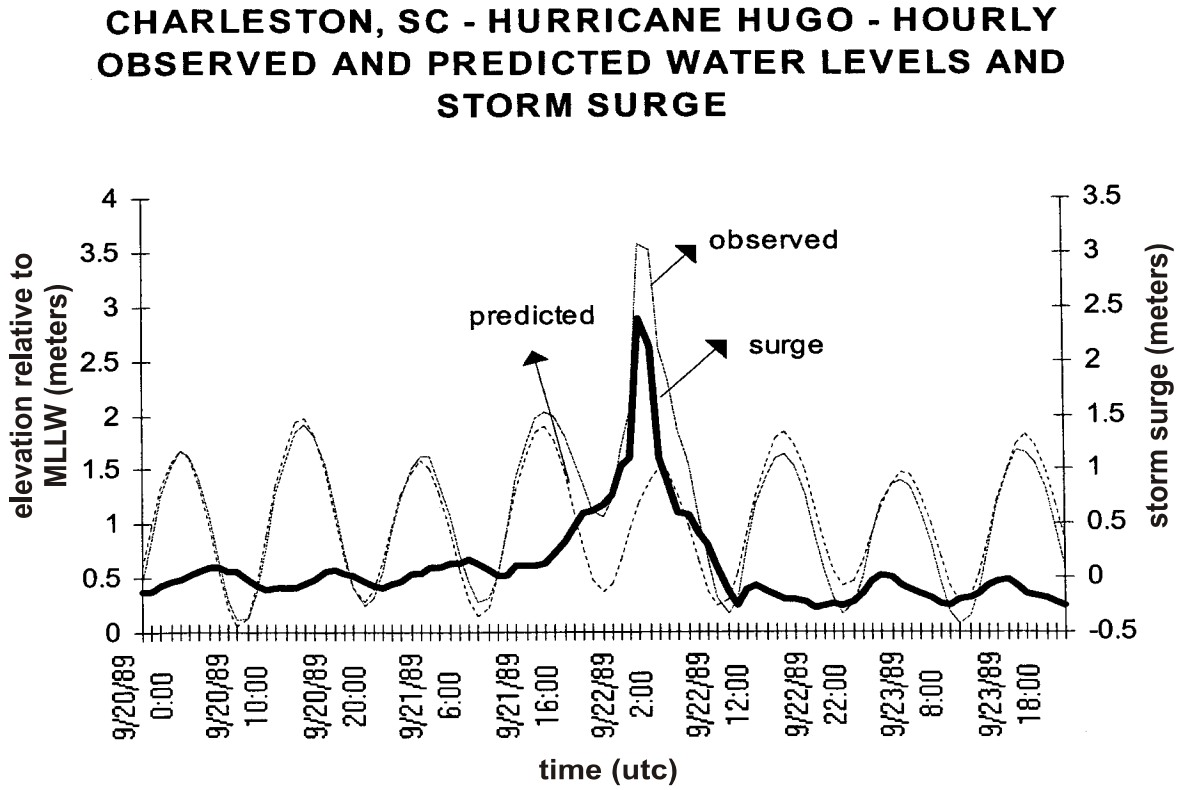

Figure 25. Observed, predicted, ans storm surge at Charleston, SC during hurricane Hugo.

Emergency Management

The warnings of natural disasters due to extreme oceanographic and meteorological events are the responsibility of NOAA's National Weather Service (NWS). The Internet address for near-real-time warnings is http://iwin.nws.noaa.gov/iwin/nationalwarnings.html. Hurricane, flood, special marine, winter storm, severe thunderstorm, flash flood, and tornado warnings are updated every minute. The web site provides nationwide coverage of all warnings applicable to the U.S.

Planning for and responding to natural disasters is mainly the responsibility of the FEMA. FEMA's National Flood Insurance Program (NFIP) has played a critical role in fostering and accelerating the principles of coastal flood management. Flood insurance is available to flood-prone communities through the NFIP, which is administered by FEMA. Prior to the NFIP, flood insurance was generally unavailable from the private sector and most states and local communities did not regulate flood plain development. Instead dependence was placed on the construction of flood control projects such as breakwaters and seawalls to reduce flood damage. Despite the expenditures of billions of dollars for these flood control projects, annual flood damages and disaster assistance costs were increasing at a rapid pace. In response to this worsening situation, Congress created the NFIP in 1968 to reduce flood losses and disaster relief cost by guiding future development away from flood hazard areas where practicable, requiring flood resistant design and construction, and transferring costs of losses to coastal occupants through flood insurance premiums.

According to FEMA, communities can reduce their vulnerability to hurricanes through the adoption and enforcement of wind- and flood-resistant building codes. Sound land-use planning can also ensure that structures are not built in the highest hazard areas. Simple construction techniques may also help. For example, coastal homes and businesses can be elevated to permit storm surges to pass under living and working spaces. The height of the structure should be above the base flood height (a flood height having a certain percent chance of being equaled or exceeded in a given year). The base flood is defined as the 100-year flood, and is the national basis of flood plain management and flood insurance (*FEMA, 1995*). Flood Insurance Studies (FIS) are studies to determine the risk of flood in a community. An FIS for a community may combine information from hydrologic and hydraulic studies, flood plain topographic surveys, information from flooded communities themselves, and statistical records of river, tsunami, and storm surge floods *(FEMA, 1996*). On the basis of the FIS, a Flood Insurance Rate Map (FIRM) is developed to outline on a USGS 7.5-minute quadrangle the spatial extent of flooded areas in the event of a base flood. These areas are called Special Flood Hazard Areas (SFHAs) (*FEMA, 1995*). The SFHAs are identified on the FIRM by the codes A, AE, AH, AO, AR, A1-30, A99, V, VE, and V1-30 (*FEMA, 1996*). The glossary that defines the significance of the these codes is found in *FEMA (1995)*. The horizontal datums that define FIRMS may be North American Datum (NAD 27), NAD 83, Puerto Rico, Old Hawaiian, or local. The vertical datum may be NGVD 29, North American Vertical Datum (NAVD 88), or local mean sea level.

Because of the inherent horizontal and vertical uncertainties associated with maps, FEMA urges that these FIRMS not be used for engineering studies, or for giving exact boundaries of SFHAs. FEMA (http://www.fema.gov) delivers a caveat that "users must apply considerable care and judgement in applying this product."

G. Modeling

Water levels, tides, storm surges, tsunamis, currents, temperature and salinity, and other physical, chemical and biological properties of the ocean-atmosphere-terrestrial system may be predicted by advanced hydrodynamical numerical models (*e.g., Hsueh, et al., 1997*). When hydrodynamical models are used to predict either tides, water levels, tsunamis or storm surges, the accuracy of their sea surface height fields are evaluated and calibrated by data obtained from NWLON stations and their international counterparts (*Schultz and Aikman, 1998; Le Provost et al., 1995; Gerritsen et al., 1995*). NOS bathymetric data and charts, referenced to tidal datums, also provide bottom depth and coastline boundaries for these models. Estuarine models have operational application to the navigation community especially in areas of low range of tide and significant contribution to water level variations due to weather. The models are capable of providing more accurate information on the forecasting of the actual water levels than traditional astronomical tide prediction products alone (*Bosley and Hess, 1997).*

NOAA's NWS is the lead civilian agency to develop and disseminate operational forecasts of marine weather. For the mariner, weather forecasts are essential. The chief variables are water level, current speed, water temperature and salinity, wind speed and direction, significant wave height, period and direction, air temperature, and visibility. In addition, special marine weather or severe oceanographic conditions due to hurricanes, storm surges and tsunamis are also publicly available. Forecasts for hurricanes or high seas are available over the Internet at http://www.nhc.noaa.gov. More standard marine forecasts including weather suitable for aviators are available from http://www.ncep.noaa.gov.

Emerging model areas for which vertical tidal and geodetic datums are important is in the topographic/bathymetric programs in numerical hydrodynamic models are run relative to specific tidal datums and geodetic datums. Important GIS applications for flooding, storm surge and other studies would result.

H. Other Vertical Datums and Their Relationship to Tidal Datums

When a position on the face of the earth is described accurately, it must be referenced in terms of latitude, longitude, and height, or three-dimensionally. This is accomplished by referencing positions in terms of vertical and horizontal datums. A geodetic or horizontal datum is a set of parameters defining a coordinate system, and a set of control points whose geometric relationships are known, either through measurement or calculation. Modern geodetic datums are defined with respect to the center of the Earth, while historical geodetic datums are defined with respect to fundamental points of the surface of the Earth.

Vertical datums allow determination of elevation or height. The zero surface to which elevations or heights are referred is called a vertical datum. Traditionally, surveyors and map makers have tried to simplify the task of determining elevation or height by using the average (or mean) sea level as the definition of zero elevation because the sea surface is available worldwide. However, for a local or regional area, there may be no tangible surface of the ocean from which to measure height. Therefore, some other reference must be used.

MSL is a close approximation to another surface, defined by gravity, called the geoid (Marmer, 1951). The geoid is the most accurate representation of the Earth's shape and the true zero surface

for measuring elevations, just as geodetic datums are the true references used for determining latitude and longitude. The geoid is the shape the ocean surface would have if it were not in motion and only influenced by gravity. To actually measure the heights above or below the geoid surface is difficult. Where this surface is located is inferred by making gravity measurements and by modeling it mathematically. The geoid is not the same as MSL; however, for practical purposes, one assumes that at the coastline the geoid and the MSL surfaces are essentially the same (Marmer, 1951). Gravity varies because the mass of the Earth varies due to differences in topography and the density of underlying materials.

Mariners use a variety of techniques and equipment to measure heights. Because assumptions are made, there is no guarantee that each technique will produce the same height measurement. Although a map or chart may state that heights are referenced to MSL, height measurement systems may not give exactly equivalent results. Different applications need heights and elevations with respect to different zero surfaces.

In order to understand the differences in vertical measurements and their representation on maps and charts or on the display of a piece of equipment, it is necessary to understand the differences between the topographic surface, ellipsoidal surface, and the geoid. The topographic surface is simply the actual visible surface of the Earth. A flattened sphere, which is called a spheroid or an ellipsoid, is used to represent the geometric model of the Earth. The reference ellipsoid is a mathematical model which approximates the irregular shape of the geoid. As mentioned earlier, the geoid, which is approximated by MSL, is the zero surface as defined by the Earth's gravity. Many reference ellipsoids are in use which minimize differences between the geoid and the ellipsoid for individual countries or continents. The most accurate global ellipsoid is the World Geodetic System (WGS 84). The geoid deviates slightly from the simpler WGS 84 reference ellipsoid due to local variations in topography and density of the Earth. For most of the Earth, the deviation between the mean sea level, geoid and the WGS84 Datum is within ± 40 meters. As mentioned earlier, locations on the Earth's surface must be defined in terms of horizontal position and vertical elevation. Presently, positions shown on some USGS topographic quadrangle maps are specified relative to the NAD83, which was based on the global WGS 84 ellipsoid.

MSL, as defined by NOS, is the local mean sea level determined over a specific NDTE and should not be confused with the fixed datums of the National Geodetic Reference System, the NGVD 1929 (previously referred to as the Sea Level Datum of 1929), or the NAVD 88.

NGVD 1929 is a fixed datum adopted as a standard geodetic reference for heights. It was derived from a general adjustment of the first order leveling nets of the U.S. and Canada, in which MSL was held fixed based on observations at 26 stations in the U.S. and Canada. Numerous adjustments have been made to these leveling nets since originally established in 1929. NGVD 1929 is no longer maintained by NGS as the official geodetic reference datum for the U.S. and has been superceded by NAVD88.

The official vertical reference datum, NAVD 88, and International Great Lakes Datum of 1985 (IGLD 85) are both based upon a simultaneous, least-squares, minimum constraint adjustment of the Canadian-Mexican-U.S. leveling observations. The height above local mean sea level for the

primary bench mark at Father Point/Rimouski, Quebec, Canada was held fixed as the single constraint.

These fixed geodetic datums (e.g., NGVD 1929 and NAVD 88) do not take into account the changing stands of sea level and because they represent a “best” fit over a broad area, their

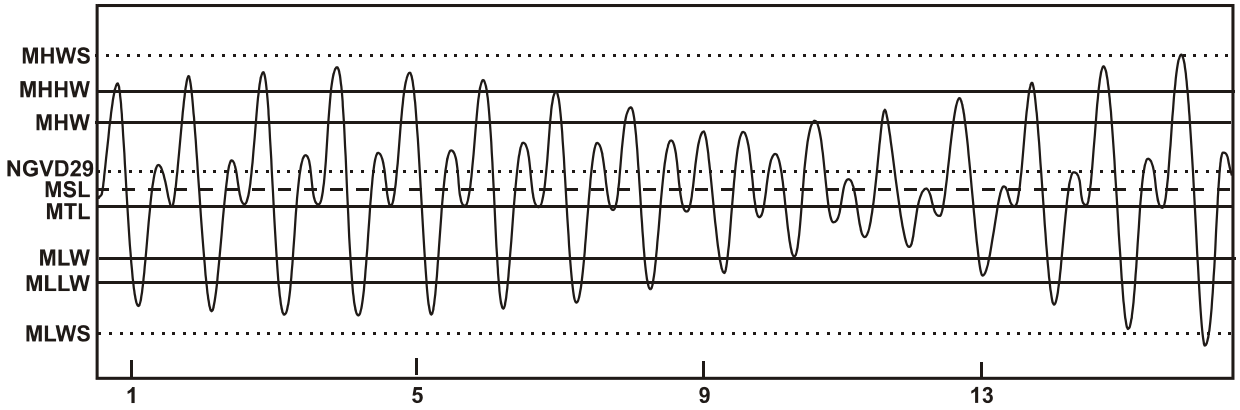

Figure 26. An illustration of the principal tidal datums and their relationship to the geodetic datum NGVD 1929 for a typical mixed tide curve.

relationship to local mean sea level differs from one location to another. Figure 26 illustrates the tidal datums with respect to a typical mixed tide curve. Mean High Water Springs (MHWS) is a tidal datum defined as the arithmetic mean of the high water heights occurring at the time of the spring tides during the NTDE. Mean Low Water Springs (MLWS) is a tidal datum defined as the arithmetic mean of the low water heights occurring at the time of the spring tides during the NTDE. Figure 27 illustrates how the elevation of the tidal datums change in relationship to the geodetic datums proceeding up a tidal river. The slopes of the changes in tidal datums relative to NAVD88, in this example, are highly dependent on changes in Mn. The illustration shows why tidal datums elevations, as well as their relationships to geodetic datums, should not be extrapolated too far from known locations without knowledge of the tidal characteristics of the estuary, bay, or river.

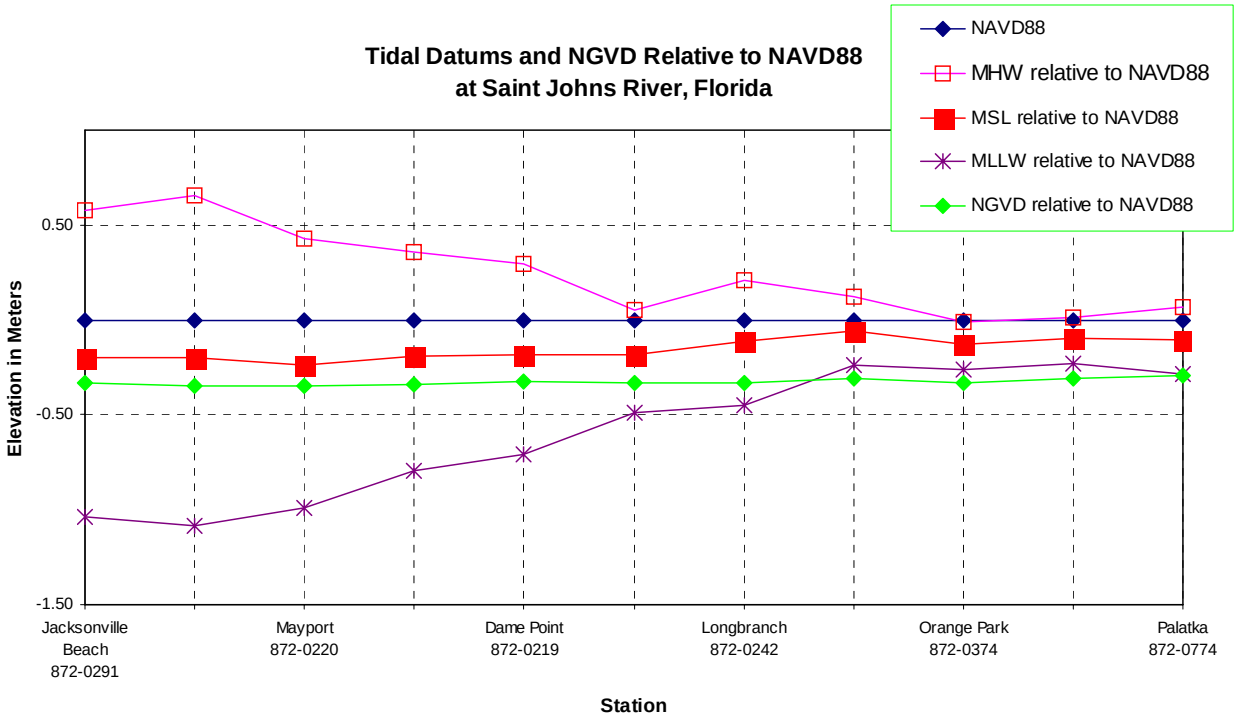

Figure 27. Tidal datums and geodetic datums for the St. Johns River**.**

Topographic Quadrangle Maps

The USGS is the lead civilian agency in data acquisition for elevation data of the land. This data is widely disseminated on USGS topographic maps. According to the USGS Web site, http://mapping.usgs.gov, the shoreline on USGS 7.5-minute quadrangle maps, and 7.5-minute Digital Electronic Models (DEMs) is defined as MHW. Typically, land elevations on USGS maps are referenced to NGVD 1929. Usually, NGVD 1929 is defined as the zero contour for elevations at MSL.

The 7.5-minute DEM is cast on a Universal Transverse Mercator (UTM) projection. These maps have a scale of 1:24,000. This means that 1 inch represents about 2000 ft, or 1 cm represents about 240 m. These elevation products have a root mean squared error (rmse) of 7 m as the desired vertical accuracy. The maximum error permitted is 15 m. According to USGS, an error due to a blunder of 50 m would be the absolute error tolerance in the vertical. On a 7.5-minute quadrangle, the purpose of the contours is primarily to indicate relief, and the contour interval is selected primarily to indicate spatial gradients in the vertical. Hence, accuracy is related to one-half of the contour interval. In the horizontal, 7.5-minute DEMs have a horizontal accuracy of 12.2 m (40 ft) for 90% of all horizontal points tested by USGS (*USGS Fact Sheet 078-96, 1997*). Accuracy testing occurs at several well-defined points in the 7.5-minute quadrangle, such as at the intersection of two roads, or a hill top. Since accuracy testing occurs throughout the quadrangle, this ensures that the elevation contours are internally consistent. The National Imagery and Mapping Agency (NIMA)

provides as a rule-of-thumb that maps of this scale may have a horizontal error as large as 50 m (*NIMA, 1998*).

On a USGS topographic map, a water body is assigned a constant elevation (*USGS, Standards for Digital Elevation Models, 1997*). Oceans or estuaries at "mean sea level," are typically assigned an elevation value of zero (i.e., NGVD 1929). However, the geometry of the mapped water body is, in part, a function of the aerial photogrammetry at the time of the survey. In low-lying coastal areas of gentle slopes, water bodies have different sizes, depending on Mn and the time of the survey relative to the tidal phase. Water bodies that do not have a published elevation are assigned an interpolated elevation which does not exceed the highest contour that approximates the shoreline of the water body. Swamps and marshes that join major water bodies at a particular elevation are forced to the elevation of the water body. Note that NGVD 1929 is not equal to MSL, MHW, or nautical chart datum, MLLW. All other inland water bodies are assigned an elevation referenced to NGVD 1929.

I. Tidal Datums and GPS

The impact of GPS technology on geodetic control surveys has been immense (Leick, 1990). The heights obtained from GPS are in a different height system than those historically obtained with traditional geodetic leveling. In the past, line-of-sight instrumentation was relied on to develop horizontal and vertical coordinates. With GPS, ground station intervisibility is no longer required, and surveys can be performed with much longer lines. Also, different instruments and survey techniques were used to measure horizontal and vertical coordinates, leading to two different networks with little overlap. GPS, on the other hand, is a three-dimensional system.

Implementing the use of differential GPS (DGPS) technology and procedures has great potential for application to marine surveying and mapping and has strong linkages to tidal datums and their operational application (*Martin, 1999*). There are several distinct applications for using DGPS: 1) to support the development of a seamless, geocentric reference system for the acquisition, management, and archiving of NOS water level data which will provide a nationally and globally consistent digital database which will comply with the minimum geospatial metadata standards of the National Spatial Data Infrastructure and connect the NOS water level database to the NGS NSRS; 2) to establish transformation functions between chart datum (MLLW) and the geocentric reference system to support NOS 3-dimensional hydrographic surveys and the implementation of Electronic Chart Display and Information Systems (ECDIS). Integration of DGPS procedures into CO-OPS PORTS™ operations will ensure safe and efficient navigation and cost-effective water-bourne commerce; 3) to use DGPS-derived orthometric heights to support water level datum transfers; and 4) to use DGPS at NWLON stations to monitor crustal motions (horizontal and vertical) in support of global climate change investigations.

To meet the requirements of these applications, NOS is establishing field requirements for the following: 1) conducting static DGPS surveys on a minimum of one bench mark at all NWLON stations and connecting additional GPS-observable marks during the static survey using rapid static GPS procedures to verify bench mark stability with priority will be given to connecting to NSRS, particularly NAVD 88 bench marks; 2) conducting static DGPS surveys on a minimum of one bench mark at subordinate water level stations with an accepted MLLW value (on current official NTDE)

and connect additional GPS-observable marks during the static survey using rapid static GPS procedures to verify bench mark stability with priority given to connecting to NSRS, particularly NAVD 88 bench marks; 3) conducting static DGPS surveys on a minimum of one bench mark at new temporary water level stations upon installation and connecting additional GPS-observable marks during the static survey using rapid static GPS procedures to verify bench mark stability with priority given to connecting to NSRS, particularly NAVD 88 bench marks; and 4) conducting static DGPS surveys at water level stations concurrently with the occupation of NAVD 88 marks to accomplish water level datum transfers using GPS-derived orthometric heights (*NGS 1997*).

GPS-derived orthometric heights can be accurately determined and used for water level datum transfers when following the established guidelines for 3-D precise relative positioning to measure ellipsoid heights, properly connecting to several NAVD 88 bench marks, and using the latest high-resolution modeled geoid heights for the area of interest. In many remote locations, the use of GPS-derived orthometric heights for datum transfer will be more efficient (timely) and more cost-effective than the use of conventional differential surveying techniques and may, under certain circumstances, preclude the installation of additional water level stations to establish a datum.

An ellipsoid height (h) is the distance from a point on the Earth's surface measured along a line perpendicular to a mathematically-defined reference ellipsoid. GPS is used to measure the ellipsoid height of a point relative to the reference ellipsoid, which presently is WGS84. WGS 84 is an earth-centered, earth-fixed coordinate system. See the Defense Mapping Agency (DMA) Technical Report, Department of Defense World Geodetic System 1984, DMA TR 8350.2 for a definition of WGS 84 and relationships with other geodetic systems. For the purpose of determining GPS-derived orthometric heights, WGS 84 and the NAD 83 are essentially the same datum. This is important to understand when choosing a geoid model for the orthometric height computation. An orthometric height (H) is the distance from a point on the Earth's surface measured along a line perpendicular to a reference geoid. The difference between the ellipsoid height and the orthometric height is the geoid height (N). The following simple relationship is used to determine GPS-derived orthometric heights:

$$H_{GPS} = h - N$$

where H_{GPS} is the GPS-derived orthometric height, h is the ellipsoid height measured with GPS, and N is a modeled geoid height using the latest high resolution geoid model, which currently is GEOID96. GEOID96 supports the direct conversion of NAD 83 ellipsoid heights to NAVD 88 orthometric heights. Access the NGS Web site, http://www.ngs.noaa.gov, to obtain and download available information on geoid models.

J. Environmental Applications: Wetlands, Marine Sanctuaries, NOAA's Trust Resources

Wetlands

Wenzel and Scavia (1993) point out that coastal wetlands, among the Earth's most productive ecosystems, are often filled, drained, dredged, or polluted. Wetlands are also lost because of the construction of canals, waterways, and diversion of sediment to the offshore region. They are nurseries for fish, mollusks, and shrimp, and are homes to many species of birds and other animals. Wetlands are

generally marshes, swamps, and mangrove forests. These are generally classified as back-barrier marshes, estuarine marshes, and tidal-freshwater marshes. Wetlands are a natural part of coastal recreation, serve to protect water quality, and help to prevent beach erosion. Wetlands account for most of the land within 1 m above MHW (*NRC, 1987*).

Ecological conditions in wetlands range from marine to terrestrial. The controlling factors are generally light, temperature, salinity, oxygen, geological/geomorphic processes, tidal and wave energy. A rise in sea level may cause a landward progression of biota, among other things. However, the ecological response may involve a complex set of interrelationships, depending upon the type of marsh (*NRC, 1987*).

In response to the loss of wetlands, several Federal agencies are involved in their scientific observation and mapping, as well as in the regulatory process. For example, NOAA is engaged in a nation-wide effort to map wetlands and perform habitat change analysis *Wenzel and Scavia* (1993). Section 10 of the Federal River and Harbors Act, Section 404 of the Federal Clean Water Act, and Executive Order 11988 on flood-plain management (*NRC, 1987*) establish permit requirements for actions that affect waterways and wetlands. In general, the philosophy of USACE and EPA is to discourage the issuance of a permit if the activity will alter wetlands, or to negotiate so that there is no net loss of wetlands. The Coastal Zone Management (CZM) Program is a voluntary partnership between the federal agencies and state governments. According to the Office of Ocean and Coastal Resource Management (OCRM), a total of 27 coastal states and five island territories have developed CZM programs, which protect more than 99% of the nations 95,000 miles of oceanic and Great Lakes coastline. Tidal datum information in NOS products and archives may be used to help delineate CZM boundaries and jurisdictions. A summary of ongoing NOAA applied research efforts to monitor coastal wetland loss due to increase in sea level in the Chesapeake Bay using tide gauge data and DGPS data are found in Nerem et al, 1998.

On nautical charts, NOS generally does not provide the MHWL on the ground in marsh areas. In wetlands, the MHWL is generally obscured. The MHWL in a wetlands will meander, be difficult to locate by an aerial photograph, and require a ground survey to map the tidal datums onto the land. In general, NOS surveys are made for nautical charts, and on the charts, the seaward edge of the wetlands is shown as the shoreline (*Hull and Thurlow*). This procedure is adequate for navigational purposes, but is not a shoreline for boundary purposes in wetlands.

Recent emerging applications of tidal datums and geodetic datums is exemplified by the Hamilton Marsh Restoration Project (USACE, 1999) in which CO-OPS and NGS are supporting the NOS ORR, the USACE, and local constituencies in the San Francisco Bay Area in restoring the Hamilton marsh by providing geodetic elevation maps using DGPS surveys and tidal datum and tidal prism information tied to geodetic datums. Knowing the elevations of the vertical reference datums are critical to a successful restoration process.

Additionally, the use of long term continuously operating GPS measurements co-located with long term sea level measurements has been initiated in the Chesapeake Bay to support further understanding and prediction of the roles of relative sea level rise and land subsidence on coastal wetland loss (Nerem et al 1998).

Marine Sanctuaries

The Marine Sanctuaries Act, U.S. Code 16, Conservation, Chapter 32, Marine Sanctuaries, extends Federal regulation into the ocean realm. The Marine Sanctuaries Act extends federal regulatory jurisdiction to the EEZ boundary, determined by MLLW. Maps depicting the boundaries of Marine Sanctuaries are drawn by using the tidal datums (e.g., MLLW) as the primary reference line. The act defines the term "marine environment," to be "those areas of coastal and ocean waters, the Great Lakes and their connecting waters, and submerged lands over which the United States exercises jurisdiction, including the exclusive economic zone, consistent with international law." Within this zone, the Secretary of the Department of Commerce may, "provide a coordinated and comprehensive approach to the conservation and management of special areas of the marine environment." The Secretary, among other things, must consider "the present and potential activities that may adversely affect the sanctuary"; the Secretary must work within a framework of "existing State and Federal regulatory and management authorities applicable to the area and the adequacy of those authorities"; consider the manageability of the area, including such factors as its size, its ability to be identified as a discrete ecological unit with definable boundaries, its accessibility, and its suitability for monitoring and enforcement activities"; assess " . . . the public benefits to be derived from sanctuary status, with emphasis on the benefits of long-term protection of nationally significant resources, vital habitats, and resources which generate tourism"; evaluate " . . . the negative impacts produced by management restrictions on income-generating activities such as living and nonliving resources development."

According to the Marine Sanctuaries Act, in the case that a "national marine sanctuary . . . is located partially or entirely within the seaward boundary of any State, the Governor affected may attest "to the Secretary that the designation of any of its terms is unacceptable, in which case the designation or the unacceptable term shall not take effect in the area of the sanctuary lying within the seaward boundary of the State." See the earlier section on state marine boundaries in this report. The Secretary may issue special use permits which "establish conditions of access to and use of any sanctuary resource," provided that "an activity . . . is compatible with the purposes for which the sanctuary is designated and with protection of sanctuary resources."

NOAA's Trust Resources

The NOS Office of Response and Restoration (ORR) has the primary responsibility within NOAA to implement these Marine Sanctuary regulations and those which follow from the Endangered Species Act and the Marine Mammal Protection Act. ORR provides decision makers with comprehensive scientific information on the resources of the nation's coastal areas, estuaries, and oceans.

The Damage Assessment Division (DAD) is an essential part of NOAA's effort to meet natural resource trustee responsibilities delegated to the agency by the Secretary of Commerce. Under the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), the Clean Water Act, the Oil Pollution Act of 1990, and the National Marine Sanctuaries Act, NOAA serves as the primary federal trustee for coastal and marine resources. Trust resources include commercial and recreational fishery resources; anadromous species; endangered and threatened marine species and their habitats; marine mammals, coastal habitats, and resources associated with marine sanctuaries and national estuarine research reserves. The Director ORR is the delegated authority to act as the "designated official" (i.e., the trustee) in executing natural resource authorities.

The DAD mission is to restore coastal and marine resources that sustain injury from oil spills or hazardous material releases. DAD pursues this specific, results-oriented mission to reverse human impacts on coastal systems through the following approach: 1) assesses injury to NOAA trust resources caused by spills and chronic releases of hazardous materials or oil; 2) develops plans for restoring injured resources and replacing lost natural resource services–these plans serve as the basis for damage claims; and 3) recovers restoration funds from polluters through negotiation or legal action. No other federal agency is a trustee for these natural resources and, therefore, only NOAA would pursue damage actions to restore coastal resources.

Damage assessment actions fill a unique niche in NOAA's stewardship portfolio by directly restoring injured coastal resources using funds recovered from those responsible for causing the injury. Since its inception in 1990, NOAA's Damage Assessment and Restoration Program has recovered more than $150 million for the restoration of NOAA trust resources. These funds are now being used to implement approximately 20 restoration projects around the country.

The Hazardous Materials Response and Assessment (HAZMAT) Division also conducts state-of-the-art science, and directly applies the results for injury assessment and restoration planning. HAZMAT provides an incentive for industry to follow environmentally-responsible business practices, thus avoids the risk of natural resource liability and helps state and federal trustee agencies develop more effective programs for restoring natural resources.

A primary tool for the biological description of coastal zones and marine sanctuaries is the Environmental Sensitivity Index (ESI) maps. According to HAZMAT, http://response.restoration.noaa.gov/esi/esiintro.html, three primary kinds of information are displayed: shoreline rankings, biological resources, and human-use resources. The classification scheme is described in *Environmental Sensitivity Index Guidelines. Version 2.0 (NOAA, 1997).* Briefly, the shoreline classification is ranked on a scale of one through ten based on the natural persistence of oil and its ease of cleanup. A shoreline classified as "one" would typically be exposed to high wave and tidal current energy, have a steep slope, be composed of bedrock, and have biological resources in low-concentrations of individuals. A shoreline ranked as "ten" would be nearly devoid of tidal energy, would have a flat slope, be composed of mud, and have high biological value. Biological resources are mapped according to species. For each species, the spatial boundaries of their ecological niches are mapped. A brief listing is provided below (the interested reader should consult the documentation for more details):

- Marine Mammals – concentration areas, migratory areas.
- Terrestrial Mammals – concentration areas, intertidal feeding, endangered species.
- Birds – concentration areas, rookeries, migratory patterns, endangered species.
- Reptiles and Amphibians – concentration areas, nesting beaches, endangered species.
- Fish – concentration areas, spawning grounds, nurseries, endangered species.
- Invertebrates – concentration areas, harvest areas, endangered species.
- Habitats and Plants – concentration areas, sub-tidal, intertidal, wetland, and upland species.

Shoreline habitats are indicated by a color-coded ranking scheme. The designation of coastal habitats are indicated by a color line with no dimension. The maps handle gentle-sloping coastal areas with large tidal ranges, and hence wide intertidal zones, by filling in the entire area from low-water to

high-water with the habitat classification color. If wetland data is available, the entire extent of the wetland is filled with a color code. Both the seaward edge and the landward edge are indicated.

Lastly, the boundaries of recreational and management areas, resource extraction sites, and cultural resources are delineated on ESI maps. The management areas include, among other things, marine sanctuaries, national wildlife refuges, national and state parks, and reserves and preserves set up by various agencies and organizations.

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9. GLOSSARY

A

absolute mean sea level change.
A eustatic change in mean sea level relative to the geographic center of the Earth.

accepted values
Tidal datums, tidal ranges and Greenwich high and low water intervals obtained through primary determination or through secondary determination through simultaneous observational comparisons made with a primary control tide station in order to derive the equivalent of a 19-year value.

ADR gauge
Analog to Digital Recorder. A float or pressure actuated water level gauge that records the heights at regular time intervals in digital format. The NOS gauges typically output 6-minute interval data onto punched-paper-tape.

air acoustic ranging sensor
A pulsed, acoustic ranging device using the air column in a tube as the acoustic sound path. The fundamental measurement is the time it takes for the acoustic signal to travel from a transmitter to the water surface and then back to the receiver. The distance from a reference point to the water surface is derived from the travel time. A calibration point is set at a fixed distance from the acoustic transducer and is used to correct the measured distance using the calibrated sound velocity in the tube.

air temperature sensors
Thermistors located in the protective well of a NGWLMS for the purpose of verifying uniformity of temperature for measurements taken by the air acoustic ranging sensor.

apogean tides or apogean tidal currents
Tides of decreased range or currents of decreased speed occurring monthly as the result of the Moon being in apogee. The apogean range (An) of the tide is the average range occurring at the time of apogean tides and is most conveniently computed from the harmonic constants. It is smaller than the mean range, where the type of tide is either semidiurnal or mixed, and is of no practical significance where the type of tide is predominantly diurnal.

apogee
The point in the orbit of the Moon or man-made satellite farthest from the Earth. The point in the orbit of a satellite farthest from its companion body.

apparent secular trend
The nonperiodic tendency of sea level to rise, fall, or remain stationary with time. Technically, it is frequently defined as the slope of a least-squares line of regression through a relatively long series of yearly mean sea-level values. The word "apparent" is used since it is often not possible to know whether

a trend is truly nonperiodic or merely a segment of a very long (relative to the length of the series) oscillation.

automatic tide gauge
An instrument that automatically registers the rise and fall of the tide. In some instruments, the registration is accomplished by recording the heights at regular time intervals in digital format; in others, by a continuous graph of height against time. The automatic gauges used in the past by the National Ocean Service were of both types.

B

bench mark (BM)
A fixed physical object or mark used as reference for a vertical datum. A tidal bench mark is one near a tide station to which a tide staff and tidal datums are referred. A primary bench mark is the principal (or only) mark of a group of tidal bench marks to which the tide gauge measurements and tidal datums are referred. The standard tidal bench mark of the National Ocean Service is a brass, bronze, or aluminum alloy disk 3-½ inches in diameter containing the inscription NATIONAL OCEAN SERVICE together with other individual identifying information. A vertical geodetic bench mark identifies a surveyed point in the National Geodetic Vertical Network. Most geodetic bench mark disks contain the inscription VERTICAL CONTROL MARK NATIONAL GEODETIC SURVEY with other individual identifying information. Bench mark disks may also be horizontal control pojnts and are so designated on their stampings. Bench mark disks of either type may, on occasion, serve simultaneously to reference both tidal and geodetic datums. Numerous bench marks of predecessor organizations to NOS, or parts of other organizations absorbed into NOS, still bear the inscriptions: U.S. COAST & GEODETIC SURVEY, NATIONAL OCEAN SURVEY, U.S. LAKE SURVEY, CORPS OF ENGINEERS, and U.S. ENGINEER OFFICE.

bubbler tide gauge
NOS has used this type of gas-purged pressure water level gauge in various configurations over time and is typically configure with a brass cylindrical orifice below the water linked through a length of neoprene rubber tubing to a bellows mechanism (historically) or a strain-gauge or crystal oscillator pressure transducer (present) to measure the water level elevation above the orifice. NOS systems use nitrogen gas supplied from a supply tank at the station. Because the bellows or the transducers are vented to the atmosphere, barometric pressure corrections to obtain water level relative to the land are not required.

C

chart datum
The datum to which soundings on a chart are referred. It is usually taken to correspond to a low-water elevation. Since 1989, chart datum has been implemented to mean lower low water for all marine waters of the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands. See datum and National Tidal Datum Convention of 1980.

Coast and Geodetic Survey
A former name of the National Ocean Service. The organization was known as: The Survey of the Coast from its founding in 1807 to 1836, Coast Survey from 1836 to 1878, Coast and Geodetic Survey from 1878 to 1970, and National Ocean Survey from 1970 to 1982. In 1982 it was named National Ocean Service. From 1965 to 1970, the Coast and Geodetic Survey was a component of the Environmental Science Services Administration (ESSA). The National Ocean Survey was a component of the National Oceanic and Atmospheric Administration (NOAA). NOAA became the successor to ESSA in 1970. The National Ocean Service is a component of NOAA, U.S. Department of Commerce.

coast line
The low water datum line for purposes of the Submerged Lands Act (Public Law 31). See shoreline.

coastal boundary
The mean high water line (MHWL) or mean higher high water line (MHHWL) when tidal lines are used as the coastal boundary. Also, lines used as boundaries inland of and measured from (or points thereon) the MHWL or MHHWL. See marine boundary.

coastal zone (legal definition for coastal zone management)
The term coastal zone means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each and in proximity to the shorelines of the several coastal states, and includes islands, transitional and inter-tidal areas, salt marshes, wetlands, and beaches. The zone extends, in Great Lakes waters, to the international boundary between the Unites States and Canada and in other areas seaward to the outer limit of the United States territorial sea. The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers, or agents.

comparison of simultaneous observations
A tidal datum reduction process in which a short series of tide or tidal current observations at any place is compared with simultaneous observations at a control station where tidal or tidal current constants have previously been determined from a long series of observations. For tides, it is usually used to adjust constants from a subordinate station to the equivalent of that which would be obtained from a l9-year series.

constituent
One of the harmonic elements in a mathematical expression for the tide-producing force and in corresponding formulas for the tide or tidal current. Each constituent represents a periodic change or variation in the relative positions of the Earth, Moon, and Sun. A single constituent is usually written in the form $y = A \cos (at + \alpha)$, in which y is a function of time as expressed by the symbol t and is reckoned from a specific origin. The coefficient A is called the amplitude of the constituent and is a measure of its relative importance. The angle $(at + \alpha)$ changes uniformly and its value at any time is called the phase of the constituent. The speed of the constituent is the rate of change in its phase and is represented by the symbol a in the formula. The quantity a is the phase of the constituent at the initial instant from which

the time is reckoned. The period of the constituent is the time required for the phase to change through 360˚ and is the cycle of the astronomical condition represented by the constituent.

control station
See primary control tide station, secondary control tide station, and control current station.

data collection platform (DCP)
A microprocessor based system that collects data from sensors, processes the data, stores the data in random access memory (RAM), and provides communication links for the retrieval or transmission of the data.

D

datum of tabulation
A permanent base elevation at a tide station to which all tide gauge measurements are referred. The datum is unique to each station and is established at a lower elevation than the water is ever expected to reach. It is referenced to the primary bench mark at the station and is held constant regardless if changes to the tide gauge or tide staff. The datum of tabulation is most often at the zero of the first tide staff installed.

datum (vertical)
For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks. See chart datum.

diurnal
Having a period or cycle of approximately one tidal day. Thus, the tide is said to be diurnal when only one high water and one low water occur during a tidal day, and the tidal current is said to be diurnal when there is a single flood and a single ebb period of a reversing current in the tidal day. A rotary current is diurnal if it changes its direction through all points of the compass once each tidal day. A diurnal constituent is one which has a single period in the constituent day. The symbol for such a constituent is the subscript 1. See stationary wave theory and type of tide.

diurnal inequality
The difference in height of the two high waters or of the two low waters of each tidal day; also, the difference in speed between the two flood tidal currents or the two ebb currents of each tidal day. The difference changes with the declination of the Moon and, to a lesser extent, with the declination of the Sun. In general, the inequality tends to increase with increasing declination, either north or south, and to diminish as the Moon approaches the Equator. Mean diurnal high water inequality (DHQ) is one-half the average difference between the two high waters of each tidal day observed over the National Tidal Datum Epoch. It is obtained by subtracting the mean of all the high waters from the mean of the higher high waters. Mean diurnal low water inequality (DLQ) is one-half the average difference between the

two low waters of each tidal day observed over the National Tidal Datum Epoch. It is obtained by subtracting the mean of the lower low waters from the mean of all the low waters. Tropic high water inequality (HWQ) is the average difference between the two high waters of each tidal day at the times of tropic tides. Tropic low water inequality (LWQ) is the average difference between the two low waters of each tidal day at the times of tropic tides. Mean and tropic inequalities, as defined above, are applicable only when the type of tide is either semidiurnal or mixed. Diurnal inequality is sometimes called declinational inequality.

diurnal range
Same as great diurnal range.

diurnal tide level
A tidal datum midway between mean higher high water and mean lower low water.

duration of rise and duration of fall
Duration of rise is the interval from low water to high water, and duration of fall is the interval from high water to low water. Together they cover, on an average, a period of 12.42 hours for a semidiurnal tide or a period of 24.84 hours for a diurnal tide. In a normal semidiurnal tide, duration of rise and duration of fall each will be approximately equal to 6.21 hours, but in shallow waters and in rivers there is a tendency for a decrease in duration of rise and a corresponding increase in duration of fall.

E

earth tide
Periodic movement of the Earth's crust caused by gravitational interactions between the Sun, Moon, and Earth.

ecliptic
The intersection of the plane of the Earth's orbit with celestial sphere.

epoch
(1) Also known as phase lag. Angular retardation of the maximum of a constituent of the observed tide (or tidal current) behind the corresponding maximum of the same constituent of the theoretical equilibrium tide. It may also be defined as the phase difference between a tidal constituent and its equilibrium argument. As referred to the local equilibrium argument, its symbol is k. When referred to the corresponding Greenwich equilibrium argument, it is called the Greenwich epoch that has been modified to adjust to a particular time meridian for convenience in the prediction of tides is represented by g or by k'. The relations between these epochs may be expressed by the following formula:
$G = k + pL$
$g = k' = G - aS / 15$
in which L is the longitude of the place and S is the longitude of the time meridian, these being taken as positive for west longitude and negative for east longitude; p is the number of constituent periods in the constituent day and is equal to 0 for all long-period constituents, 1 for diurnal constituents, 2 for semidiurnal constituents, and so forth; and a is the hourly speed of the constituent, all angular

measurements being expressed in degrees. (2) As used in tidal datum determination, it is 19-year cycle over which tidal height observations are averaged in order to establish the various datums. As there are periodic and apparent secular trends in sea level, a specific 19-year cycle (the National Tidal Datum Epoch) is selected so that all tidal datum determinations throughout the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands, will have a common reference. See National Tidal Datum Epoch.

equatorial tides
Tides occurring semimonthly as a result of the Moon being over the Equator. At these times the tendency of the Moon to produce a diurnal inequality in the tide is at a minimum.

equilibrium argument
The theoretical phase of a constituent of the equilibrium tide. It is usually represented by the expression (V + u), in which V is a uniformly changing angular quantity involving multiples of the hour angle of the mean Sun, the mean longitudes of the Moon and Sun, and the mean longitude of lunar or solar perigee; and u is a slowly changing angle depending upon the longitude of the Moon's node. When pertaining to an initial instant of time, such as the beginning of a series of observations, it is expressed by (V_o + u).

equilibrium theory
A model under which it is assumed that the waters covering the face of the Earth instantly respond to the tide-producing forces of the Moon and Sun to form a surface of equilibrium under the action of these forces. The model disregards friction, inertia, and the irregular distribution of the land masses of the Earth. The theoretical tide formed under these conditions is known as the equilibrium tide.

equilibrium tide
Hypothetical tide due to the tide producing forces under the equilibrium theory. Also known as gravitational tide.

equinoctial tides
Tides occurring near the times of the equinoxes.

equinoxes
The two points in the celestial sphere where the celestial equator intersects the ecliptic; also, the times when the Sun crosses the equator at these points. The vernal equinox is the point where the Sun crosses the Equator from south to north and it occurs about March 21. Celestial longitude is reckoned eastward from the vernal equinox. The autumnal equinox is the point where the Sun crosses the Equator from north to south and it occurs about September 23.

equipotential surface
Same as geopotential surface.

estuary
An embayment of the coast in which fresh river water entering at its head mixes with the relatively saline ocean water. When tidal action is the dominant mixing agent it is usually termed a tidal estuary. Also,

the lower reaches and mouth of a river emptying directly into the sea where tidal mixing takes place. The latter is sometimes called a river estuary.

eustatic sea level rate
The worldwide change of sea level elevation with time. The changes are due to such causes as glacial melting or formation, thermal expansion or contraction of sea water, etc.

extreme high water
The highest elevation reached by the sea as recorded by a tide gauge during a given period. The National Ocean Service routinely documents monthly and yearly extreme high waters for its control stations.

extreme low water
The lowest elevation reached by the sea as recorded by a tide gauge during a given period. The National Ocean Service routinely documents monthly and yearly extreme low water for its control stations.

F

first reduction
A method of determining high and low water heights, time intervals, and ranges from an arithmetic mean without adjustment to a long-term series through simultaneous observational comparisons.

float well
A stilling well in which the float of a float-actuated gauge operates. See stilling well.

forced wave
A wave generated and maintained by a continuous force. See gravity wave.

Fourier series
A series proposed by the French mathematician Fourier about the year 1807. The series involves the sines and cosines of whole multiples of a varying angle and is usually written in the following form:
$y = A_o + A_1 \sin x + A_2 \sin 2x + A_3 \sin 3x + ... B_1 \cos x + B_2 \cos 2x + B_3 \cos 3x + ...$
By taking a sufficient number of terms the series may be made to represent any periodic function of x.

free wave
A wave that continues to exist after the generating force has ceased to act.

G

geodetic datum
See National Geodetic Vertical Datum of 1929 and North American Vertical Datum of 1988.

geopotential

The unit of geopotential difference, equal to the gravity potential of 1 meter squared per second squared, m^2 / s^2, or 1 joule per kilogram, J / kg.

geopotential anomaly (delta D)
The excess in geopotential difference over the standard geopotential difference [at a standard specific volume at 35 parts per thousand (˚/oo) and 0 degrees C] between isobaric surfaces. See geopotential and geopotential topography.

great diurnal range (Gt)
The difference in height between mean higher high water and mean lower low water. The expression may also be used in its contracted form, diurnal range.

great tropic range (Gc)
The difference in height between tropic higher high water and tropic lower low water. The expression may also be used in its contracted form, tropic range.

Greenwich argument
Equilibrium argument computed for the meridian of Greenwich.

Gulf Coast Low Water Datum (GCLWD)
A tidal datum. Used as chart datum from November 14, 1977, to November 27, 1980, for the coastal waters of the Gulf coast of the United States. GCLWD is defined as mean lower low water when the type of tide is mixed and mean low water (now mean lower low water) when the type of tide is diurnal. See National Tidal Datum Convention of 1980.

geopotential difference
The work per unit mass gained or required in moving a unit mass vertically from one geopotential surface to another. See geopotential, geopotential anomaly, and geopotential topography.

geopotential (equipotential) surface
A surface that is everywhere normal to the acceleration of gravity.

geopotential topography
The topography of an equiscalar (usually isobaric) surface in terms of geopotential difference. As depicted on maps, isopleths are formed by the intersection of the isobaric surface with a series of geopotential surfaces. Thus, the field of isopleths represents variations in the geopotential anomaly of the isobaric surface above a chosen reference isobaric surface (such as a level of no motion).

H

half-tide level
A tidal datum. The arithmetic mean of mean high water and mean low water. Same as mean tide level.

harmonic analysis

The mathematical process by which the observed tide or tidal current at any place is separated into basic harmonic constituents.

harmonic constants
The amplitudes and epochs of the harmonic constituents of the tide or tidal current at any place.

harmonic prediction
Method of predicting tides and tidal currents by combining the harmonic constituents into a single tide curve. The work is usually performed by electronic digital computer.

head of tide
The inland or upstream limit of water affected by the tide. For practical application in the tabulation for computation of tidal datums, head of tide is the inland or upstream point where the mean range becomes less than 0.2 foot. Tidal datums (except for mean water level) are not computed beyond

high tide
Same as high water.

high water (HW)
The maximum height reached by a rising tide. The high water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions. For tidal datum computational purposes, the maximum height is not considered a high water unless it contains a tidal high water.

high water line
The intersection of the land with the water surface at an elevation of high water.

high water mark
A line or mark left upon tide flats, beach, or along shore objects indicating the elevation of the intrusion of high water. The mark may be a line of oil or scum on along shore objects, or a more or less continuous deposit of fine shell or debris on the fore shore or berm. This mark is physical evidence of the general height reached by wave run up at recent high waters. It should not be confused with the mean high water line or mean higher high water line.

higher high water (HHW)
The highest of the high waters (or single high water) of any specified tidal day due to the declination Al effects of the Moon and Sun.

higher low water (HLW)
The highest of the low waters of any specified tidal day due to the declination Al effects of the Moon and Sun.

hydrographic datum
A datum used for referencing depths of water and the heights of predicted tides or water level observations. Same as chart datum. See datum.

I

Indian spring low water
A datum originated by Professor G. H. Darwin when investigating the tides of India. It is an elevation depressed below mean sea level by an amount equal to the sum of the amplitudes of he harmonic constituents M_2, S_2, K_1, and O_1.

Indian tide plane
Same as Indian spring low water.

International Great Lakes Datum (1955) [IGLD (1955)]
Mean water level at Pointe-au-Pere, Quebec, on the Gulf of St. Lawrence over the period 1941 through 1956, from which geopotential elevations (geopotential differences) throughout the Great Lakes region are measured. The term is often used to mean the entire system of geopotential elevations rather than just the referenced water level. See low water datum (1).

International Hydrographic Organization (formerly Bureau)
An institution consisting of representatives of a number of nations organized for the purpose of coordinating the hydrographic work of the participating governments. It had its origin in the International Hydrographic Conference in London in 1919. It has permanent headquarters in the Principality of Monaco and is supported by funds provided by the member nations. Its principal publications include the Hydrographic Review and special publications on technical subjects.

international low water
A hydrographic datum originally suggested for international use at the International Hydrographic Conference in London in 1919, and later discussed at the Monaco Conference in 1926. The proposed datum, which has not yet been generally adopted, was to be "a plane so low that the tide will but seldom fall below it." This datum was the subject of the International Hydrographic Bureau's Special Publication No. 5 (March 1925) and No. 10 (January 1926), reproduced in the Hydrographic Review for May 1925 and July 1926.

intertidal zone (technical definition)
The zone between the mean higher high water and mean lower low water lines.

inverse barometer effect
The inverse response of sea level to changes in atmospheric pressure. A static reduction of 1.005 mb in atmospheric pressure will cause a stationary rise of 1 cm in sea level.

K

K_1
Lunisolar diurnal constituent. This constituent, with O_1, expresses the effect of the Moon's declination. They account for diurnal inequality and, at extremes, diurnal tides. With P_1, it expresses the effect of the Sun's declination. Speed = 15.041,068,6˚ per solar hour.

K_2
Lunisolar semi diurnal constituent. This constituent modulates the amplitude and frequency of M_2 and S_2 for the declination Al effect of the Moon and Sun, respectively. Speed = 30.082,137,3˚ per solar hour.

kappa (κ)
Name of Greek letter used as the symbol for a constituent phase lag or epoch when referred to the local equilibrium argument and frequently taken to mean the same as local epoch. See epoch (1).

kappa prime (κ´)
Name of Greek letter (with prime mark) used as the symbol for a constituent phase lag or epoch when the Greenwich equilibrium argument (G) has been modified to a particular time meridian. Same as g. See kappa (κ) and epoch (1).

L

L_2
Smaller lunar elliptic semi diurnal constituent. This constituent, with N_2, modulates the amplitude and frequency of M_2 for the effect of variation in the Moon's orbital speed due to its elliptical orbit. Speed = 29.528,478,9˚ per solar hour.

lagging of tide
The periodic retardation in the time of occurrence of high and low water due to changes in the relative positions of the Moon and Sun.

lambda
Smaller lunar evectional constituent. This constituent, with ν_2, μ_2, and (S_2), modulates the amplitude and frequency of M_2 for the effects of variation in solar attraction of the Moon. This attraction results in a slight pear-shaped lunar ellipse and a difference in lunar orbital speed between motion toward and away from the Sun. Although (S_2) has the same speed as S_2, its amplitude is extremely small. Speed = 29.455,625,3˚ per solar hour.

latitude
The angular distance between a terrestrial position and the equator measured northward or southward from the equator along a meridian of longitude.

level of no motion
A level (or layer) at which it is assumed that an isobaric surface coincides with a geopotential surface. A level (or layer) at which there is no horizontal pressure gradient force.

level surface
See geopotential surface as preferred term.

littoral zone

In coastal engineering, the area from the shoreline to just beyond the breaker zone. In biological oceanography, it is that part of the benthic division extending from the high water line out to a depth of about 200 meters. The littoral system is divided into a eulittoral and sublittoral zone, separated at a depth of about 50 meters. Also, frequently used interchangeably with intertidal zone.

long period waves (long waves)
Forced or free waves whose lengths are much longer than the water depth. See tidal wave and tsunami.

longitude
Angular distance in a great circle of reference reckoned from an accepted origin to the projection of any point on that circle. Longitude on the Earth's surface is measured on the Equator east and west of the meridian of Greenwich and may be expressed either in degrees or in hours, the hour being taken as the equivalent of 15˚ of longitude. Celestial longitude is measured in the ecliptic eastward from the vernal equinox. The mean longitude of a celestial body moving in an orbit is the longitude that would be attained by a point moving uniformly in the circle of reference at the same average angular velocity as that of the body, with the initial position of the point so taken that its longitude would be the same as that of the body at a certain specified position in its orbit. With a common initial point, the mean longitude of a body will be the same in whatever circle it may be reckoned.

low tide
Same as low water.

low water (LW)
The minimum height reached by a falling tide. The low water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions. For tidal datum computational purposes, the minimum height is not considered a low water unless it contains a tidal low water.

low water datum (LWD)
(1) The geopotential elevation (geopotential difference) for each of the Great Lakes and Lake St. Clair and the corresponding sloping surfaces of the St. Marys, St. Clair, Detroit, Niagara, and St. Lawrence Rivers to which are referred the depths shown on the navigational charts and the authorized depths for navigation improvement projects. Elevations of these planes are referred to IGLD (1955) and are Lake Superior 600.0 feet, Lakes Michigan and Huron 576.8 feet, Lake St. Clair 571.7 feet, Lake Erie 568.6 feet, and Lake Ontario 242.8 feet. (2) An approximation of mean low water that has been adopted as a standard reference for a limited area and is retained for an indefinite period regardless of the fact that it may differ slightly from a better determination of mean low water from a subsequent series of observations. Used primarily for river and harbor engineering purposes. Boston low water datum is an example.

low water equinoctial springs
Low water springs near the times of the equinoxes. Expressed in terms of the harmonic constants, it is an elevation depressed below mean sea level by an amount equal to the sum of the amplitudes of the constituents M_2, S_2, and K_2.

low water line

The intersection of the land with the water surface at an elevation of low water.

lower high water (LHW)
The lowest of the high waters of any specified tidal day due to the declination Al effects of the Moon and Sun.

lower low water (LLW)
The lowest of the low waters (or single low water) of any specified tidal day due to the declination effects of the Moon and Sun.

lower low water datum (LLWD)
An approximation of mean lower low water that has been adopted as a standard reference for a limited area and is retained for an indefinite period regardless of the fact that it may differ slightly from a better determination of mean lower low water from a subsequent series of observations. Used primarily for river and harbor engineering purposes. Columbia River lower low water datum is an example.

lunar day
The time of the rotation of the Earth with respect to the Moon, or the interval between two successive upper transits of the Moon over the meridian of a place. The mean lunar day is approximately 24.84 solar hours in length, or 1.035 times as great as the mean solar day.

lunar tide
That part of the tide on the Earth due solely to the Moon as distinguished from that part due to the Sun.

lunisolar tides
Harmonic tidal constituents K_1, and K_2, which are derived partly from the development of the lunar tide and partly from the solar tide, the constituent speeds being the same in both cases. Also, the lunisolar synodic fort nightly constituent MSf.

lunitidal interval
The interval between the Moon's transit (upper or lower) over the local or Greenwich meridian and the following high or low water. The average of all high water intervals for all phases of the Moon is known as mean high water lunitidal interval and is abbreviated to high water interval (HWI). Similarly, mean low water lunitidal interval is abbreviated to low water interval (LWI). The interval is described as local or Greenwich according to whether the reference is to the transit over the local or Greenwich meridian. When not otherwise specified, the reference is assumed to be local. When there is considerable diurnal inequality in the tide, separate intervals may be obtained for the higher high waters, lower high waters, higher low waters, and lower low waters. These are designated respectively as higher high water interval (HHWI), lower high water interval (LHWI), higher low water interval (HLWI), and lower low water interval (LLWI). In such cases, and also when the tide is diurnal, it is necessary to distinguish between the upper and lower transit of the Moon with reference to its declination. Intervals referred to the Moon's upper transit at the time of its north declination or the lower transit at the time of south declination are marked a. Intervals referred to the Moon's lower transit at the time of its north declination or to the upper transit at the time of south declination are marked b.

M

M_1
Smaller lunar elliptic diurnal constituent. This constituent, with J_1, modulates the amplitude of the declinational K_1, for the effect of the Moon's elliptical orbit. A slightly slower constituent, designated (M_1), with Q_1, modulates the amplitude and frequency of the declinational O_1, for the same effect. Speed = 14.496,693,9˚ per solar hour.

M_2
Principal lunar semidiurnal constituent. This constituent represents the rotation of the Earth with respect to the Moon. Speed = 28.984,104,2˚ per solar hour.

M_3
Lunar terdiurnal constituent. A shallow water compound constituent. See shallow water constituent. Speed = 43.476,156,3˚ per solar hour.

M_4, M_6, M_8
Shallow water overtides of principal lunar constituent. See shallow water constituent.
Speed of M_4 = 57.968,208,4˚ per solar hour.
Speed of M_6 = 86.952,312,7˚ per solar hour.
Speed of M_8 = 115.936,416,9˚ per solar hour.

marigram
A graphic record of the rise and fall of the water. The record is in the form of a curve in which time is generally represented on the abscissa and the height of the tide on the ordinate. See tide curve.

marine boundary
The mean lower low water line (MLLWL) when used as a boundary. Also, lines used as boundaries seaward of and measured from (or points thereon) the MLLWL. See coastal boundary.

mean diurnal tide level (MDTL)
A tidal datum. The arithmetic mean of mean higher high water and mean lower low water.

mean high water (MHW)
A tidal datum. The average of all the high water heights observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch.

mean high water line (MHWL)
The line on a chart or map which represents the intersection of the land with the water surface at the elevation of mean high water. See shoreline.

mean higher high water (MHHW)

A tidal datum. The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch.

mean higher high water line (MHHWL)
The line on a chart or map which represents the intersection of the land with the water surface at the elevation of mean higher high water.

mean low water (MLW)
A tidal datum. The average of all the low water heights observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch.

mean low water line (MLWL)
The line on a chart or map which represents the intersection of the land with the water surface at the elevation of mean low water.

mean low water springs (MLWS)
A tidal datum. Frequently abbreviated spring low water. The arithmetic mean of the low water heights occurring at the time of spring tides observed over the National Tidal Datum Epoch. It is usually derived by taking an elevation depressed below the half-tide level by an amount equal to one-half the spring range of tide, necessary corrections being applied to reduce the result to a mean value. This datum is used, to a considerable extent, for hydrographic work outside of the United States and is the level of reference for the Pacific approaches to the Panama Canal.

mean lower low water (MLLW)
A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch.

mean lower low water line (MLLWL)
The line on a chart or map which represents the intersection of the land with the water surface at the elevation of mean lower low water.

mean range of tide (Mn)
The difference in height between mean high water and mean low water.

mean rise
The height of mean high water above the elevation of chart datum.

mean rise interval (MRI)
The average interval between the transit of the Moon and the middle of the period of the rise of the tide. It may be computed by adding half the duration of rise to the mean low water interval, rejecting the semidiurnal tidal period of 12.42 hours when greater than this amount. The mean rise interval may be either local or Greenwich according to whether it is referred to the local or Greenwich transit.

mean river level
A tidal datum. The average height of the surface of a tidal river at any point for all stages of the tide observed over the National Tidal Datum Epoch. It is usually determined from hourly height readings. In rivers subject to occasional freshets, the river level may undergo wide variations and, for practical purposes, certain months of the year may be excluded in the determination of the tidal datum. For charting purposes, tidal datums for rivers are usually based on observations during selected periods when the river is at or near a low water stage.

mean sea level (MSL)
A tidal datum. The arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; e.g., monthly mean sea level and yearly mean sea level.

mean tide level (MTL)
Same as half-tide level.

mean water level (MWL)
A datum. The mean surface elevation as determined by averaging the heights of the water at equal intervals of time, usually hourly. Mean water level is used in areas of little or no range in tide.

mean water level line (MWLL)
The line on a chart or map which represents the intersection of the land with the water surface at the elevation of mean water level.

meteorological tides
Tidal constituents having their origin in the daily or seasonal variations in weather conditions which may occur with some degree of periodicity. The principal meteorological constituents recognized in the tides are Sa, Ssa, and S_1. See storm surge.

Metonic cycle
A period of almost 19 years or 235 lunations. Devised by Meton, an Athenian astronomer who lived in the fifth century B.C., for the purpose of obtaining a period in which new and full Moon would recur on the same day of the year. Taking the Julian year of 365.25 days and the synodic month as 29.530,588 days, we have the l9-year period of 6,939.75 days as compared with the 235 lunations of 6,939.69 days, a difference of only 0.06 day.

Mf
Lunar fort nightly constituent. This constituent expresses the effect of departure from a sinusoidal declination Al motion. Speed = 1.098,033,1˚ per solar hour.

mixed (tide)
Type of tide characterized by a conspicuous diurnal inequality in the higher high and lower high waters and/or higher low and lower low waters. See type of tide.

Mm
Lunar monthly constituent. This constituent expresses the effect of irregularities in the Moon's rate of change of distance and speed in orbit. Speed = 0.544,374,7˚ per solar hour.

modified epoch
See kappa prime and epoch (1).

MSf
Lunisolar synodic fort nightly constituent. Speed = 1.015,895,8˚ per solar hour.

mu (μ_2)
Variational constituent. See lambda. Speed = 27.968,208,4˚ per solar hour.

N

N
Rate of change (as of January 1, 1900) in mean longitude of the Moon's node. N = 0.002,206,41˚ per solar hour.

N_2
Larger lunar elliptic semi diurnal constituent. See L_2 Speed = 28.439,729,5˚ per solar hour.

$2N_2$
Lunar elliptic semi diurnal second-order constituent. Speed = 27.895,354,8˚ per solar hour.

National Geodetic Vertical Datum of 1929 [NGVD (1929)]
A fixed reference adopted as a standard geodetic datum for elevations determined by leveling. The datum was derived for surveys from a general adjustment of the first-order leveling nets of both the United States and Canada. In the adjustment, mean sea level was held fixed as observed at 21 tide stations in the United States and 5 in Canada. The geodetic datum now in use in the United States is the National Geodetic Vertical Datum. The year indicates the time of the general adjustment. A synonym for Sea-level Datum of 1929. The geodetic datum is fixed and does not take into account the changing stands of sea level. Because there are many variables affecting sea level, and because the geodetic datum represents a best fit over a broad area, the relationship between the geodetic datum and local mean sea level is not consistent from one location to another in either time or space. For this reason, the National Geodetic Vertical Datum should not be confused with mean sea level. NGVD(1929) has been superceded for use by NAVD88.

National Tidal Datum Convention of 1980
Effective November 28, 1980, the Convention: (1) establishes one uniform, continuous tidal datum system for all marine waters of the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands, for the first time in its history; (2) provides a tidal datum system independent of computations based on type of tide; (3) lowers chart datum from mean low water to mean lower low water along the Atlantic coast of the United States; (4) updates the National Tidal Datum

Epoch from 1941 through 1959, to 1960 through 1978; (5) changes the name Gulf Coast Low Water Datum to mean lower low water; (6) introduces the tidal datum of mean higher high water in areas of predominantly diurnal tides; and (7) lowers mean high water in areas of predominantly diurnal tides. See chart datum.

National Tidal Datum Epoch
The specific l9-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (e.g., mean lower low water, etc.) for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present National Tidal Datum Epoch is 1960 through 1978. It is reviewed annually for possible revision and must be actively considered for revision every 25 years.

National Water Level Observation Network (NWLON)
The network of tide and water level stations operated by the National Ocean Service along the marine and Great Lakes coasts and islands of the United States. The NWLON is composed of the primary and secondary control tide stations of the National Ocean Service. Distributed along the coasts of the United States, this Network provides the basic tidal datums for coastal and marine boundaries and for chart datum of the United States. Tide observations at a secondary control tide station or tertiary tide station are reduced to equivalent l9-year tidal datums through the comparison of simultaneous observations with a primary control tide station. In addition to hydrography and nautical charting, and to coastal and marine boundaries, the Network is used for coastal processes and tectonic studies, tsunami and storm surge warnings, and climate monitoring. The National Water Level Observation Network also includes stations operated throughout the Great Lakes Basin. The primary network is composed of 54 sites with 139 seasonal gauge sites selectively operated 4 months annually for the maintenance of IGLD. The network supports regulation, navigation and charting, river and harbor improvement, power generation, various scientific activities, and the adjustment for vertical movement of the Earth's crust in the Great Lakes Basin.

neap range
See neap tides.

neap tides or tidal currents
Tides of decreased range or tidal currents of decreased speed occurring semimonthly as the result of the Moon being in quadrature. The neap range (Np) of the tide is the average range occurring at the time of neap tides and is most conveniently computed from the harmonic constants. It is smaller than the mean range where the type of tide is either semi diurnal or mixed and is of no practical significance where the type of tide is predominantly diurnal. The average height of the high waters of the neap tide is called neap high water or high water neaps (MHWN) and the average height of the corresponding low waters is called neap low water or low water neaps (MLWN).

Next Generation Water Level Measurement System (NGWLMS)
A fully integrated system encompassing new technology sensors and recording equipment, multiple data transmission options, and an integrated data processing, analysis, and dissemination subsystem.

node cycle

Period of approximately 18.61 Julian years required for the regression of the Moon's nodes to complete a circuit of 360˚ of longitude. It is accompanied by a corresponding cycle of changing inclination of the Moon's orbit relative to the plane of the Earth's Equator, with resulting inequalities in the rise and fall of the tide and speed of the tidal current.

North American Vertical Datum of 1988 (NAVD 88)
A fixed reference for elevations determined by geodetic leveling. The datum was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark, referenced to the International Great Lakes Datum of 1985 (IGLD 85) Local mean sea level height value, at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD 88 and IGLD 85 are identical. However, NAVD 88 bench mark values are given in Helmert orthometric height units while IGLD 85 values are in dynamic heights. See International Great Lakes Datum of 1985, National Geodetic Vertical Datum of 1929, and geopotential difference.

nu (ν_2)
Larger lunar evectional constituent. See lambda. Speed = 28.512,583,1˚ per solar hour.

O

O_1
Lunar diurnal constituent. See K_1. Speed = 13.943,035,6˚ per solar hour.

oceanography
Oceanography is the science of all aspects of the oceans, in spite of its etymology. The term, oceanography, however, implies the interrelationships of the various marine sciences of which it is composed. This connotation has arisen through the historical development of marine research in which it has been found that a true understanding of the oceans is best achieved through investigations based on the realization that water, its organic and inorganic contents, motions, and boundaries are mutually related and interdependent.

OO_1
Lunar diurnal, second-order, constituent. Speed = 16.139,101,7˚ per solar hour.

overtide
A harmonic tidal (or tidal current) constituent with a speed that is an exact multiple of the speed of one of the fundamental constituents derived from the development of the tide-producing force. The presence of overtides is usually attributed to shallow water conditions. The overtides usually considered in tidal work are the harmonics of the principal lunar and solar semi diurnal constituents M_2 and S_2, and are designated by the symbols M_4, M_6, M_8, S_4, S_6, etc. The magnitudes of these harmonics relative to those of the fundamental constituents are usually greater in the tidal current than in the tide.

P

p
Rate of change (as of January 1, 1900) in mean longitude of lunar perigee. p = 0.004,641,83˚ per solar hour.

p_1
Rate of change (as of January 1, 1900) in mean longitude of solar perigee. p_1 = 0.000,001,96˚ per solar hour.

P_1
Solar diurnal constituent. See K_1. Speed = 14.958,931,4˚ per solar hour.

parallel plate intake
Intake of a stilling or protective well with two parallel plates attached below. The plates are typically three times the diameter of the well and are spaced three inches apart. The plates are used to minimize current-induced draw-down (Bernoulli effect) error in water level measurements.

perigean tides or tidal currents
Tides of increased range or tidal currents of increased speed occurring monthly as the result of the Moon being in perigee. The perigean range (Pn) of tide is the average range occurring at the time of perigean tides and is most conveniently computed from the harmonic constants. It is larger than the mean range where the type of tide is either semi diurnal or mixed, and is of no practical significance where the type of tide is predominantly diurnal.

perigee
The point in the orbit of the Moon or man-made satellite nearest to the Earth. The point in the orbit of a satellite nearest to its companion body.

perihelion
The point in the orbit of the Earth (or other planet, etc.) nearest to the Sun.

period
Interval required for the completion of a recurring event, such as the revolution of a celestial body or the time between two consecutive like phases of the tide or tidal current. A period may be expressed in A angular measure and is then taken as 360˚. The word also is used to express any specified duration of time.

phase
(1) Any recurring aspect of a periodic phenomenon, such as new Moon, high water, flood strength, etc. (2) A particular instant of a periodic function expressed in angular measure and reckoned from the time of its maximum value, the entire period of the function being taken as 360˚. The maximum and minimum of a harmonic constituent have phase values of 0˚ and 180˚, respectively.

phase inequality
Variations in the tides or tidal currents due to changes in the phase of the Moon. At the times of new and full Moon the tide-producing forces of the Moon and Sun act in conjunction, causing the range of tide

and speed of the tidal current to be greater than the average, the tides at these times being known as spring tides. At the times of the quadratures of the Moon these forces are opposed to each other, causing neap tides with diminished range and current speed.

PORTS™
Physical Oceanographic Real Time System. A system of current, water level, and meteorological stations telemetering their data to a central location for storage, processing, and dissemination. Available to pilots, mariners, the U.S. Coast Guard, and other marine interests in voice or digital real-time form. First introduced in Tampa Bay.

potential, tide-producing
Tendency for particles on the Earth to change their positions as a. result of the gravitational interactions between the Sun, Moon, and Earth. Although the gravitational attraction varies inversely as the square of the distance of the tide producing body, the resulting potential varies inversely as the cube of the distance.

pressure sensor
A pressure transducer sensing device for water level measurement. A relative transducer is vented to the atmosphere and pressure readings are made relative to atmospheric pressure. An absolute transducer measures the pressure at its location. The readings are then corrected for barometric pressure taken at the surface.

primary control tide station
A tide station at which continuous observations have been made over a minimum of 19 years. Its purpose is to provide data for computing accepted values of the harmonic and non harmonic constants essential to tide predictions and to the determination of tidal datums for charting and for coastal and marine boundaries. The data series from this station serves as a primary control for the reduction of relatively short series from subordinate tide stations through the method of comparison of simultaneous observations and for monitoring long-period sea level trends and variations. See tide station, secondary control tide station, tertiary tide station, and subordinate tide station (1).

protective well
A vertical pipe with a relatively large opening (intake) in the bottom. It is used with the air acoustic ranging sensor and electronic processing (filtering) technique to minimize the nonlinear characteristics of the stilling well. Its purpose is also to shield the sensing element from physical damage and harsh environment. Unlike a stilling well, damping of high frequency waves is not a critical requirement. See stilling well.

Q

Q_1
Larger lunar elliptic diurnal constituent. See M_1. Speed = 13.398,660,9˚ per solar hour.$2Q_1$ Lunar elliptic diurnal, second order, constituent. Speed = 12.854,286,2˚ per solar hour.

quadrature of Moon
Position of the Moon when its longitude differs by 90 deg from the longitude of the Sun. The corresponding phases are known as first quarter and last quarter.

R

R_2
Smaller solar elliptic constituent. This constituent, with $_{T2}$, modulates the amplitude and frequency of S_2 for the effect of variation in the Earth's orbital speed due to its elliptical orbit. Speed = 30.041,066,7˚ per solar hour.

radiational tide
Periodic variations in sea level primarily related to meteorological changes such as the semidaily (solar) cycle in barometric pressure, daily (solar) land and sea breezes, and seasonal (annual) changes in temperature. Other changes in sea level due to meteorological changes that are random in phase are not considered radiation Al tides.

range of tide
The difference in height between consecutive high and low waters. The mean range is the difference in height between mean high water and mean low water. The great diurnal range or diurnal range is the difference in height between mean higher high water and mean lower low water. For other ranges see spring, neap, perigean, apogean, and tropic tides; and tropic ranges.

real-time
Pertains to a data collecting system that controls an on-going process and delivers its outputs (or controls its inputs) not later than the time when these are needed for effective control.

red tide (water)
The term applied to toxic algal blooms caused by several genera of dinoflagellates (Gymnodinium and Gonyaulax) which turn the sea red and are frequently associated with a deterioration in water quality. The color occurs as a result of the reaction of a red pigment, peridinin, to light during photosynthesis. These toxic algal blooms pose a serious threat to marine life and are potentially harmful to humans. The term has no connection with astronomic tides. However, its association with the word "tide" is from popular observations of its movements with tidal currents in estuarine waters.

reduction of tides or tidal currents
A processing of observed tide or tidal current data to obtain mean values for tidal or tidal current constants.

reference station
A tide or current station for which independent daily predictions are given in the "Tide Tables" and "Tidal Current Tables," and from which corresponding predictions are obtained for subordinate stations by means of differences and ratios. See subordinate tide station (2) and subordinate current station (2).

relative mean sea level change
A local change in mean sea level relative to a network of bench marks established in the most stable and permanent material available (bedrock, if possible) on the land adjacent to the tide station location. A change in relative mean sea level may be composed of both an absolute mean sea level change component and a vertical land movement change component, together.

river current
The gravity-induced seaward flow of fresh water originating from the drainage basin of a river. In the fresh water portion of the river below head of tide, the river current is alternately increased and decreased by the effect of the tidal current. After entering a tidal estuary, river current is the depth averaged mean flow through any cross-section and finally, into the ocean. See head of tide and estuary.

S

s
Rate of change (as of January 1, 1900) in mean longitude of Moon. s = 0.549,016,53˚ per solar hour.

S_1
Solar diurnal constituent. Speed = 15.000,000,0˚ per solar hour.

S_2
Principal solar semi diurnal constituent. This constituent represents the rotation of the Earth with respect to the Sun. Speed = 30.000,000,0˚ per solar hour.

S_4, S_6
Shallow water overtides of the principal solar constituent.
Speed of S_4 = 60.000,000,0˚ per solar hour.
Speed of S_6 = 90.000,000,0˚ per solar hour.

Sa
Solar annual constituent. This constituent, with Ssa, accounts for the nonuniform changes in the Sun's declination and distance. In actuality, they mostly reflect yearly meteorological variations influencing sea level. Speed = 0.041,068,64˚ per solar hour.

Ssa
Solar semiannual constituent. See Sa. Speed = 0.082,137,3˚ per solar hour.

salinity (S)
The total amount of solid material in grams contained in 1 kilogram of sea water when all the carbonate has been converted to oxide, the bromine and iodine replaced by chlorine, and all organic matter completely oxidized. S(˚/oo) = 1.806,55 x Cl (˚/oo) Where Cl(˚/oo) is chlorinity in parts per thousand. See chlorinity.

secondary control tide station

A tide station at which continuous observations have been made over a minimum period of 1 year but less than 19 years. The series is reduced by comparison with simultaneous observations from a primary control tide station. This station provides for a 365-day harmonic analysis including the seasonal fluctuation of sea level. See tide station, primary control tide station, tertiary tide station, and subordinate tide station (1).

secular trend
See apparent secular trend as preferred term.

seiche
A stationary wave usually caused by strong winds and/or changes in barometric pressure. It is found in lakes, semi enclosed bodies of water, and in areas of the open ocean. The period of a seiche in an enclosed rectangular body of water is usually represented by the formula:
Period (T) = $2L / \sqrt{gd}$
in which L is the length, d the average depth of the body of water, and g the acceleration of gravity. See standing wave.

seismic sea wave
Same as tsunami.

semidiurnal
Having a period or cycle of approximately one-half of a tidal day. The predominant type of tide throughout the world is semi diurnal, with two high waters and two low waters each tidal day. The tidal current is said to be semi diurnal when there are two flood and two ebb periods each day. A semi diurnal constituent has two maxima and two minima each constituent day, and its symbol is the subscript 2. See type of tide.

semidiurnal tide
A tide with two high and two low waters in a tidal day with comparatively little diurnal tide inequality.

sequence of tide
The order in which the four tides of a day occur, with special reference as to whether the higher high water immediately precedes or follows the lower low water.

shallow water constituent
A short-period harmonic term introduced into the formula of tidal (or tidal current) constituents to take account of the change in the form of a tide wave resulting from shallow water conditions. Shallow water constituents include the overtides and compound tides.

shallow water wave
A wave is classified as a shallow water wave whenever the ratio of the depth (the vertical distance of the still water level from the bottom) to the wave length (the horizontal distance between crests) is less than 0.04. Such waves propagate according to the formula:
$C = \sqrt{gd}$

where C is the wave speed, g the acceleration of gravity, and d the depth. Tidal waves are shallow water waves.

shoreline (coastline)
The intersection of the land with the water surface. The shoreline shown on charts represents the line of contact between the land and a selected water elevation. In areas affected by tidal fluctuations, this line of contact is the mean high water line. In confined coastal waters of diminished tidal influence, the mean water level line may be used. The shoreline is defined as MHW.

sidereal day
The time of the rotation of the Earth with respect to the vernal equinox. It equals approximately 0.997,27 of a mean solar day. Because of the precession of the equinoxes, the sidereal day thus defined is slightly less than the period of rotation with respect to the fixed stars, but the difference is less than the hundredth part of a second.

small diurnal range (Sl)
Difference in height between mean lower high water and mean higher low water.

small tropic range (Sc)
Difference in height between tropic lower high water and tropic higher low water.

solar day
The period of the rotation of the Earth with respect to the Sun. The mean solar day is the time of the rotation with respect to the mean Sun. The solar day commencing at midnight is called a civil or calendar day, but if the day is reckoned from noon it is known as an astronomical day because of its former use in astronomical calculation.

solar tide
(1) The part of the tide that is due to the tide-producing force of the Sun. (2) The observed tide in areas where the solar tide is dominant. This condition provides for phase repetition at about the same time each solar day.

solstices
The two points in the ecliptic where the Sun reaches its maximum and minimum declinations; also the times when the Sun reaches these points. The maximum north declination occurs on or near June 21, marking the beginning of summer in the Northern Hemisphere and the beginning of winter in the Southern. The maximum south declination occurs on or near December 22, marking the beginning of winter in the Northern Hemisphere and the beginning of summer in the Southern.

solstitial tides
Tides occurring near the times of the solstices. The tropic range may be expected to be especially large at these times.

species of constituent

A classification depending upon the period of a constituent. The principal species are semidiurnal, diurnal, and long-period.

spring high water
Same as mean high water springs (MHWS). See spring tides.

spring low water
Same as mean low water springs (MLWS). See spring tides and mean low water springs.

spring range (Sg)
See spring tides.

spring tides or tidal currents
Tides of increased range or tidal currents of increased speed occurring semimonthly as the result of the Moon being new or full. The spring range (Sg) of tide is the average range occurring at the time of spring tides and is most conveniently computed from the harmonic constants. It is larger than the mean range where the type of tide is either semi diurnal or mixed, and is of no practical significance where the type of tide is predominantly diurnal. The average height of the high waters of the spring tides is called spring high water or mean high water springs (MHWS) and the average height of the corresponding low waters is called spring low water or mean low water springs (MLWS).

stand of tide
Sometimes called a platform tide. An interval at high or low water when there is no sensible change in the height of the tide. The water level is stationary at high and low water for only an instant, but the change in level near these times is so slow that it is not usually perceptible. In general, the duration of the apparent stand will depend upon the range of tide, being longer for a small range than for a large range, but where there is a tendency for a double tide the stand may last for several hours even with a large range of tide.

stationary wave theory
An assumption that the basic tidal movement in the open ocean consists of a system of stationary wave oscillations, any progressive wave movement being of secondary importance except as the tide advances into tributary waters. The continental masses divide the sea into irregular basins, which, although not completely enclosed, are capable of sustaining oscillations which are more or less independent. The tide-producing force consists principally of two parts, a semi diurnal force with a period approximately the half-day and a diurnal force with a period of a whole day. Insofar as the free period of oscillation of any part of the ocean, as determined by its dimensions and depth, is in accord with the semi-diurnal or diurnal tide-producing forces, there will be built up corresponding oscillations of considerable amplitude which will be manifested in the rise and fall of the tide. The diurnal oscillations, superimposed upon the semi diurnal oscillations, cause the inequalities in the heights of the two high and the two low waters of each day. Although the tidal movement as a whole is somewhat complicated by the overlapping of oscillating areas, the theory is consistent with observational data.

stilling well

A vertical pipe with a relatively small opening (intake) in the bottom. It is used in a gauge installation to dampen short period surface waves while freely admitting the tide, other long period waves, and sea level variations; which can then be measured by a tide gauge senor inside. See float well and protective well.

storm surge
The local change in the elevation of the ocean along a shore due to a storm. The storm surge is measured by subtracting the astronomic tidal elevation from the total elevation. It typically has a duration of a few hours. Since wind generated waves ride on top of the storm surge (and are not included in the definition), the total instantaneous elevation may greatly exceed the predicted storm surge plus astronomic tide. It is potentially catastrophic, especially on low lying coasts with gently sloping offshore topography. See storm tide.

storm tide
As used by the National Weather Service, NOAA, the sum of the storm surge and astronomic tide. See storm surge.

submerged lands
Lands covered by water at any stage of the tide. See tidelands.

subordinate tide station
(1) A tide station from which a relatively short series of observations is reduced by comparison with simultaneous observations from a tide station with a relatively long series of observations. See tide station, primary control tide station, secondary control tide station, and tertiary tide station. (2) A station listed in the Tide Tables from which predictions are to be obtained by means of differences and ratios applied to the full predictions at a reference station. See reference station.

T

T
Rate of change of hour angle of mean Sun at place of observation. T = 15˚ per mean solar hour.

T_2
Larger solar elliptic constituent. See R_2.
Speed = 29.958,933,3˚ per solar hour.

telemetry
The capability of transmitting or retrieving data over long distance communication links, such as satellite or telephone.

terdiurnal
Having three periods in a constituent day. The symbol of a terdiurnal constituent is the subscript 3.

tertiary tide station

A tide station at which continuous observations have been made over a minimum period of 30 days but less than 1 year. The series is reduced by comparison with simultaneous observations from a secondary control tide station. This station provides for a 29-day harmonic analysis. See tide station, primary control tide station, secondary control tide station, and subordinate tide station (1).

tidal bench mark description
A published, concise description of the location, stamped number or designation, date established, and elevation (referred to a tidal datum) of a specific bench mark.

tidal characteristics
Principally, those features relating to the time, range, and type of tide.

tidal constants
Tidal relations that remain practically constant for any particular locality. Tidal constants are classified as harmonic and non harmonic. The harmonic constants consist of the amplitudes and epochs of the harmonic constituents, and the non harmonic constants include the ranges and intervals derived directly from the high and low water observations.

tidal datum
See datum.

Tidal day
The time of the rotation of the earth with respect to the moon, approximately 24 hours and 50 minutes. Same as lunar day.

tidal difference
Difference in time or height between a high or low water at a subordinate station and a reference station for which predictions are given in the Tide Tables. The difference, when applied according to sign to the prediction at the reference station, gives the corresponding time or height for the subordinate station.

tidal epoch
See National Tidal Datum Epoch and epoch.

tidal estuary
See estuary.

tidal range
The difference in height between consecutive high and low (or higher high and lower low) waters.

tidal wave
A shallow water wave caused by the gravitational interactions between the Sun, Moon, and Earth. Essentially, high water is the crest of a tidal wave and low water, the trough. Tidal current is the horizontal component of the particulate motion, while tide is manifested by the vertical component. The observed tide and tidal current can be considered the result of the combination of several tidal waves,

each of which may vary from nearly pure progressive to nearly pure standing and with differing periods, heights, phase relationships, and direction.

tidal zoning
The practice of dividing a hydrographic survey area into discrete zones or sections, each one possessing similar tidal characteristics. One set of tide reducers is assigned to each zone. Tide reducers are used to adjust the soundings in that zone to chart datum (MLLW). Tidal zoning is necessary in order to correct for differing water level heights occurring throughout the survey area at any given time. Each zone of the survey area is geographically delineated such that the differences in time and range do not exceed certain limits, generally 0.2 hours and 0.2 feet respectively; however, these limits are subject to change depending upon type of survey, location, and tidal characteristics. The tide reducers are derived from the water levels recorded at an appropriate tide station, usually nearby. Tide reducers are used to correct the soundings throughout the hydrographic survey area to a common, uniform, uninterrupted chart datum. See tide reducers.

tide
The periodic rise and fall of the water resulting from gravitational interactions between Sun, Moon, and Earth. The vertical component of the particulate motion of a tidal wave. Although the accompanying horizontal movement of the water is part of the same phenomenon, it is preferable to designate this motion as tidal current. See tidal wave.

tide curve
A graphic representation of the rise and fall of the tide in which time is usually represented by the abscissa and height by the ordinate. For a semidiurnal tide with little diurnal inequality, the graphic representation approximates a cosine curve. See marigram.

tide (water level) gauge
An instrument for measuring the rise and fall of the tide (water level). See ADR gauge, automatic tide gauge, Next Generation Water Level Measurement System, gas purged pressure gauge, electric tape gauge, pressure gauge, and tide staff.

tide-producing force
That part of the gravitational attraction of the Moon and Sun which is effective in producing the tides on the Earth. The force varies approximately as the mass of the attracting body and inversely as the cube of its distance. The tide-producing force exerted by the Sun is a little less than one-half as great as that of the Moon. A mathematical development of the vertical and horizontal components of the tide-producing forces of the Moon and Sun will be found in Coast and Geodetic Survey Special Publication No. 98.

tide reducers
Height corrections for reducing soundings to chart datum (MLLW). A tide reducer represents the height of the water level at a given place and time relative to chart datum. Tide reducers are obtained from one or more tide stations within or nearby the survey area. Often, due to differing tidal characteristics over the survey area, the tide reducers obtained directly from a tide station must be corrected to adjust for time and range of tide differences in the various zones of the hydrographic survey area. See tidal zoning.

tide staff
A tide gauge consisting of a vertical graduated staff from which the height of the tide can be read directly. It is called a fixed staff when secured in place so that it cannot be easily removed. A portable staff is one that is designed for removal from the water when not in use. For such a staff a fixed support is provided The support has a metal stop secured to it so that the staff will always have the same elevation when installed for use. See electric tape gauge.

tide (water level) station
The geographic location at which tidal observations are conducted. Also, the facilities used to make tidal observations. These may include a tide house, tide gauge, tide staff, and tidal bench marks. See primary control tide station, secondary control tide station, tertiary tide station, and subordinate tide station (1).

Tide Tables
Tables which give daily predictions of the times and heights of high and low waters. These predictions are usually supplemented by tidal differences and constants through which predictions can be obtained for numerous other locations.

tidelands
The zone between the mean high water and mean low water lines. It is identical with intertidal zone (technical definition) when the type of tide is semi diurnal or diurnal.

tidewater
Water activated by the tide generating forces and/or water affected by the resulting tide, especially in coastal and estuarine areas. Also, a general term often applied to the land and water of estuarine areas formed by postglacial drowning of coastal plain rivers.

time, kinds
Time is measured by the rotation of the Earth with respect to some point in the celestial sphere and may be designated as sidereal, solar, or lunar, according to whether the measurement is taken in reference to the vernal equinox, the Sun, or the Moon. Solar time may be apparent or mean, according to whether the reference is to the actual Sun or the mean Sun. Mean solar time may be local or standard, according to whether it is based upon the transit of the Sun over the local meridian or a selected meridian adopted as a standard over a considerable area. Greenwich time is standard time based upon the meridian of Greenwich. In civil time the day commences at midnight, while in astronomical time, as used prior to 1925, the beginning of the day was reckoned from noon of the civil day of the same date. The name universal time is now applied to Greenwich mean civil time.

time meridian
A meridian used as a reference for time.

tractive force
The horizontal component of a tide producing force vector (directed parallel with level surfaces at that geographic location).

transit

The passage of a celestial body over a specified meridian. The passage is designated as upper transit or lower transit according to whether it is over that part of the meridian lying above or below the polar axis.

tropic inequalities
Tropic high water inequality (HWQ) is the average difference between the two high waters of the day at the times of tropic tides. Tropic low water inequality (LWQ) is the average difference between the two low waters of the day at the times of tropic tides. These terms are applicable only when the type of tide is semi diurnal or mixed. See tropic tides.

tropic intervals
Tropic higher high water interval (TcHHWI) is the lunitidal interval pertaining to the higher high waters at the time of the tropic tides. Tropic lower low water interval (TcLLWI) is the lunitidal interval pertaining to the lower low waters at the time of the tropic tides. Tropic intervals are marked a when reference is made to the upper transit of the Moon at its north declination or to the lower transit at the time of south declination, and are marked b when the reference is to the lower transit at the north declination or to the upper transit at the south declination. See tropic tides.

tropic ranges
The great tropic range (Go), or tropic range, is the difference in height between tropic higher high water and tropic lower low water. The small tropic range (Sc) is the difference in height between tropic lower high water and tropic higher low water. The mean tropic range (Mc) is the mean between the great tropic and the small tropic range. Tropic ranges are most conveniently computed from the harmonic constants. See tropic tides.

tropic tides
Tides occurring semimonthly when the effect of the Moon's maximum declination is greatest. At these times there is a tendency for an increase in the diurnal range. The tidal datums pertaining to the tropic tides are designated as tropic higher high water (TcHHW), tropic lower high water (TcLHW), tropic higher low water (TcHLW), and tropic lower low water (TcLLW).

tropical year
The average period of the revolution of the Earth around the Sun with respect to the vernal equinox. Its length is approximately 365.242,2 days. The tropical year determines the cycle of changes in the seasons, and is the unit to which the calendar year is adjusted through the occasional introduction of the extra day on leap years.

trough
The lowest point in a propagating or standing wave. See low water and tidal wave.

tsunami
A shallow water progressive wave, potentially catastrophic, caused by an underwater earthquake or volcano.

type of tide

A classification based on characteristic forms of a tide curve. Qualitatively, when the two high waters and two low waters of each tidal day are approximately equal in height, the tide is said to be semidiurnal; when there is a relatively large diurnal inequality in the high or low waters or both, it is said to be mixed; and when there is only one high water and one low water in each tidal day, it is said to be diurnal. Quantitatively (after Dietrich), where the ratio of $K_1 + O_1$ to $M_2 + S_2$ is less than 0.25, the tide is classified as semidiurnal; where the ratio is from 0.25 to 1.5, the tide is mixed, mainly semidiurnal; where the ratio is from 1.5 to 3.0, the tide is mixed, mainly diurnal; and where greater than 3.0, diurnal.

U

universal time (UT)
Same as Greenwich mean time (GMT).

uplands
Land above the mean high water line (shoreline) and subject to private ownership, as distinguished from tidelands, the ownership of which is prima facie in the state but also subject to divestment under state statutes. See tidelands.

V

vanishing tide
In a predominantly mixed tide with very large diurnal inequality, the lower high water (or higher low water) becomes indistinct (or vanishes) at times of extreme declinations.

W

wave height
The vertical distance between crest and trough. See range of tide.

Z

Z_0
Symbol recommended by the International Hydrographic Organization to represent the elevation of mean sea level above chart datum.

Appendix A: Chronology of Significant Events in the Analysis of Tides and Tidal Datums

Table A1. Chronology of Significant Events:

1807 — The Survey of the Coast established.
1830 — Tide predictions for United States began. Published in The American Almanac. High water time predictions (one per day) for Boston, New York, and Charleston. Time differences for 96 other stations. Spring range predictions for 84 stations.
1836 — The Survey of the Coast became Coast Survey.
1844 — Tide notes (including lunitidal intervals) on nautical charts began.
1853 — Tables for obtaining tide predictions by the nonharmonic lunitidal interval method first published in the appendix to the Annual Report.
1864 — Last year of tables for lunitidal interval method. One thousand copies provided to Union naval forces.
1867 — First Tide Tables published.
1868 — Low water predictions began for west coast of Florida and Pacific coast.
1878 — Coast Survey became Coast and Geodetic Survey.
1885 — William Ferrel's Maxima and Minima Tide Predictor introduced.
1887 — Low water predictions included for all stations.
1890 — Tidal current predictions began (New York Harbor and vicinity).
1896 — Extension of tables to include numerous ports throughout the world.
1912 — Harris-Fischer Tide Predicting Machine introduced.
1914 — Last year Ferrel's Maxima and Minima Tide Predictor used.
1923 — Tidal Current Tables first published separately from Tide Tables (two volumes, Atlantic Coast and Pacific Coast, North America).
1928 — Single port miniature tables introduced.
1932 — Last year of single port miniature tables (revived from 1940 through 1944 for New York Harbor and vicinity only).
1940 — Special restricted tables for war effort began.
1951 — Last year of special wartime and occupation tables.
1955 — Special Tide Tables for selected places in Greenland, Canada, and Alaska began.
1959 — Tide predictions added to Small Craft Chart series.
1961 — Motor drive and automatic readout installed on Harris-Fischer machine.
— Last year of special Tide Tables for selected places in Greenland, Canada, and Alaska.
1965 — Last year Harris-Fischer Tide Predicting Machine used.
— Analog-to-digital recorder (ADR) tide gauges and computer processing introduced.
1966 — Electronic digital computer introduced for predictions.
1967 — Established Estuarine Flushing and Nontidal Current Prediction Service.
— International Symposium on Mean Sea Level, IAPO and UNESCO.
— Electronic digital computer introduced for harmonic analysis of tides.
1970 — Coast and Geodetic Survey became National Ocean Survey.
1973 — Established National Tidal Datum Epoch.
— Telemetered water level measurements introduced for Great Lakes.
1977 — Gulf Coast Low Water Datum adopted.
1978 — Water Level Telemetry System introduced for marine coasts.
1980 — National Tidal Datum Convention of 1980 adopted.
1982 — National Ocean Survey became National Ocean Service.
— Personal computer software introduced for local user access to water level telemetry stations.
1987 — Tidal Circulation and Water Level Forecast Atlas introduced.
— Operational RADS current meter system introduced.
1988 — International Conference on Tidal Hydrodynamics.
— Personal computer software introduced for local user access to current telemetry stations.
— Operational NGWLMS field units introduced using an air acoustic ranging sensor and satellite telemetry.
1995 — Operational NGWLMS field units become standard. Last year ADR gauges used.
1996 — NGWLMS Data processing and analysis system becomes operational.
1997 — Internet and Web access implemented for products.

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMMISSIONERS

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District Three

RESOURCE STEWARDSHIP DEPARTMENT

Creating Solutions for Our Future

Brent Butler
Director

MITIGATED DETERMINATION OF NONSIGNIFICANCE
State Environmental Policy Act (SEPA)
PROJECT NUMBER NO. 2014108800

May 3, 2016

Applicant: ChangMook Sohn
930 76th Avenue NE
Olympia, WA 98506

Description of Proposal: Shoreline Substantial Development Permit for a commercial intertidal geoduck operation on private tidelands. The application for the above listed project was submitted to Thurston County on December 18, 2014 by ChangMook Sohn (Owner).

The proposed project consists of a 1.1 acre commercial geoduck farm on private tidelands. Geoducks will be seeded by hand. In this phase, a 10 inch length of 4-6 inch diameter PVC pipe (tube) will be placed on end and buried in the substrate with 2 to 3 inches exposed. Tubes are placed at the density of one per square foot (Approximately 47,900) while seeds are planted three per tube. During the growth period the juvenile geoduck will be within the confines of protective tubes. To protect the juvenile geoduck clams from predators, the tubes will be covered with area netting after seeding. The area netting will be made 50' x 50' durable nets. A total of 16 nets will cover the growing area. Area netting will be staked with rebar every 10-feet to ensure that nets stay anchored and prevent any loose tubes from being washed into Zangle Cove and Dana Passage. Rebar will be pushed into the substrate. Area nets below the line of mean higher high water will have identification markers spaced every 50 feet. Markers will be attached to rebar.

After 18 months, when the juvenile geoduck clams reach a size at which protection against predation is no longer needed, the PVC tubes and area netting will be removed. Following the tube removal, the predator netting may be replaced over the growing area for an additional 6 months depending on local predation pressure.

Geoduck clams will be harvested when they reach marketable size (1.5 to 2 lbs) in five to six years. Harvest will occur by hand on the exposed beach during low tide cycles when possible. Harvest will be undertaken using low-pressure water pumps with a nozzle inside tip diameter of 5/8-inch (WAC 220-52-019(2a)) or less. The nozzles will be hand held and controlled by the operator; the nozzle pressure is limited to about 100 psi measured at the pump. Water intake lines on the pumps are fitted with screens that meet NMFS screening criteria to prevent enrainment of fish or other species. The water hose will be injected directly into the sediment

adjacent to the geoduck siphon. This procedure loosens the sediment around the geoduck and allows it to be removed by hand. Pumps for the hoses are run by a small internal combustion engine and would be mounted on a small 8' x 8' barge (no propulsion) and outfitted with a muffler and covered entirely with an insulated box to minimize sound. The barge will reside next to the vessel just offshore of the harvest. This harvest method has been widely applied in Washington State for intertidal geoduck aquaculture.

Harvest by SCUBA diving, from below the water line, will only be used on the rare occasion the tide levels are not low enough for the hand harvest method. It is expected this method will be used for less than 10% of the harvest time. This method is the same as above except it is conducted by scuba diving.

The property is zoned Rural Residential Resource One Dwelling Unit Per Five Acres (RRR 1/5) within unincorporated, rural Thurston County. The property is within the Conservancy Shoreline designation of the Shoreline Master Program for the Thurston Region.

The project requires a shoreline substantial development permit (SSDP). Other State and Federal permits are required. The Resource Stewardship staff is the issuing authority for the SEPA threshold determination and the County Hearing Examiner will be the approval authority for the SSDP and for any appeal of the SEPA threshold determination.

Location of Proposal: 930 76th Avenue NE, Olympia WA 98506

Section/Township/Range: Section 11 Township 19 Range 2W SW NW & Tidelands

Tax Parcel Numbers & Legal Description: 12911440102 – Lot 3 of SS-2070 022/104 INC Second Class Tidelands

Threshold Determination: The lead agency for this proposal has determined that the attached mitigating conditions, along with required compliance with applicable County, State and Federal codes will mitigate all probable significant adverse impacts upon the environment.

An Environmental Impact Statement is not required under RCW 43.21C.030(2)(C). This decision was made after review by the Lead Agency of a completed Environmental Checklist and other information on file with the Lead Agency. This information is available to the public on request.

Mitigating Conditions: See Attachment

Jurisdiction: Thurston County
Lead Agency: Resource Stewardship Department
Responsible Official: Mike Kain, Manager/Environmental Review Officer

Date of Issue: May 3, 2016
Comment Deadline: May 17, 2016
Appeal Deadline: May 24, 2016

5/3/16

Tony Kantas, Associate Planner Date

A site map depicting the parcel and other information are attached.

Appeals: Threshold determinations may be appealed pursuant to TCC 17.09.160 if a written notice of appeal, meeting the requirements of TCC 17.09.160(D), and the appropriate appeal fee are received by the Thurston County Resource Stewardship Department prior to 4:00 p.m. on the appeal deadline date shown above. Per TCC 17.09.160(B), only aggrieved parties who submit written comments during the comment period may appeal.

Note: The issuance of this Mitigated Determination of Non-Significance does not constitute project approval. The applicant must comply with all applicable requirements of the Shoreline Master Program for the Thurston Region, as well as applicable State and Federal requirements prior to project initiation.

Thurston County Resource Stewardship Department
Building #1, Administration
2000 Lakeridge Drive SW
Olympia, WA 98502
(360) 786-5472
Email: kantast@co.thurston.wa.us

cc:
Department of Ecology
Adjacent Property Owners (500')
TC Environmental Health
WDFW – Theresa Nation
US Army Corps - Seattle
WA DNR Aquatic Lands
Thurston County BOCC
TC Environmental Health
TC Public Works
Nisqually Tribe
Chehalis Tribe
Squaxin Indian Tribe
US Fish and Wildlife Service
Cliff Moore, TC Manager

MDNS Attachments
SEPA Project #2014108800

Information Reviewed

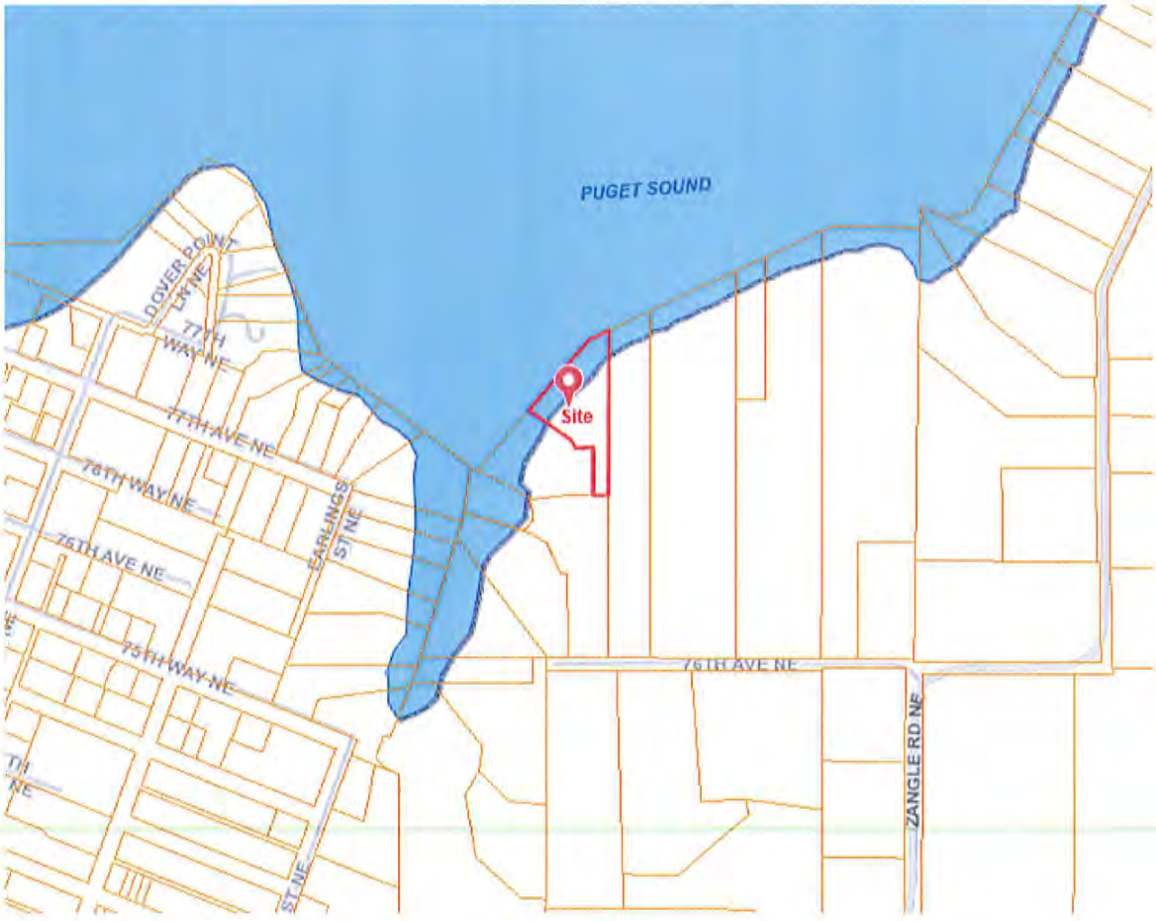
The environmental threshold determination and conditions are substantially based on analysis of information obtained from the following documents. Documents and other related information is available for public review from 8:00 a.m. to 12:30 p.m. at the Permit Assistance Center on the second floor of Building #1, Thurston County Courthouse, 2000 Lakeridge Drive SW, Olympia, Washington. Please contact Thurston County Resource Stewardship at (360) 786-5472 or email kantast@co.thurston.wa.us with questions.

List of documents reviewed and environmental characteristics considered:

1. Master Applications submitted December 18, 2014.
2. SEPA Environmental Checklist submitted December 18, 2014.
3. JARPA Applications submitted December 18, 2014.
4. Site Plans submitted December 18, 2014.
5. Notice of Application mailed out on March 12, 2015.
6. Comment Letters and Reports submitted by near-by property owners through put the project review.
7. Confluence Environmental Company Response to Public Comments dated November 20, 2015.
8. Confluence Environmental Company Addendum Response to Public Comments dated February 26, 2016.
9. April 1, 2015 Comment Letter from Washington State Department of Ecology.
10. January 8, 2015 Comment Letter from Washington State Department of Ecology.
11. Pacific Northwest Aquaculture Biological Evaluation dated December 2014.
12. Assessing Potential Benthic Impacts of Subtidal Geoduck Clam Harvesting, by Wenshan Liv and Chris Pearce of Fisheries and Oceans Canada, research completed October 2010.
13. Final Report Geoduck Aquaculture Research Program, by University of Washington through the Sea Grant Program dated December 2015.
14. Interim Progress Report Geoduck Aquaculture Research Program, by University of Washington through the Sea Grant Program dated December 1, 2014.
15. Geoduck Aquaculture Research Program Report to the Washington State Legislature through the Sea Grant Program dated November 2013.
16. Interim Progress Report Geoduck Aquaculture Research Program, by University of Washington through the Sea Grant Program dated February 2012.
17. Interim Progress Report Geoduck Aquaculture Research Program, by University of Washington through the Sea Grant Program dated March 2011.
18. Effects of Geoduck Aquaculture on the Environment: A Synthesis of Current Knowledge, by Washington Sea Grant, University of Washington dated October 27, 2009.
19. Marine Forage Fishes in Puget Sound, by Dan Pentilla WDFW dated 2007.

20. Requirements and conditions that are brought on by State and Federal permits for geoduck farms.

Vicinity Map



Mitigation Discussion

A primary concern with geoduck beds is the potential impact on native eelgrass. Eelgrass provides valuable nearshore habitat for forage fish including surf smelt, sand lance and herring. These fish in turn provide the base prey for many salmonids including listed species such as Steelhead and Chinook salmon. The proposed geoduck beds do not contain eelgrass, and therefore should not disturb critical habitat for listed species.

Based on analysis of the Biological Assessments for the site and on the Sea Grant Interim and Final Progress Reports to the Washington State Legislature, as well as analysis of the multitude of other documents listed above and the off-site eelgrass site being 330-feet from the project site, the Resource Stewardship Department finds that the project will not cause significant environmental impacts defined in WAC 197-11-794 with implementation of the below-listed

mitigating conditions, in conjunction with conditions related to the various other permits required by State and Federal agencies.

Further, the various conditions and permitting requirements will adequately address all elements of the environment as listed in WAC 197-11-444. The Resource Stewardship Department finds that there will be no significant impact to any specific element of the environment as a result of the proposed project. The directly applicable environmental elements are erosion, water quality, habitat for plants and animals, unique species, fish migration routes, noise, toxic releases, light and glare, aesthetics, recreation, and cultural preservation. Each has been satisfactorily addressed based on current science and in the conditions and notes listed below.

Mitigating Conditions

1. The preparation, planting, maintenance and harvesting at the subject sites shall be in compliance with the most current version of the Washington State Geoduck Growers Environmental Codes of Practice for Pacific Coast Shellfish Aquaculture.

2. An unobtrusive but visible sign shall be placed at the aquaculture bed listing the name and contact information for a person designated to immediately address problems associated with the aquaculture bed when discovered by citizens or agency representatives.

3. Prior to any site preparation, the property owners and aquaculture bed operator shall each sign a document to be recorded with the Thurston County Auditor granting access to the site for researchers affiliated with County, State or Federal governments to gather information related to geoduck aquaculture.

4. All tubes, mesh bags, and nets used on the tidelands below the ordinary high water mark (OHWM) shall be clearly, indelibly, and permanently marked to identify the permittee name and contact information (e.g., telephone number, email address and mailing address). On area nets, if used, identification markers will be placed with a minimum of one identification marker for each 100 square feet of net.

5. The applicant / operator shall routinely inspect, document, and report any fish or wildlife found entangled in anti-preditor nets or other culturing equipment. At least twice a month during the time the nets are installed, they shall be inspected and a record of observations maintained. Live entangled fish and wildlife shall be released upon observation. During the required bi-monthly site visits the applicant / operator shall remove from the beach or secure any loose nets, tubing or aquaculture related debris.

6. All protective tubes and netting related to the proposed Geoduck aquaculture shall be removed from the shoreline within two (2) years of installation.

7. Weekly patrols of tidelands within a half mile of the geoduck farm shall be conducted. During those patrols, all geoduck debris must be collected regardless of its source.

8. Patrols to search for and collect geoduck debris must also be conducted within a day following a severe storm event.

9. The applicant / operator must keep a record of the total number of PVC tubes, net caps, mesh tubes, and canopy nets they place of the site, and how many of those pieces of geoduck gear they remove through farming practices or collect from beach patrols.

10. Gear that blends into the surrounding environment (e.g., neutral colors or black) shall be used at the most extent possible to reduce any potential aesthetic impacts.

11. Shellfish culturing shall not be placed above the tidal elevation of +3 MLLW in order to minimize potential impacts to forage fish habitat. If herring spawn is observed, then those areas shall be avoided until the eggs have hatched.

12. Land vehicles and equipment shall not be washed, stored, fueled, or maintained within 150 feet of any waterbody. All vehicles will be inspected for fluid leaks daily within 150 feet of any waterbody.

13. Permanent lighting of the aquaculture beds shall not be permitted. Any temporary lighting shall be directed such that off-site glare is minimized to the extent possible. When tides force nighttime operations, crews shall only use headlamps, and shall be trained to limit light pollution.

14. Noise impacts shall be minimized by using fully-enclosed and insulated motors with approved muffled exhaust systems.

15. All individual screens placed on tubes shall be secured with UV-resistant fasteners.

16. If archaeological artifacts are observed during any phase of the aquaculture operation, all work shall be immediately halted. The State Department of Archaeology and Historic Preservation, the Thurston County Resource Stewardship Department and affected Tribes shall be contacted to assess the situation prior to resumption of work.

17. Only washed gravel shall be used for shellfish bed preparation. Unsuitable material (e.g., trash, debris, concrete, asphalt, tires) shall not be discharged or used as fill (e.g., to secure nets, create berms or provide nurseries).

18. No physical work on the beds shall be initiated until the applicant provides evidence that required State and Federal permits and approvals have been granted. A listing of the known State and Federal requirements is provided in the Notes "A" and "B" below.

Notes

A. In addition to a Shoreline Substantial Development Permit by the County, at minimum the following State and Federal permits will also be required prior to commencement of the proposed aquaculture operation. Each will stipulate specific mitigations to address the public health, safety and general welfare. The permits include: 1. US Army Corps of Engineers NWP 48 Permit or Individual Permit under Section 10, US Rivers and Harbors Act; 2. Washington State Department of Ecology Section 401 Water Quality Certification;

3. Washington State Department of Ecology Coastal Zone Management Certification; 4. Washington State Department of Health Harvest Site Certification; 5. Washington State Department of Health Shellfish Operation License; and 6. Washington State Department of Fish and Wildlife Aquatic Farm Permit.

B. The US Army Corps of Engineers may require a Section 404 Clean Water Act Permit because the project is located on the beach within the floodplain. Through this permit, the Corps and the US Fish and Wildlife Service will provide consultation with the applicant as required under Section 7 of the Endangered Species Act and the Essential Fish Habitat provisions of the Magnuson Stevens Fishery Conservation and Management Act. This consultation satisfies the requirements of the Biological Opinion issued by the National Marine Fisheries Service on September 22, 2008. This Opinion requires that a Habitat Assessment be conducted for any non-exempt project located within a floodplain anywhere in the United States. This project cannot proceed until the Corps permit is issued or a finding of exemption is made by the Corps. It is the responsibility of the applicant to ascertain if a permit is required. The Habitat Assessment has been conducted.

C. Washington State Water Quality Laws, Chapter 90.48 RCW, Water Pollution Control and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, define quality of state waters. Any discharge of sediment-laden runoff or of other pollutants to waters of the state is in violation of these state laws and may be subject to enforcement action.

D. The proposed project must be consistent with all applicable policies and other provisions of the Shoreline Management Act, its rules, and the Shoreline Master Program for the Thurston Region. The review by Thurston County staff to make a recommendation on that finding will occur prior to the Shoreline Substantial Development Permit hearing (not yet scheduled). **The final decision will be rendered by the Hearing Examiner.**

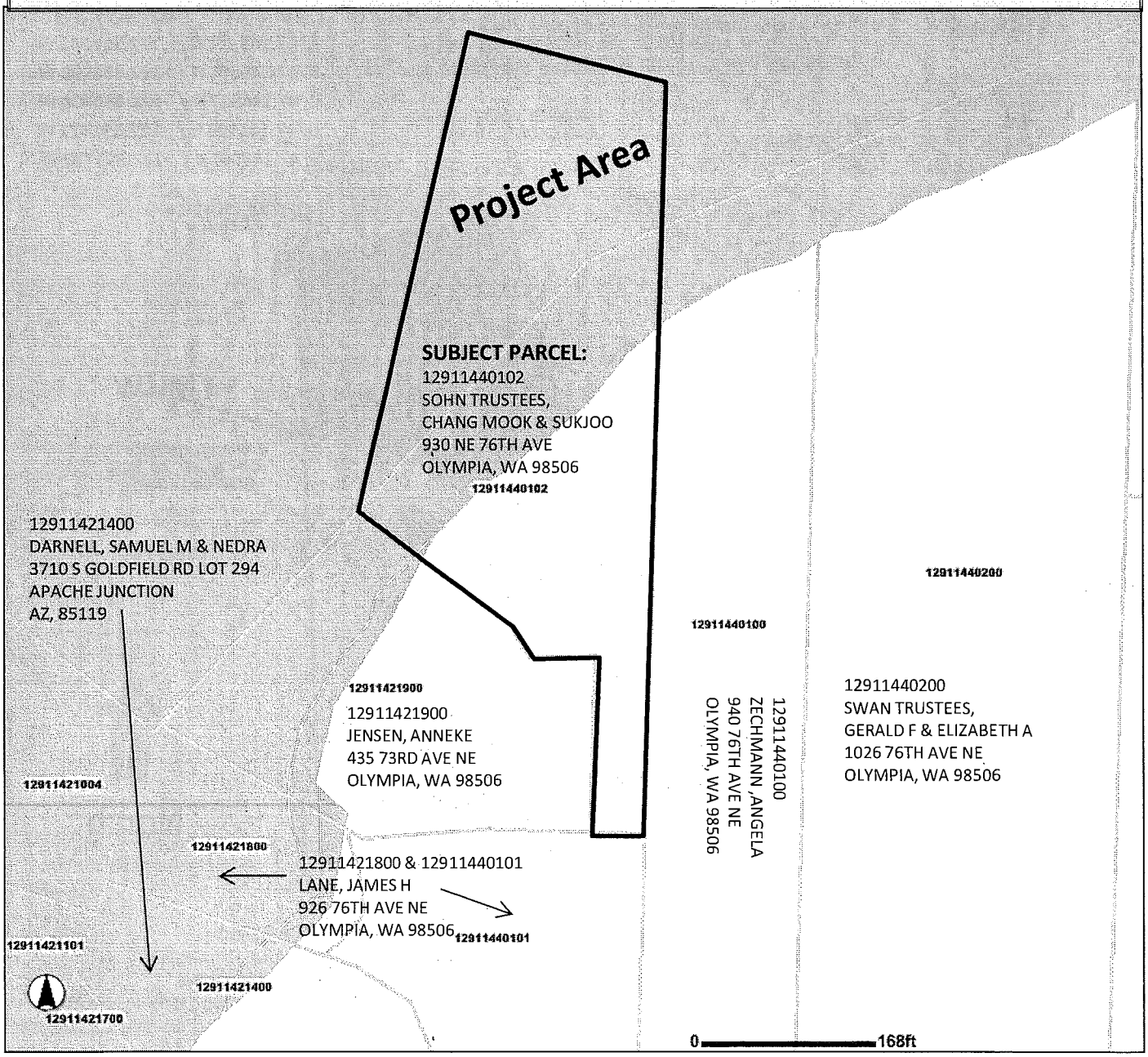
Summary

The Thurston County Resource Stewardship Department has determined that the requirements for environmental analysis, protection, and mitigation have been adequately addressed in the above conditions and notes, in conjunction with the requirements of the Shoreline Master Program for the Thurston Region and the Comprehensive Plan adopted under chapter 36.70A RCW, and in other applicable local, State, or Federal laws or rules, as provided by RCW 43.21C.240 and WAC 197-11-158. Other than the conditions listed above, this Department will not require additional mitigation measures under SEPA.

REFERENCE:
APPLICANT: *Pacific Northwest Aquaculture*
930 76th Avenue NE
Olympia, WA 98506
ADJACENT PROPERTY OWNERS:
1. *Jensen, Anneke*
2. *Zechmann, Angela*

LOCATION: *Thurston County Parcel# 12911440102*
930 76th Avenue NE
Olympia, WA 98506
LAT/LONG:
47.144536 N lat.
-122.891005 W long.
S/T/R: *11/19N/02W*
PAGE 3 OF *11* **DATE: December 8, 2014**

PROPOSED PROJECT:
Commercial Aquaculture (Geoduck Tube Culture)
IN: *Zangle Cove*
NEAR/AT: *Boston Harbor*
COUNTY: *Thurston*
STATE: *WA*



Note: Property ownership and contact information is provided for parcels within 300' of Subject Parcel.
Source: Thurston County Geodata

Figure 3. Parcel Map

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	S/T/R: *11/19N/02W*	
	PAGE *4 OF 11* **DATE: December 8, 2014**	

A. 47.145311 N / -122.891241 W
B. 47.145096 N / -122.890500 W
C. 47.144517 N / -122.890500 W
D. 47.143903 N / -122.891421 W
E. 47.143997 N / -122.891752 W

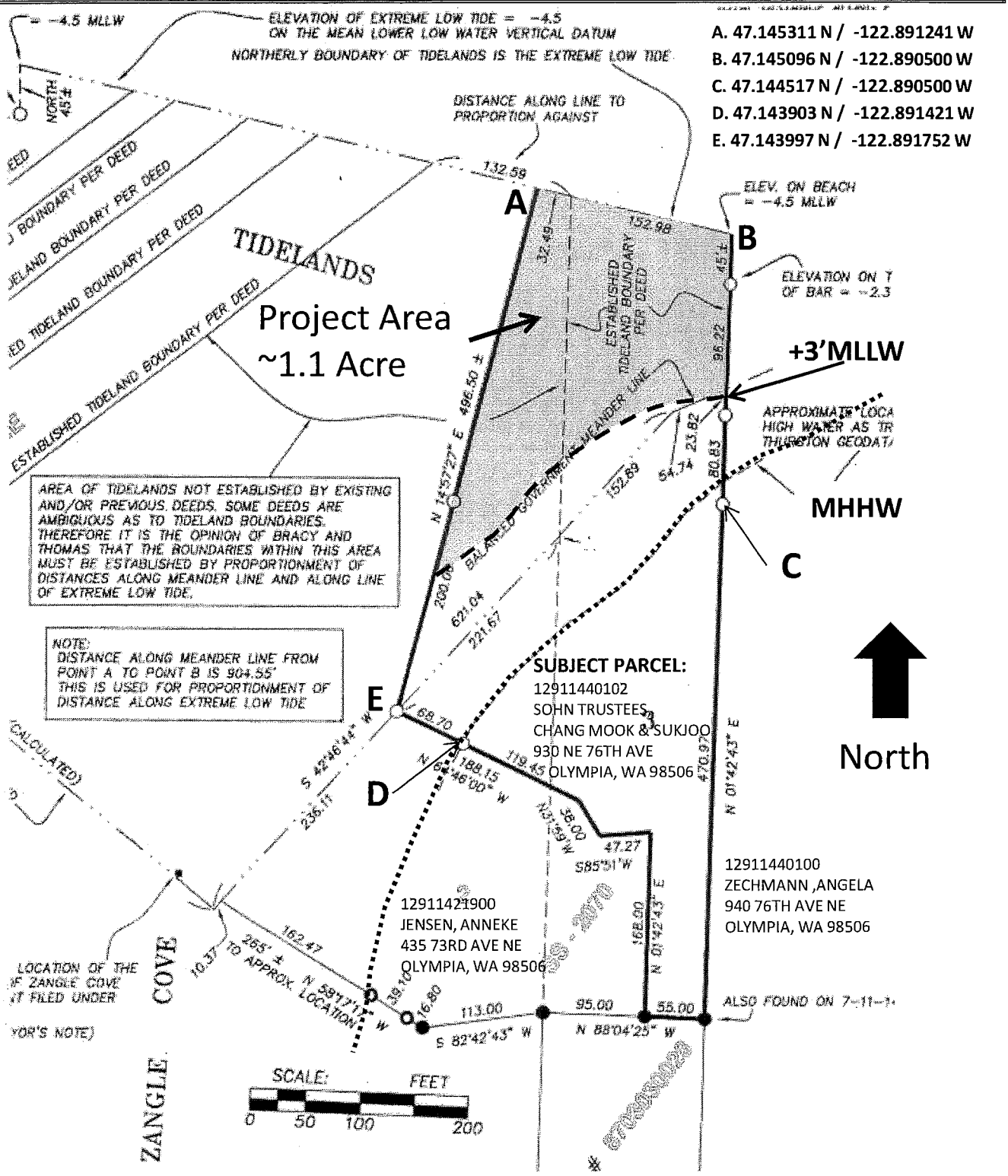

Figure 4. Tideland Survey Plan View

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REFERENCE:	**LOCATION:** *Thurston County Parcel#*	**PROPOSED PROJECT:**
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Olympia, WA 98506	**LAT/LONG:**	**COUNTY:** *Thurston*
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2. *Zechmann, Angela*	**S/T/R:** *11/19N/02W*	
	PAGE ***5 OF 11*** **DATE: December 8, 2014**	

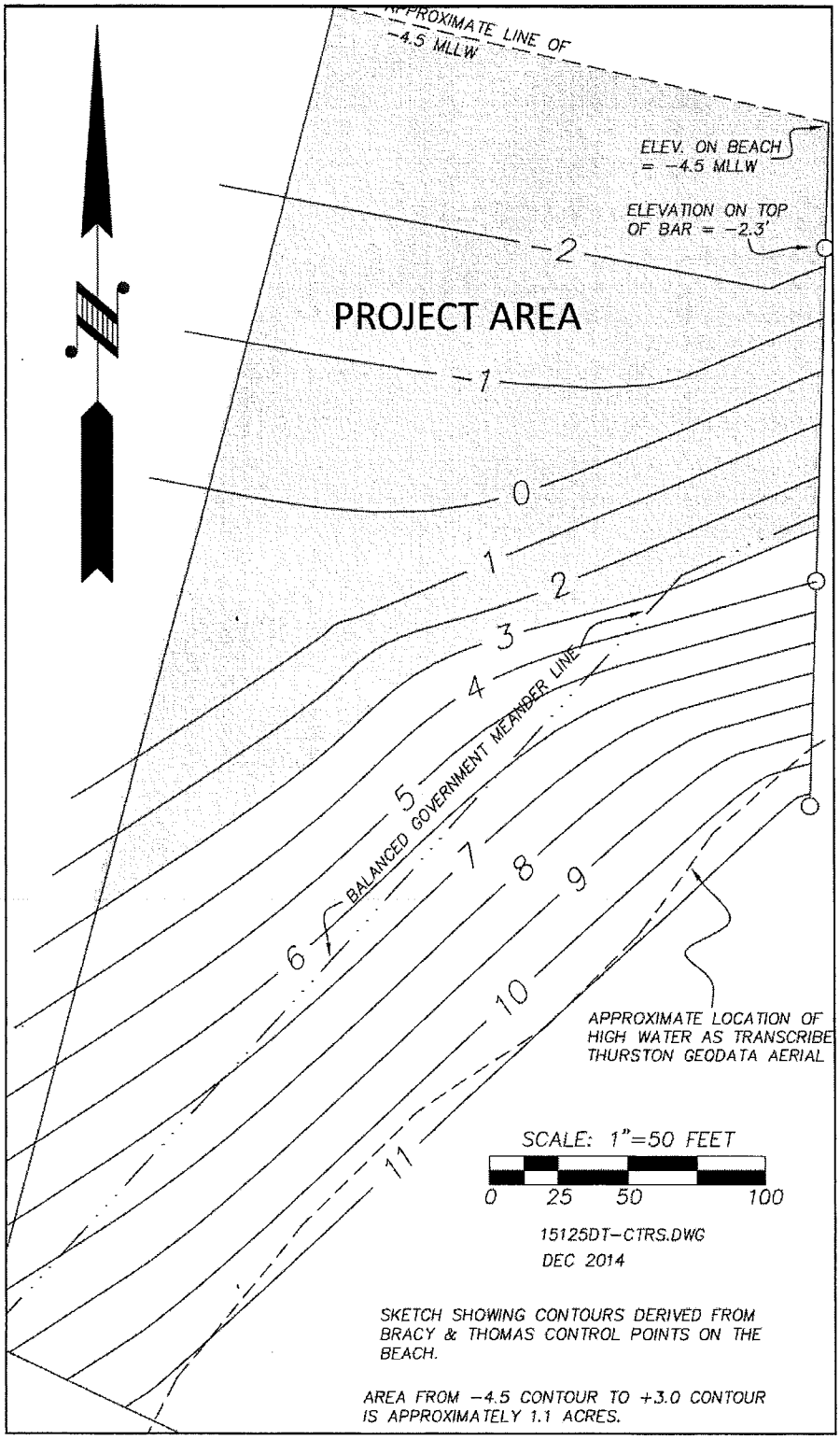

Figure 5. Tideland Survey Contour Map

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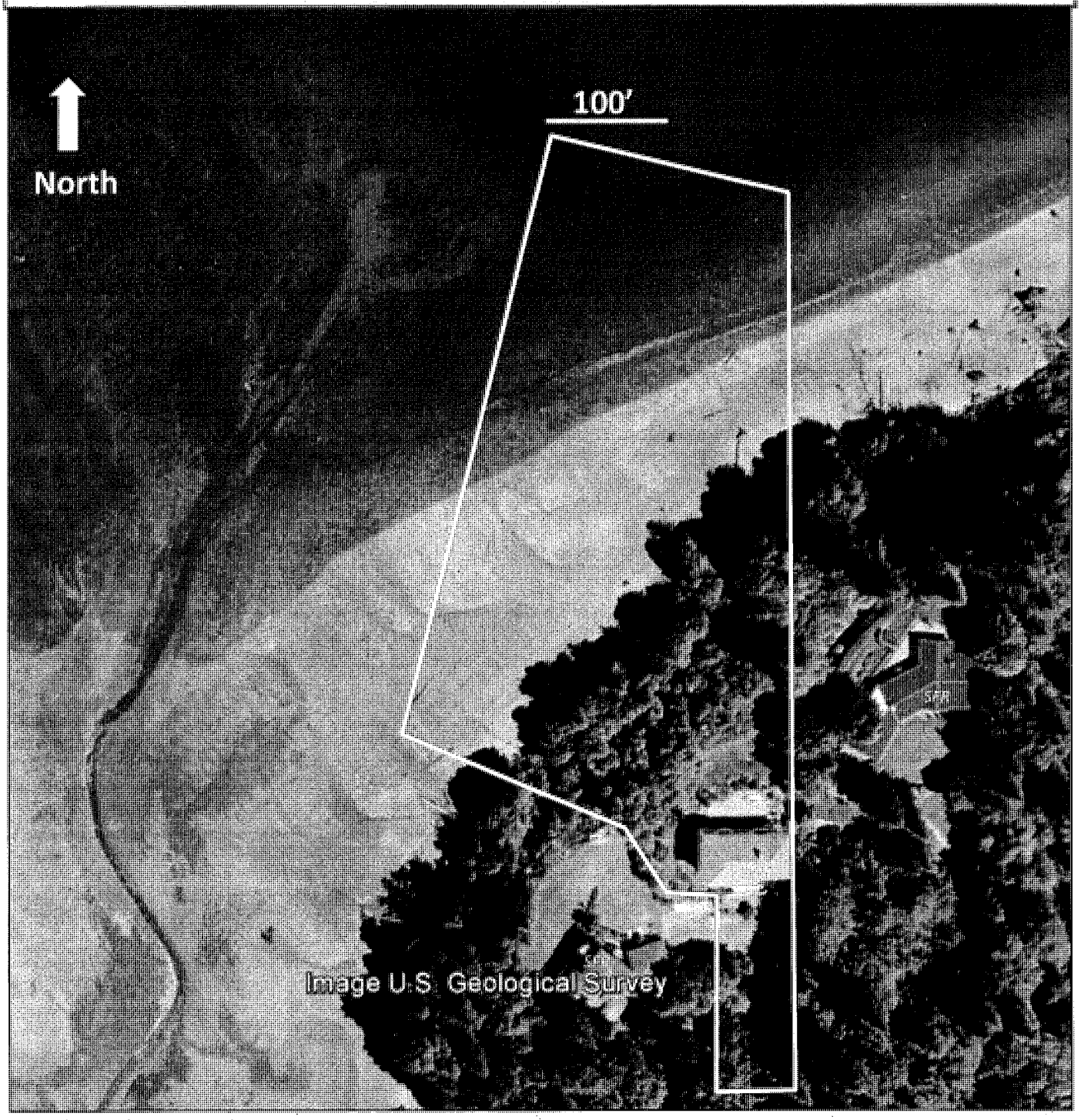

Parcel Boundary Approximate

Figure 6. Aerial Photograph

ACERA LLC
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Note: WA State Coastal Atlas. Photo taken 7/11/2006 at 1:58.48 PM
Parcel Boundary Approximate – Not to Scale

Figure 7. Coastal Atlas Photograph

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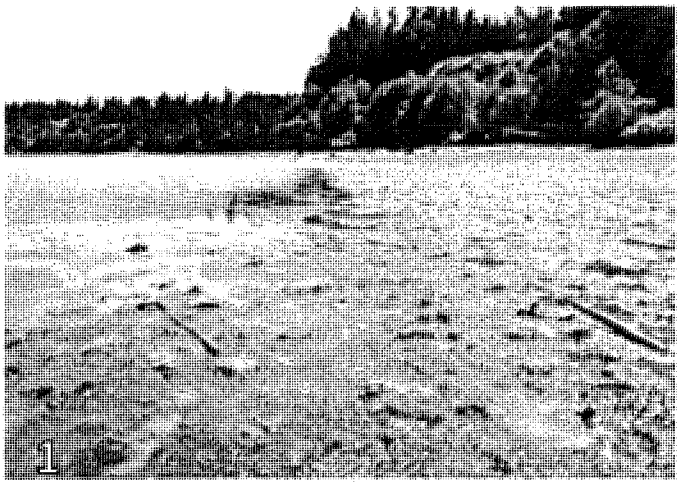

1. Looking East at the tideline
2. Looking West at the tideline
3. Looking East along shoreline
4. Looking South into Zangle Cove

Note: Photos taken on June 12th, 2014 during the lower-low tide (approx. -3.0' MLLW)

Figure 8. Site Photos

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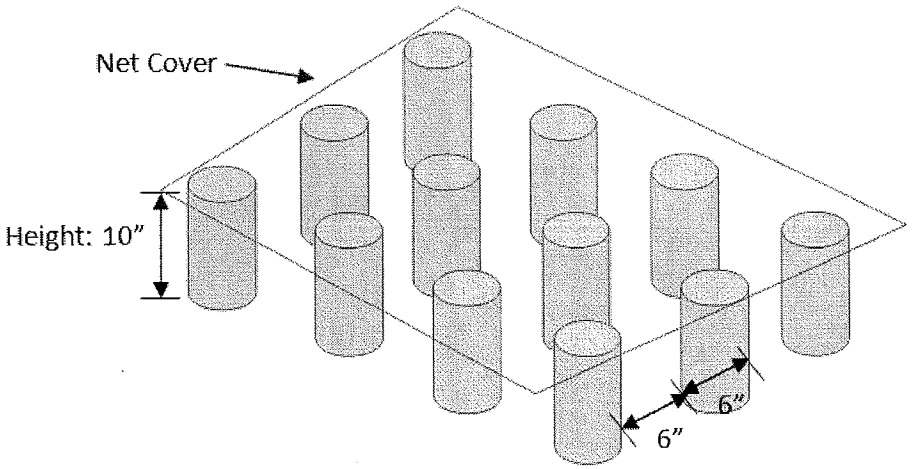
	PAGE *9* OF *11* **DATE: December 8, 2014**	

Perspective View of a Typical Geoduck Farm



4-6" diameter PVC tube, Height: 10", Wall Thickness: 1/16",

Density of the tubes is one per square foot.

Net Cover

Figure 9. Typical Perspective View

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	PAGE *10* OF *11* DATE: December 8, 2014	

Cross-Section View of a Typical Geoduck Tube

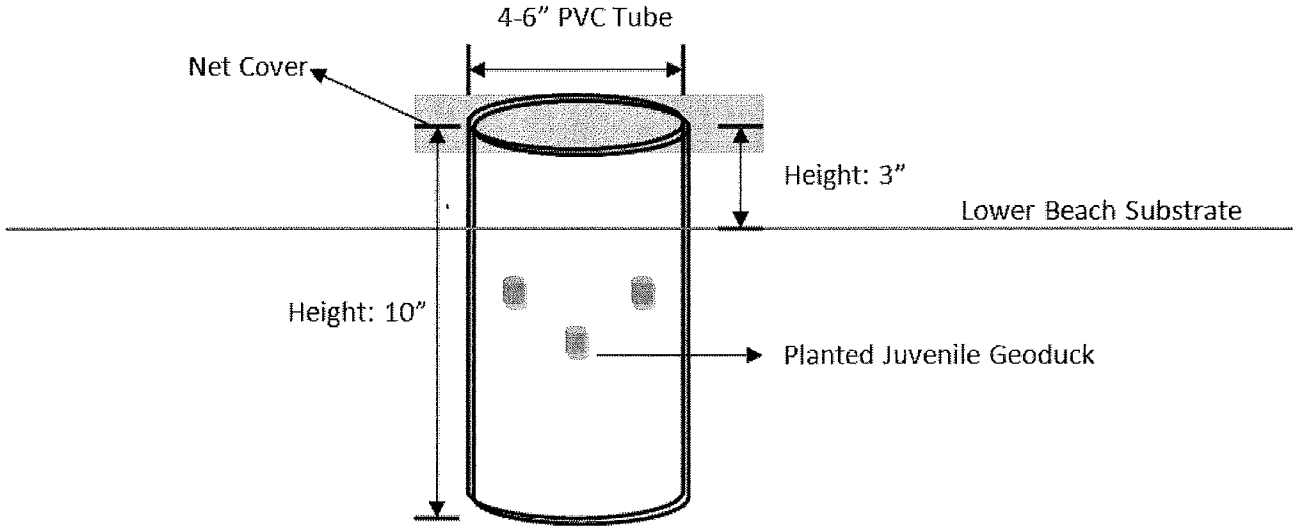

Figure 10. Typical Cross Section View

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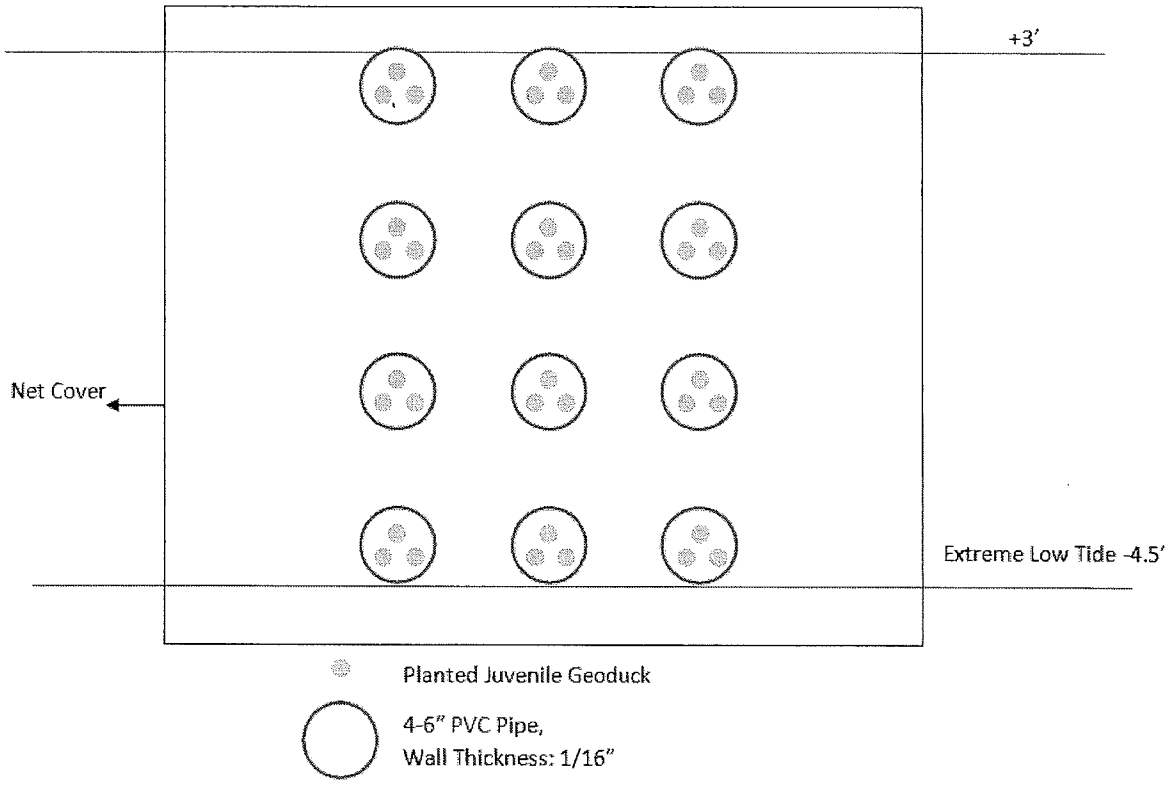
	PAGE *11* OF *11* DATE: December 8, 2014	

Plan View of a Typical Geoduck Farm

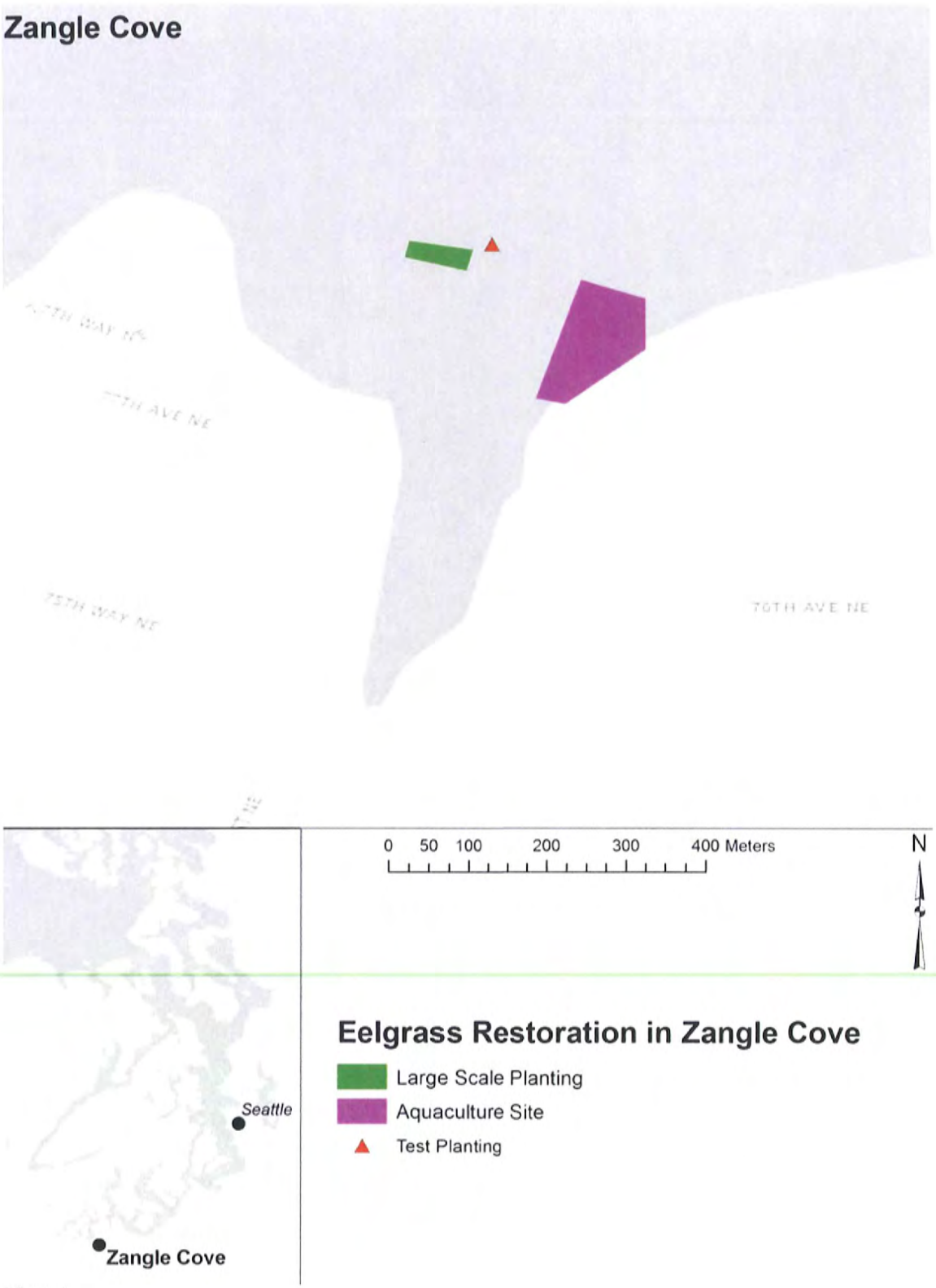


Average pipe per square foot: 1

Average juvenile geoducks per square foot: 3

Figure 11. Typical Plan View

ACERA LLC
Advanced Concepts in Environmental Regulatory Assistance


Zangle Cove
75TH AVE NE
75TH WAY NE
0 50 100 200 300 400 Meters
N
Eelgrass Restoration in Zangle Cove
Large Scale Planting
Aquaculture Site
Test Planting
Seattle
Zangle Cove

Map 4

Adjacent Property Owners
2014108800 – Sohn Geoduck Farm
Updated: April 29, 2016
500' mail radius

SAMUEL M & NEDRA DARNELL
3710 S GOLDFIELD RD LOT 294
APACHE JUNCTION, AZ 85119

RICHARD M FINCH
1030 76TH AVE NE
OLYMPIA, WA 98506

ANNEKE JENSEN
435 73RD AVE NE
OLYMPIA, WA 98506

JAMES H LANE
926 76TH AVE NE
OLYMPIA, WA 98506

JAMES A LIVINGSTON
1910 4TH AVE E PMB 77
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Aarlene D. Meaders, Confluence
:nvironmental Company

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Patrick Townsend

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POLITICS & GOVERNMENT

Shellfish growers settle suit

STAFF, WIRE REPORT

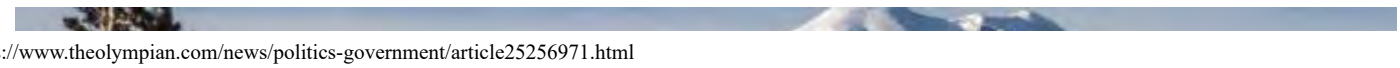
JUNE 24, 2010 12:00 AM

Three area shellfish companies have agreed to pay the state a total of $417,000 for the unauthorized use of publicly owned tidelands to grow and harvest shellfish under a settlement announced Wednesday.

The state Department of Natural Resources determined that Shelton-based Taylor Shellfish trespassed on 3.1 acres of tidelands along North Bay near Allyn to grow geoducks, clams and oysters. It concluded that Olympia-based Seattle Shellfish and Arcadia Point Seafood, also of Shelton, each encroached on about a half-acre of tideland to grow geoducks along Case Inlet. The violations took place for between five and seven years, the state said.

The three companies agreed to stop growing shellfish in those areas without a lease but will receive legal permission from the state to harvest geoducks, clams and oysters already planted there. The encroachments are considered unintentional under the pacts.

TOP ARTICLES



Late season storm bringing rain, wind and cold to Western Washington - and maybe snow?

"I am pleased that all three shellfish growers have shown such commitment to working cooperatively with DNR to determine the rightful access to use these public tidelands," Public Lands Commissioner Peter Goldmark said in a statement. "Each firm's legal use of tidelands – both private and publicly owned – is important to create jobs and generate revenue that helps protect Puget Sound and bring it back to health."

The state launched a public-land survey last summer after discovering that Taylor Shellfish had been growing shellfish on public tidelands.

The state acknowledged in a news release that identifying ownership of private and public tidelands "can be complicated by the changing landscapes of shorelines areas, as well as the different ways in which state law has identified the boundaries of shoreline parcels since statehood."

Bill Dewey, a spokesman for Taylor Shellfish, said the company has reviewed its shellfish farm boundaries and surveyed areas that were in doubt.

"We've been proactively working through our properties and cooperating with the state to find other accidental encroachments," Dewey told The Associated Press.

On this particular trespass, he said, the company leased land from a private owner and relied on its property lines.

"When we started leasing other people's beaches, we probably were more careless than we should have been," he added. "I'm sure this will not happen again in the future."

"Mistakes happen," Jim Gibbons, Seattle Shellfish's president, told the AP. "We get everything surveyed now."

Last year, Taylor Shellfish and DNR settled a long-brewing dispute over geoduck harvesting on state-owned lands in Totten Inlet in south Puget Sound.

Outgoing state Public Lands Commissioner Doug Sutherland had negotiated a tidelands lease with the company days before leaving office.

New Lands Commissioner Peter Goldmark didn't sign that lease, saying the public was shut out of the process.

In May 2009, DNR granted Taylor rights to harvest oysters and geoducks it mistakenly raised on public lands, but it didn't allow shellfish to be replanted there.

Taylor agreed to pay the state $1.5 million and withdraw lawsuits it had filed against the agency.

Under the agreements, Taylor Shellfish will pay $225,000; Seattle Shellfish, $75,000; and Arcadia Point Seafood, $117,000. DNR will put the money into an account used to restore habitat, inform the public and fund research projects on Puget Sound.

The Associated Press and staff writer John Dodge contributed to this report.

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First coronavirus case confirmed in Thurston County

MARCH 11, 2020 12:06 PM

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MARCH 10, 2020 10:11 PM

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MARCH 12, 2020 2:10 PM

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BY ELAINE KURTENBACH *AP BUSINESS WRITER*

MARCH 12, 2020 08:17 PM

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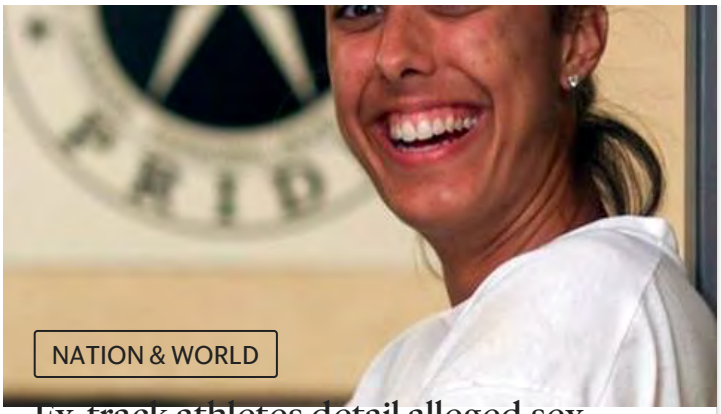

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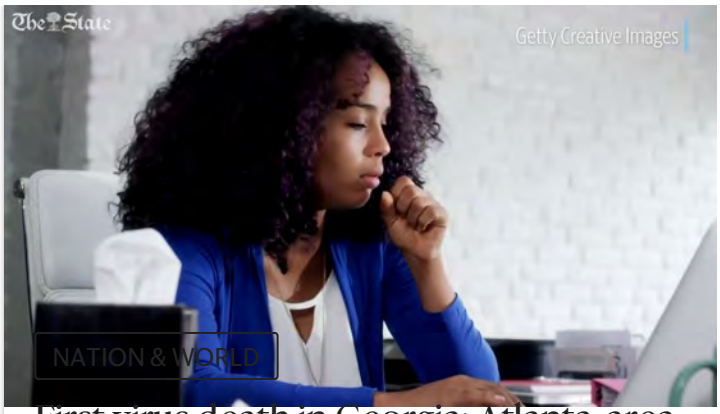
Ex-track athletes detail alleged sex abuse by college coach

MARCH 12, 2020 6:01 PM



NATION & WORLD

First virus death in Georgia; Atlanta-area schools closing

MARCH 12, 2020 5:51 PM

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EXHIBIT FOR
PATRICK TOWNSEND

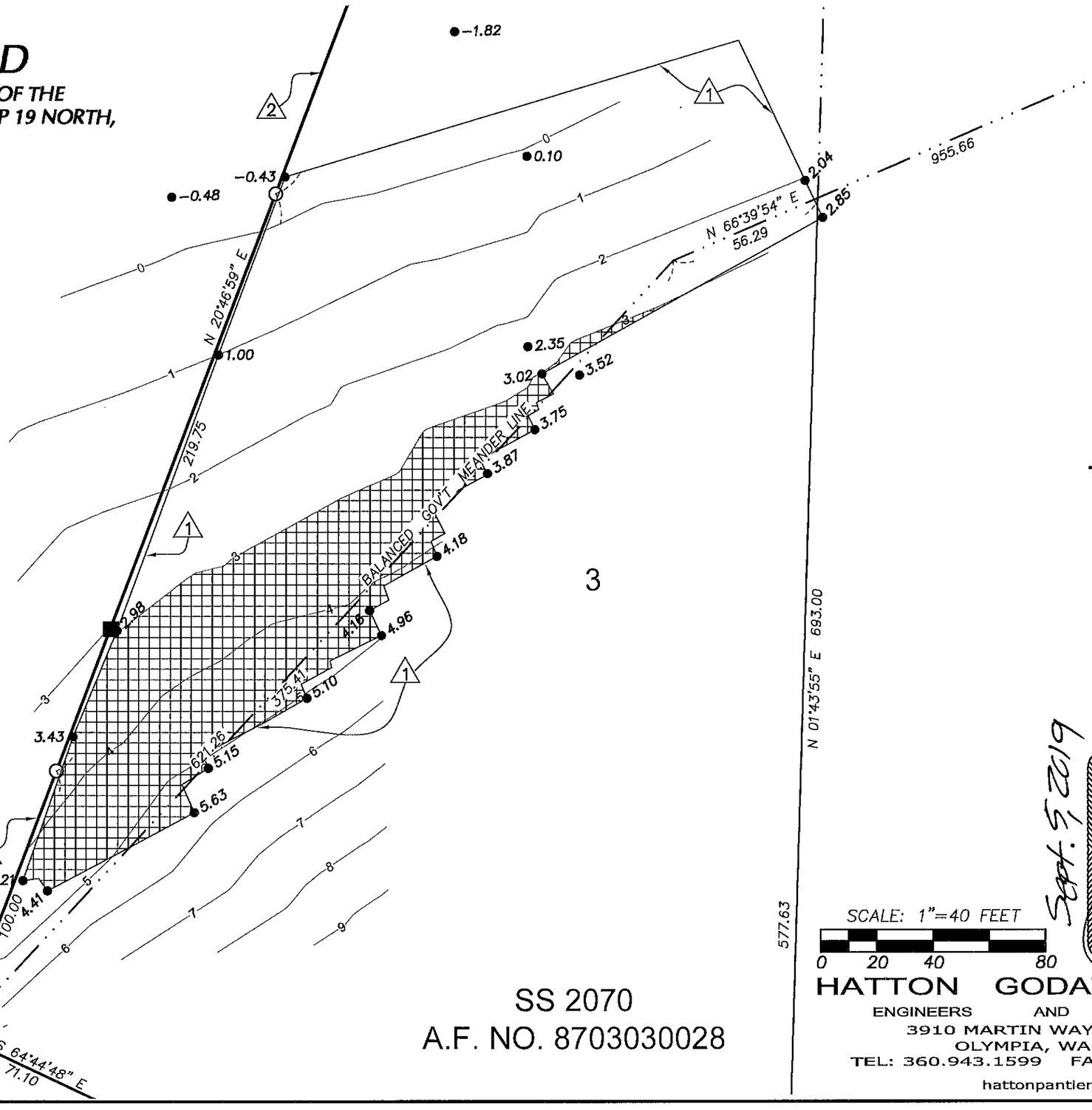
A PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 19 NORTH, RANGE 2 WEST. W.M.

LEGEND

- ■ WOOD HUB SET AT ELEVATION 3.0'
- ○ FOUND 5/8" REBAR AND PLASTIC CAP LS 28073
- ● FOUND 1/2" REBAR AND PLASTIC CAP LS 11019
- • SPOT ELEVATION
- 1 LIMITS OF NETTED AREA
- 2 LINE ESTABLISED BY SURVEY DATED MAY 2019.
- AREA OF NETTING LYING ABOVE ELEVATION 3.0' (MLLW)

VERTICAL DATUM
MLLW

ESTIMATED LINE OF EXTREME LOW TIDE IS BASED ON ELEVATIONS OBTAINED DURING FIELD SURVEY BY HGP IN MAY 2015. ELEVATIONS ARE BASED ON TIDAL DATUM OF MEAN LOWER LOW WATER AT 0.00. THE ESTIMATE OF EXTREME LOW TIDE OF −4.5 FEET WAS OBTAINED FROM HISTORICAL DATA AND AN 18.6 YEAR TIDAL CYCLE.



3

BASIS OF BEARINGS:
THURSTON COUNTY HIGH PRECISION SURVEY CONTROL NETWORK BASED ON CONTROL POINTS #905 AND #7804

Sept. 5, 2019

JEFF S. PANTIER
STATE OF WASHINGTON
28073
REGISTERED
PROFESSIONAL LAND SURVEYOR

SCALE: 1"=40 FEET
0 20 40 80

SS 2070
A.F. NO. 8703030028

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

JWL
15011

Polly Stoker

From: John Woodford <jwoodford.aia@gmail.com>
Sent: Friday, April 17, 2020 1:53 PM
To: Jennifer Davis; Polly Stoker; Andrew Deffobis
Subject: April 15, 2020, virtual Planning Commission meeting

Ms. Davis, Ms. Stoker, Mr. Deffobis and Commissioners,

As a non-participating observer of last Wednesday's meeting I would like to add my comments. First, please do not make virtual meetings the "new normal" for the long term...for the short term-okay. Return to live meetings in Room 152 when the governor and BoCC say we're ready. And, please do not ever consider holding Open Houses or Public Hearings in a virtual format; the public has to be able to participate in person.

Now...the things that I liked and appreciated with the virtual format. I could see all of you participants very well. And I could actually HEAR all of your comments...something that is most often very "iffy" in a live meeting. The visual material presented by Shannon Shula and Andrew Deffobis was vastly more visible and useful than images projected on the screen in Room 152. And, I could sit at home at my desk, spread out my notes/my copy of Ch 19.600 and easily make new notes.

One thing missing from the virtual meeting, that I would have liked hearing, was the Public Comments/Communication. I know that you received five written comments and that they are already posted on your web page, but I would have liked to hear at least a very brief summary of the subject matter of each comment during the meeting.

Now, Andy, I would like to raise some SMP items that were not discussed Wednesday evening.

1) Why were Water Oriented Industrial Uses in Shoreline Residential SEDs changed from "Prohibited" to "Conditional Use Permit"? See Table 19.600.105...the Matrix, 19.600.150.A.2 and 19.600.150.B.3.a. Where in a Thurston County Shoreline Residential SED could you find a place where any industrial use would be compatible with residential use? Everyone, please take a close look at the SED map. Other than the Boston Harbor area and a sizable portion the west coast of Eld Inlet (Steamboat Island), all other marine water Shoreline Residential stretches are very limited. The vast majority of Shoreline Residential properties are adjacent the County's fresh water lakes. Allowing any industrial use in an existing residential neighborhood seems counter to any reasonable planning standards.

2) These comments deal with 19.600.160 Mooring Structures and Activities.

a) 19.600.160.C.1.p and f plus 19.600.160.C.5.e through h deal with covers and grating requirements for boat houses, piers and floats. While this has been discussed in the past, it did not come up on Wednesday. None of this applies to the fresh water lakes of Thurston County.

b) 19.600.160.C.4.c states, "Piers shall have a north-south orientation..." And it goes on to say that the pier height must be raised for every degree that the pier departs from this n-s orientation. I assume that this has something to to do with salmon/juvenile salmonids; the requirement should not apply to lakes...where most of the residential properties occur. I live on Long Lake which has a predominately north-south bearing. Therefore, for most Long Lake residents to have a pier perpendicular to their shoreline (an east-west orientation), they would have to raise it far above the water level.

c) 19.600.160.C.4.d states, "New or replacement piers must be oriented in a straight line." Does this prohibit an L or T or even a curved configuration? If so, why?

3) On your web site the SMP Draft-Chapter-19.700-update-Strike-thru-WM.pdf that appears on the Meeting Agenda for April 15, 2020, contains no strikes-through or change of any kind. This is exactly the same Chapter 19.700 that was first presented to the Planning Commission in the late summer of 2017. Or, am I missing something here? Will 19.700 be on the agenda for the next Planning Commission meeting?

Thank you all for your efforts during these difficult times.

Stay Safe,

John Woodford, AIA,
Chair
Thurston County Shoreline Stakeholder Coalition

MLR comments 6.3.20

7600 Redstart Dr. SE

Olympia, WA 98513

June 2, 2020

Maya Teeple, Senior Planner

Thurston County Planning

2000 Lakeridge Dr. SE

Olympia, WA 98502

Re: Mineral Lands Review

Dear Ms. Teeple,

Once again, I am double booked for meetings June 3rd at 6:30. I will try switch from another meeting in order to make a public comments at the beginning of the Planning Commission meeting, but in case I can't, I am submitting comments and questions regarding the Mineral Lands Review materials in the Planning Commission meeting notice May 29th.

I am referencing the May 20th materials "Presentation of MLR Options" (Presentation MRL 05202020 Options Follow Up Discussion.pdf), in the Summary of Decision Points and Options for the D and E options, there are "Considerations" columns of Ease of Implementation and Flexibility to the Industry. May I suggest for the Planning Commission members that columns be added to include Environmental and Property Owners/Residential? These are important considerations and impacts for each option.

Thank you for your work and service on this challenging project. I appreciate your patience and assistance!

Regards,

Phyllis Farrell

Polly Stoker

From: Bob Jensen <rvmijensen@hotmail.com>
Sent: Wednesday, June 03, 2020 9:14 PM
To: Andrew Deffobis
Cc: pmrlowe@comcast.net; mcbeehler@outlook.com
Subject: Thurston County Shoreline Master Program Amendments -- Toxic Blue-Green Algae Blooms

Dear Andrew,

I just watched on Zoom, the Thurston County Planning Commission discussion, and your presentation regarding proposed amendments to the County Shoreline Master Program (SMP). It was not open to public discussion. Therefore, subsequently, I left you a voicemail message on your office phone.

My name is Robert (Bob) Jensen. I am deeply concerned about the increasing occurrence of toxic blue-green algae blooms on Pattison and other shoreline lakes in the County.

I have an extensive history in the administration and adjudication of activities on the shorelines of the State. I believe I have detailed this to the County in previous written comments. Please advise me if you need elaboration of this.

The toxic algae blooms are primarily caused by leaking phosphorous into lakes. This accumulation is due to the continual of phosphorous into the lakes from septic systems. Absent requiring sewers, which is unlikely to happen any time soon; the only practical control currently available is the limitation of the outflow of phosphorous from residential septic systems into the lakes. For this reason, I advocate mandatory monitoring and maintenance of the existing systems. In addition, the problem is grave enough to consider a moratorium on new residential development on shoreline lakes; until the toxic blue-green algae blooms end on the lakes.

Unfortunately, the County Commission, approximately three years ago, rejected a proposed ordinance, which would have required a fee; which would have been used by the County Health Department, to regulate septic systems on lakes subject to increasing residential use.

As a result of this failure, and as a complement to the authority of the County Health Commission, the Shoreline Master Program must be the primary tool to control these toxic algae blooms.

I know how critical the placement of sewers is to controlling the blooms. I lived in Seattle, as a youth, when many beaches on Lake Washington were closed due to such blooms. Once the residential development around the lake was protected by sewers, the toxic blooms

stopped. Once again, the beaches were open both to the public, and private use.

I later saw this same situation occur on Eastern Washington lakes in the mid 1970's. Studies then proved toxic blue green algae blooms were occurring due to the over-loading of phosphorous. In fact, in 1976, a major toxic algae bloom occurred during this time on Lake Spokane, below Spokane on the Spokane (Columbia) River. It caused a major fish kill, as well as adverse physical and psychological effects on many of the residents of that lake. The source of the phosphorous loading in that incidence, was a temporary planned bypass of Spokane's sewage treatment plant, during the period when the upgraded plant was connected to the sewer, which discharged into the river.

Please advise me how and when I can present my proposal to the Planning Commission, prior to approval of the proposed amendments to the SMP.

My telephone number is: 360-259-2736; my email address is: rvmijensen@hotmail.com.
Thank you kindly for your attention.

Respectfully yours,
Bob Jensen

From: Bob Jensen
To: Andrew Deffobis
Cc: pmrlowe@comcast.net; mcbeehler@outlook.com
Subject: Thurston County Shoreline Master Program Amendments -- Toxic Blue-Green Algae Blooms
Date: Wednesday, June 03, 2020 9:45:31 PM

Dear Andrew,

I just watched on Zoom, the Thurston County Planning Commission discussion, and your presentation regarding proposed amendments to the County Shoreline Master Program (SMP). It was not open to public discussion. Therefore, subsequently, I left you a voicemail message on your office phone.

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residents of that lake. The source of the phosphorous loading in that incidence, was a temporary planned bypass of Spokane's sewage treatment plant, during the period when the upgraded plant was connected to the sewer, which discharged into the river.

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My telephone number is: 360-259-2736; my email address is: rvmijensen@hotmail.com.
Thank you kindly for your attention.

Respectfully yours,
Bob Jensen

7600 Redstart Dr. SE

Olympia, WA 98513

July 1, 2020

SMP comments to Thurston Planning Commission July 1, 2020

Greetings Commissioners,

As the SMP update process is nearing completion, I would like to emphasize the importance of the wording you recommend as this document will be in effect for many years and be the guiding document regarding the use of and protection of our shorelines. Your questions and recommendations have been reflected in the draft language, but much of the public comment and recommendations have not made it into the draft language. You can ask those be included in the draft plan.

I would like to refer you to two documents submitted by Anne Van Sweringen, representing 5 local environmental groups…the 30 pages of draft language suggestions dated July 15th, 2018 and 16 pages dated September 10, 2018. Anne is a retired environmental planner and the documents contain best available science recommendations.

Also, the Futurewise letter of March 6, 2019 has specific recommendations for areas in the draft SMP that do not meet the requirements of the SMA. Please request those recommendations be included in the draft language.

I would like you to ask how the County is addressing the "no net loss" standard required by the SMA? Between development, pollution and aquaculture, this standard is obviously not being met as evidenced by water quality issues and the decline of salmon and Orcas. Please consider asking for a "net gain" standard and the requirements to implement that….the tribes, Orca Task Force and the Puget Sound Partnership have the rationale to support such language in an SMP.

The recent federal court decision invalidating the Army Corps of Engineers general NW48 aquaculture permits will require new individual aquaculture permits. The court found that shellfish bed preparation, spraying, the use of plastics and hydraulic harvesting all have impacts on the environment. Thurston County should heed that ruling and look closer at aquaculture processes. Recommend staff prepare appropriate regulations for aquaculture permits that will address these practices and ensure "no net loss".

Maintaining and increasing marine buffers, reducing marine armoring and requiring more public access will benefit the shorelines and public interests. Please make sure these recommendations are included in the draft SMP.

Thank you

Phyllis Farrell

From:	Polly Stoker
To:	Polly Stoker
Cc:	Andrew Deffobis
Subject:	FW: Planning Commission Meeting 7-1-2020
Date:	Wednesday, July 01, 2020 4:44:30 PM

Hello Planning Commissioners,
Below is another written comment for tonight's PC Meeting.
Thanks
Polly

From: Annabel Kirschner <kirschner01@gmail.com>
Sent: Wednesday, July 1, 2020 4:33 PM
To: Andrew Deffobis <andrew.deffobis@co.thurston.wa.us>
Subject: Planning Commission Meeting 7-1-2020

Dear Planning Commission:

I am making a few written comments for the Planning Commission, because the speaker on my computer doesn't always work for ZOOM meetings.

First, like many others in Thurston County, I strongly think the Planning Commission must do all it can to preserve the natural environment (streams, lakes shorelines, forested areas, parks, etc) from the runaway development we see just north of here. Pierce, King and Snohomish counties have been destroyed by sprawl and development. The commission's job is to see that it doesn't happen here.

Yes, the county will grow substantially in the next few decades. That growth MUST be confined to the urban growth area, making these more compact. This will make public transportation more feasible and help reduce traffic congestion.

Developers will NOT LIKE THIS. They make easy money by by plowing up new land and creating sprawl. There is NO reason your office or Thurston County residents need to put up with this. If a developer doesn't like county regulations, he/she can go elsewhere. There are plenty of responsible developers.

Also, the agency must do much more to protect our shorelines. I have been told that geoduck operators do not need a permit to bulldoze and pressure wash tidelands. If this is really the

case it is UNBELIEVABLE. Most geoducks are sold abroad so you are allowing commercial entities to destroy OUR environment for money. Is someone in your office getting kickbacks for this? All fishing and shellfishing must be strongly regulated to protect what we have left of a once thriving aquaculture and to try and bring some of this back.

Development along shorelines must also be strictly regulated with no relaxation on setbacks, bulkheads or docks. These regulations actually need to be made stricter and enforced whenever shoreline property is sold.

Without these and other efforts at regulation, the county's environment will deteriorate, traffic will become a nightmare, our waterways will become more polluted, air pollution will increase and our quality of living will go down while of cost of living increases. Please help the county avoid these problems.

Sincerely

Annabel Kirschner

1008 Loete Ct. SE

Tumwater, WA 98501

From: Andrew Deffobis
To: Polly Stoker
Subject: FW: Shoreline Master Plan
Date: Wednesday, July 15, 2020 3:10:50 PM

Hello Polly,

The following written comment has been submitted, and the commenter would like it forwarded to the Planning Commission. I will include it in the SMP record. Is it too late to provide to PC for this meeting?

Andrew Deffobis, Associate Planner
Thurston County Community Planning and Economic Development Department
2000 Lakeridge Drive SW
Olympia, WA 98502
Phone: (360) 786-5467
Fax: (360) 754-2939

From: Esther Grace Kronenberg <wekrone@gmail.com>
Sent: Wednesday, July 15, 2020 12:31 PM
To: Andrew Deffobis <andrew.deffobis@co.thurston.wa.us>
Subject: Shoreline Master Plan

Dear Mr. Deffobis,
Please share these comments with the Planning Commission and include them in the public comments on the Shoreline Master Plan.

Dear Planning Commission,

I write as a private citizen who also is a member of the League of Women Voters of Thurston County's Water Study Team regarding the Shoreline Master Plan update.

The Water Study Team has learned that Thurston County faces serious issues around water quality. There is ample evidence of increasing degradation of our waters from Thurston County's own Water Resources and Environmental Health Departments, LOTT and other non-profits engaged in this work. In addition, climate change is already leading to rising sea levels around the country. In light of the increasing development pressures in our County and the current fragile state of our water resources, it is imperative that the Planning Commission act with foresight and determination to safeguard our water resources as its highest priority when considering the Shoreline Master Plan.

Among the suggestions made by Futurewise and the South Sound Sierra Club, I support the following measures to protect the water quality of our area.

- adoption of a "net gain" standard to quantify data
- maintenance of current marine buffers and an increase for new developments, especially important given current and projected sea level rise
- phasing out the use of aquaculture plastics to prevent further degradation of water quality and protection of sealife from microplastic pollution
- prohibiting destructive industry practices, such as the use of heavy equipment on fragile beaches and the spraying of herbicides and pesticides
- limiting armoring of docks and bulkheads, which can be done by requiring community rather than individual docks, especially important for the survival of our threatened orca population.

We are in the 21st century at a time where the common good needs to be protected over calls for individual property rights. We can no longer afford to continue on a path that values one person's "right" over the community and the ecosystem's sustainability lest we all suffer in the long run. A pragmatic policy that benefits the greater community and the generations to come is more important now than ever before as we face multiple crises that will challenge our ability to come together as a community for the greater good.

I urge you to weigh the health of our shared environment which we all rely on for material sustenance, economic prosperity, and recreational uses as the primary consideration in any changes to the Shoreline Master Plan.

Thank you.

Sincerely,
Esther Kronenberg