Public comments received on the draft SMP Chapters between the October 31, 2018 Planning Commission meeting and December 12, 2018.

Farmed Geoduck Clams

ARCADIA POINT SEAFOOD

On Totten Inlet, Puget Sound, Washington

November 26, 2018

Electronic Delivery to: Thurston County Commissioners
John Hutchings, District 1, john.hutchings@co.thurston.wa.us
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Thurston County Staff and Planning Commission
Brad Murphy, County Planner, brad.murphy@co.thurston.wa.us

Re: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Thank you for this opportunity to comment on proposed updates to the Thurston County Shoreline Master Program (SMP). Our comments primarily focus on the Aquaculture section of Chapter 19.600. However, we also have included comments on other Chapters/Sections as they relate to Aquaculture.

Background

We provide the following background to set context for our comments. Arcadia Point Seafood is a small, family-owned, shellfish business operating in Mason and Thurston counties. We primarily lease tidelands from the property owners for growing geoduck clams. We have done this since 2003. In addition to ourselves (Vicki and Steve), we have five full-time employees (salaried and with benefits) and hire temporary workers during peak planting, maintenance, and harvest periods.

In reviewing the aquaculture-related parts of the update, one main theme arose: The degree to which small companies may be priced out of the ability to start or grow in Thurston County. To this end, we have tried to make suggestions that will help reduce cost uncertainty, minimize redundancy, and provide additional guidance to both applicants and reviewers, while maintaining a robust review process.

We know how challenging the SMP update process can be. As a past member of the Mason County Planning Commission, Vicki worked on its update for several years. We appreciate all the work by staff, Planning Commission members, and County Commissioners. We offer these suggestions not as criticism, but rather with the hope of building on that good work.

Comments

Our comments begin with the Aquaculture section of Chapter 19.600, and then include suggestions for Chapters 19.300 and 19.700 where related to Aquaculture.

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Chapter 19.600, Section 19.600.115 Aquaculture

A. Environmental Designations Permit Requirements

Section A.3.a The rationale is unclear for why Thurston County is opting to require a CUP for an existing aquaculture operation that wants to convert to growing geoduck.

In general, the issues around geoduck culture fall into one of two buckets: ecosystem/environmental and public access/aesthetics. With respect to the former, extensive review was done by the Army Corps of Engineers (ACOE), National Marine Fisheries (NMFS), and U.S. Fish and Wildlife Service (USFWS) in preparation for issuance of the 2017-2022 Nationwide Permit 48 (i.e., the ACOE's nationwide permit (NWP) for *Commercial Shellfish Aquaculture Activities*). [1] The main issue around which debate continues is the ability of shellfish aquaculture and eelgrass/kelp to co-exist.

Suggestion: For an existing aquaculture operation converting to commercial geoduck aquaculture, require a CUP only if the site involves direct impacts to eelgrass/kelp beds.[2] If the only issue related to conversion is public access (including aesthetics), explore the use of an administrative process that addresses only the public access issue identified as a concern by the County. [3]

B. Application Requirements

Thank you for including in the introduction the phrase "...if not already provided in the local, state or federal permit applications.". We believe some additional changes can reinforce the desire to cut down on redundancy and duplication, and would support steps the County has already taken.

Section B.2. There are many existing sources of information that could be used to provide an adequate baseline description of most potential farm sites. Adding the following underlined

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[1] Issues commonly raised regarding geoduck culture include impacts from harvest activities, cover nets, PVC tubes, bottom disturbing activities, and planting activities. Concerns associated with these activities and their impacts usually include (1) water quality specifically related to suspended sediments and turbidity (from harvest), (2) water quality specifically related to nutrient balance (from densities and feeding), (3) benthic disturbance (from various activities), (4) pollution and species entanglement (from PVC tubes and cover nets) and (5) degradation of submerged aquatic vegetation, i.e., native eelgrass and rooted kelp (from various activities). The ACOE, NMFS and USFWS examined these issues and concerns, looking at cumulative impacts over a 20-year period (i.e., approximately 2016-2036) on species, critical habitat, and essential fish habitat (defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (NMFS, PBO, 2016, p 104). A set of conservation measures, along with permit terms and conditions, were developed to ensure that the nationwide permit would authorize only activities (including geoduck activities) with no more than minimal individual and cumulative adverse environmental impacts.

[2] The Department of Ecology did something similar regarding when to require site-specific Section 401 Water Quality review for applicants of Nationwide Permit 48 (Commercial Shellfish Aquaculture Activities). That is, Ecology Section 401 review is required for projects or activities authorized by NWP 48 only if "The project is a new operation, or an expansion of an existing operation, with direct impacts to eelgrass beds in marine water".)

[3] In identifying if a public access issue exists, the question should be asked: Why would a public access issue exist under geoduck culture when it did not exist for the current species being farmed?

phrase to the first sentence of the introductory paragraph would provide some guidance to both applicant and staff.

> **Suggestion:** A baseline description of existing and seasonal conditions, including best available information using existing resources and databases where applicable.

Section B.2.h. As part of NWP 48, the ACOE developed protocols for eelgrass surveys (which are also applicable to other marine plant species such as kelp). [4]

> **Suggestion:** Change the guideline/protocols for eelgrass and macroalgae surveys from that of WDFW to the ACOE. This will help minimize duplicative efforts between federal and local application requirements. Clarify that if photos demonstrate a lack of aquatic vegetation, there should be no need for further surveying.

Section B.2.j. Probable direct, indirect, and cumulative impacts of shellfish aquaculture over a 20-year planning horizon (approximately 2016-2036) were part of the 2016 analyses contained in the Programmatic Biological Assessment (PBA) developed by the ACOE and the Programmatic Biological Opinions (PBOs) produced by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (the Services). [5] Applicants to the ACOE for NWP 48 are allowed to use these three Programmatic analyses as their proxy biological evaluation if certain conditions are met.

> **Suggestion:** Follow the lead of the ACOE in accepting the Programmatic analyses referenced above as an applicant's proxy biological evaluation if the applicant's activities meet the following three conditions:
>
> (1) the proposed activities fall within the scope of activities described in the PBA,
> (2) the applicant can and will meet the PBA's conservation measures, and
> (3) the proposed site occurs within the geographic area considered by the PBA.
>
> Require additional work only if the applicant's proposed activities or location differ substantially and substantively from those addressed in the above documents.

Section B.4. We find this section a little confusing, and as a small business, somewhat daunting in terms of studies that may be requested and the timing of such requests. The Application Requirement states "Other applications and reports, when applicable or requested, to ensure compliance with permit conditions, which may include ..." Our question is: If permit conditions are not determined until after review of the application (and in some cases, review by a Hearing Examiner), how does the County know which of these reports and studies is needed to ensure

[4] Components of a Complete Eelgrass Delineation Report, Army Corps of Engineers, Seattle District, January 9, 2018.

[5] The three agencies' analyses focused on impacts to listed species, critical habitat, and essential fish habitat (including eelgrass and forage fish) based on current baseline conditions and projected future shellfish activities in Washington waters. Effects regarding water quality, substrate and sediments, vegetation, benthic community, fish and birds, contaminants, and noise were examined. Growth, in terms of acreage, and its impacts were analyzed for specific commercial shellfish activities in each of five regions in the state, one of which is Sound Puget Sound (SPS) including Thurston County.

compliance with permit conditions, and when in the process will the applicant be required to provide the studies/analyses?

Suggestions:

1. Some of the listed items, for example B.4.b through B.4.d, seem more like *permit* requirements, not *application* requirements and misplaced in this section.

2. Depending on what the County has in mind, requirements such as B.4.e through B.4.h (especially when combined with Chapter 19.700 on Special Reports) may simply provide too much cost uncertainty for a small business to handle. At a minimum, having an explicit policy statement encouraging use of existing information (versus original research or field work) might help alleviate some of the cost uncertainty for a small business while still providing the County an option to require additional work if a demonstrated compelling reason exists. See Chapter 19.300.130 (Shoreline Use and Site Planning policies) comments for suggested policy statements.

C. Development Standards

Section C.1. General Standards "Ecology recommends local governments address dormancy in order to avoid abandonment provisions from unintentionally applying to ongoing aquaculture operations." (Shoreline Master Programs Handbook, Chapter 16, Aquaculture, December 2015, pp 13-14). We did not find where this issue was addressed (although it may have been).

Suggestion: Add a General Standard that addresses dormancy. As a starting point, below is sample language used in the Mason County SMP update (October 2017, General Aquaculture Regulations).

> Existing aquaculture activities include areas that are actively cultivated and/or dormant. It is presumed that the following areas are dormant and hence existing: areas acquired under the Bush act of 1895; areas undergoing crop rotation; and areas dormant due to market conditions, seed or juvenile availability, past and current pest infestations or control issues, water quality issues, and other cultivation factors beyond the control of the operator. A presumptively dormant area may, on a case-by-case basis as determined by the Administrator, be deemed abandoned provided clear and affirmative information evidencing intent to abandon the area for shellfish farming is provided. Existing or permitted aquaculture operations are not subject to Section 17.50.120, Existing Structures and Uses, and shall not be considered nonconforming or abandoned. Ongoing maintenance, harvest, replanting, restocking or changing the culture technique or species cultivated for any existing or permitted aquaculture activity shall not require shoreline review or a new permit, unless or until:
>
> i. the operation changes the scope and intent of the original permit as defined in 17.50.400; or
>
> ii. The facility proposes to cultivate non-native species not previously cultivated in the state of Washington.

Section C.1.d. We suggest some rewording to more closely match that of the 2007 Attorney General Opinion (AGO) re geoduck permitting and navigation, as well as suggest an added phrase related to the preferred status of water-dependent uses. Revisions are underlined.

> **Suggestion:** Aquaculture shall not ~~significantly conflict~~ substantially interfere with navigation and other water-dependent uses, while also being protected against encroachment from incompatible, competing uses.

Section C.1.l. We believe we understand the intent of this standard. However, a literal translation given Thurston County's interpretation of "structure" might mean that tubes/nets/bags etc. would need to be marked according to U.S. Coast Guard requirements, which makes no sense.

> **Suggestion:** Revise the standard to make it clear that submerged equipment secured to the substrate is not included.

Section C.2. Many of the Additional Standards for Commercial Geoduck Aquaculture are appreciated and are equally applicable to all shellfish aquaculture.

> **Suggestion:** Move, and reword as necessary, subsections C.2.b. through C.2.e. to General Standards so they apply to all shellfish aquaculture, not just geoduck culture.

Chapter 19.300 General Goals and Policies

Section 19.300.105 Critical Areas and Ecological Protection

Goal Statement. The goal statement could more closely match the intent of the Shoreline Management Act (RCW 90.58).[6] Replacing the strikeout language with the underlined language helps achieve a better match.

> **Suggestion:** Protect and conserve shoreline natural resources, including protection of critical areas (Title 24 TCC), while accommodating reasonable and appropriate uses ~~which will assure, at a minimum,~~ consistent with no net loss to shoreline ecological functions and processes.

Section 19.300.105 G. (Policy SH-13) We believe that emphasizing a focus on ecological impacts *that fall outside the range of natural variation* would provide additional guidance to applicants and reviewers. We suggest adding a 5th item to the list of things to take into account.

> **Suggestion:** Add the following: 5. In considering factors 1 through 4, special emphasis should be placed on impacts that fall outside the range of natural variation.

Section 19.300.115 Water Quality and Quantity

Section 19.300.115 A. (Policy SH-18) Given the overall section topic (Water Quality and Quantity) and the specific stated goal, "aesthetic qualities" seems misplaced and "recreation" too narrow. We suggest replacing the strikeout language with the underlined language.

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[6] We believe the intent of the Act is to (a) plan for and foster all reasonable and appropriate uses and (b) result in no-net-loss of ecological function, while (c) maintaining public rights to navigation and related uses.

Suggestion: 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~~ water-dependent opportunities, including healthy shellfish harvest.

Section 19.300.130 Shoreline Use and Site Planning

Section 19.300.130 F. (Policy SH-31) This policy seems to contain two somewhat different concepts, one dealing with potential locations and another dealing with the evolving nature of some aquaculture. We suggest creating two separate policies, with the underlined language added to the location-related policy.

Suggested location policy: 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. Therefore, priority should be given to aquaculture uses in areas having high potential for such uses. In addition, shoreline and upland development in productive aquaculture areas and areas with a high potential for aquaculture should be reviewed for detrimental impacts on aquaculture, and aquaculture operations should be protected against encroachment from incompatible, competing uses.

Suggested technology-experimental policy: Other than creating a separate policy, we have no suggested changes to the language starting "The technology associated with some forms of aquaculture... .

Section 19.300.130 H. (Policy SH-33) In 19.600.115, C.1.d. above, we suggested a wording change consistent with the 2007 AGO on interference with navigation. We believe that change is applicable here as well and suggest replacing the strikeout language with the underlined language.

Suggestion: Replace ...~~significantly conflict~~ ...with ... substantially interfere...

Section 19.300.130 J. (Policy SH-35) Consistent with the "planning for the future" intent of shoreline master programs, this policy could be strengthened by adding the following underlined language.

Suggestion: Upland uses and modifications should be properly managed to improve, where needed, and avoid degradation of water quality of existing shellfish areas and those areas with a high potential for aquaculture uses.

Section 19.300.130 K (Policy SH-36) We are unaware of any science or compelling public policy reason for this policy. Equally important, the policy does not make sense for most forms of shellfish aquaculture.

Suggestion: Delete this entire policy. ~~Planting and harvesting by boat shall be preferred over low-tide harvest methods where feasible.~~

Section 19.300.130 L (Policy SH-37) We may have missed it but could not find a definition or wording that would give a sense of what is meant by "small scale aquaculture projects".

Suggestion: It would be helpful for applicants to have some clarity as to when a project is no longer considered "small scale".

Section 19.300.130 Policy Statement Additions In addition to the above comments regarding specific 19.300.130 policies, we offer the following suggestions for additional policies that we believe will strengthen this section and provide additional guidance to applicants and reviewers.

Suggested Policy Addition 1: Minimize redundancy of permit application requirements and permit standards/conditions between this Program and those of other County, State and Federal permit processes.

Suggested Policy Addition 2: Encourage and support use of existing public/private sources of information when responding to permit application requirements unless there is a compelling and substantive reason to believe that only original site analyses can address an issue.

Suggested Policy Addition 3: Where there is an irreconcilable conflict between water-dependent shoreline uses or physical public access and maintenance of views from adjacent properties, the water-dependent uses and physical public access shall have priority, unless there is a compelling reason to the contrary. [Note: Language is verbatim from WAC 173-26-221 (4).]

Chapter 19.700 Special Reports

Section 19.700.100 Special Reports – General We realize that Chapter 19.700 applies across all the various shoreline-related developments and uses, not just Aquaculture, and how challenging it is to give specifics that fit all situations. Nonetheless, it seems that additional statements in this section might provide guidance to staff and applicants and convey that, within reason, permit applications will not be a prohibitive financial barrier to small business in Thurston County. The two suggestions provide general guidance on when Special Reports may be required and on the preferred approach for Special Report contents.

Suggestion:

Addition (1): A Special Report will be required only when a compelling reason, consistent with SMA intent, is demonstrated by the County.

Addition (2): In preparing a Special Report, use of existing documents, analyses, and data sources is encouraged; original data collection and analyses are required only if existing sources are demonstrated to be inadequate to addressing an issue.

19.700.115 Habitat Management Plan, 19.700.130 Cumulative Impacts Report, and 19.700.145 Biological and Habitat Surveys: The following comment applies to these three sections, as they relate to Aquaculture. We believe that the suggested additions to *Special Reports-General* provided above, along with prior suggestions for Aquaculture Application Requirements and

Development Standards will help reduce cost uncertainty, minimize redundancy, and provide additional guidance to applicants and reviewers, without limiting the County's ability to have a robust review process. Our goal is not to interfere with the County's ability to make informed decisions, rather it is to advocate that it occur in a way that minimizes burden and unpredictability for everyone, focuses effort where demonstrable issues exist, and achieves efficiencies by taking advantage of existing research, reviews, and analyses.

Thank you again for considering these comments and for all the hard work that has gone into the update to-date.

Sincerely,

Vicki Wilson

Vicki and Steve Wilson

From:	Brad Murphy
To:	PlanningCommission; SMP
Subject:	FW: Shoreline Regulations
Date:	Monday, December 3, 2018 11:28:16 AM

From: Madeline Bishop [mailto:mfbishop.bishop@gmail.com]
Sent: Sunday, December 02, 2018 5:15 AM
To: Allison Osterberg <allison.osterberg@co.thurston.wa.us>; Brad Murphy <brad.murphy@co.thurston.wa.us>
Subject: Shoreline Regulations

Please do not remove current rules for geoduck aquaculture. The recent claims by the Shellfish Industry are not true.
This is true:
There has been no eelgrass study in a large tract of land.
There is a correlation between expansion of geoduck aquaculture and the decline of other species.
The impact of disruptions from geoduck aquaculture have not been adequately assessed.

Please use caution in making changes that could further destroy our environment.

Sincerely,

Madeline Bishop
9529 62nd Ave SE, Olympia, WA 98513

From:	Brad Murphy
To:	PlanningCommission; SMP
Subject:	FW: geoduck aquaculture
Date:	Thursday, November 29, 2018 10:30:24 AM

From: hwbranch@aol.com [mailto:hwbranch@aol.com]
Sent: Thursday, November 29, 2018 10:03 AM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Subject: geoduck aquaculture

So many unsupported claims...

1. *Geoduck aquaculture doesn't damage eelgrass*. This assertion is often supported by a study in which a small patch of eelgrass in Padilla Bay was harrowed and readily recovered. It was not a valid study because the tract was surrounded on all sides by eelgrass that spread into the damaged area via rhizomes which wouldn't happen in a larger tract.

2. *We know that geoducks don't eat forage fish larvae because we don't find them in the gut of geoducks*. Geoducks don't eat fish larvae and we wouldn't find them in the gut. They'd be expelled dead and unconsumed. Forage fish are a vital link in the food web. We have spacial and temporal correlations between the rapid expansion of geoduck aquaculture and declines in other species, most recently SRKW orcas.

3. *Geoducks are filter feeders and they clean the water*. If we're talking about nutrients (nitrogen and phosphorus) geoducks don't consume nutrients they consume phytoplankton that consume nutrients. Consuming the consumers won't logically increase consumption and the data is mixed and complicated. If we're talking about chemical toxins, shellfish like any organism can absorb them. If they do they shouldn't be eaten.

Geoduck aquaculture involves first the disruption of benthic biota when the geoducks are planted. There is a second disruption when the tubes and netting are removed. And there is a third disruption when the geoducks are hydraulically harvested. The immediate ecological and oceanographic impacts have not been adequately assessed. The cumulative impacts of repeated disruptions more so and even at best wouldn't be understood until after the fact. This is not a precautionary approach.

Harry Branch
360-943-8508

From:	Brad Murphy
To:	SMP; PlanningCommission
Subject:	FW: Thurston County Shoreline Master Program Update
Date:	Tuesday, November 27, 2018 12:40:05 PM

From: James Coffee [mailto:jimcoffee@hotmail.com]
Sent: Tuesday, November 27, 2018 12:37 PM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Subject: Thurston County Shoreline Master Program Update

Mr. Brad Murphy
County Planer

I am particularly interested in aquaculture and especially shellfish farming. I hope the approach of the Planing Commission will be to shore up any short comings in current laws and practices while encouraging development of aquaculture and easing the permitting process. From my brief review of the proposal, it seems to attempt to reduce shellfish farming by making it prohibitively time consuming and expensive to start or expand and even continue a farming operation.

Current aqua farming is carried out with great care and respect for the environment. Indeed the shellfish farmer has the greatest stake in maintaining clean and clear water for the growth and sale of their product.

I am wondering if there are specific problems that are being addressed in this extensive expansion of regulations or if it is an exercise in making regulations which are largely redundant and only add costs and impediments to expansion. Such expansion (well regulated of course) would benefit all of the people of Washington, including people working in the industry, consumers of our beautiful seafood and tax payers as well as the growers.

Please don't allow this process to add administration burdens unless specific problems which are not already being adequately addressed are to be solved.

Thank you for your consideration,

James B. Coffee
2 Morning Beach Drive
Bellingham, Washington 98229

From: Brad Murphy
To: Phyllis Farrell
Cc: SMP; PlanningCommission
Subject: FW: Shoreline Master Program review
Date: Tuesday, November 6, 2018 9:12:02 AM
Attachments: SMPltrbradmurphy11.3.18.docx
aquaculturepics.odt

Hi Phyllis,

I'm forwarding your information to the SMP e-mail and the Planning Commission e-mail for inclusion in the record. The Planning Commission have already received their packet of information for this week's meeting so you can make copies if you'd like them to receive it tomorrow or they will receive this at the next Planning Commission meeting when their next packet of information is sent to them.

Thanks again for your interest in the SMP update. Please let me know if you have any additional questions.

Sincerely,

Brad Murphy

Senior Planner
Long Range Planning
Thurston County Community Planning
and Economic Development
2000 Lakeridge Dr. SW
Olympia, WA 98502
360-754-4465
murphyb@co.thurston.wa.us

From: Phyllis Farrell [mailto:phyllisfarrell681@hotmail.com]
Sent: Monday, November 05, 2018 8:53 PM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Cc: bruceeyork@gmail.com; loisward@comcast.net; avansw2@gmail.com; 'Sam Merrill' <sammerrill3@comcast.net>
Subject: Shoreline Master Program review

Greetings Brad!

I have attached a letter and accompanying pictures for the SMP review. I hope these will be included in the public record.
I plan on presenting this information at the Nov. 7th Planning Commission meeting. Will you be forwarding the attachments to the County Commissioners and Planning Commission

members, or should I bring copies?

Thank you for your hard work and service to the County!

Regards,

Phyllis

Sent from Outlook

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 Farrell, Chair,
South Sound Sierra Club Group

cc: Thurston County Commissioners
Thurston County Planning Commission


Geoduck farm: The point source of plastic pollution found on Tolmie State Park shorelines.
Tolmie State Park
Google earth

Date: November 28, 2018

To: Mr. Brad Murphy, Thurston County
From: Jeff Fisher, PhD, Stacy Fisher, 9735 Steamboat Island Rd NW, Olympia, WA

RE: Thurston County Shoreline Master Program Update

Dear Mr. Murphy,

We have reviewed the proposed amendments to the county's Shoreline Master Program, with particular interest in relation to the proposed permitting requirements for shellfish aquaculture. We are tax paying shoreline property owners living in the county since 2000, and owning shoreline property since 2005; we are owners of a family-run shellfish farm on that property since 2006. Indeed, the value of the property—the express purpose for purchasing it initially, is based on its suitability for shellfish farming and the tide lands it encumbered. As a small grower, we have hired dozens of workers over the years at contracted wages substantially above minimum. The income we obtain from the farm, besides being an important source of finance for the contract workers we have used, has been fundamental to addressing family health challenges in addition to basic needs, and is factored into our future financial planning to support family educational costs. It's hard work that we enjoy, that we look forward to handing on to our children, and that we hope will provide fundamental support of our family and our workers for many years to come. In this light, we are a somewhat typical family farm operation—we would likely 'do better' with economies of scale and more time, but are working with what we have at present.

Sustainable aquaculture practices are the desire of all growers, and the maintenance of good water quality and functional habitat are paramount amongst growers; indeed, growers have been fundamental at championing these needs for decades. We will continue to work to improve our practices, like most in the industry are challenged to do. As such, a reasonable and predictable regulatory system is appropriate and certainly not something we would oppose. In the nature of what is called for in the revised SMP language, however, we have serious concerns about several key areas of the proposed language, some of which are highlighted below.

- Elements of the requirements in B2. reflect a desire for a level of environmental review by the county for which the purpose is questionable as to how the data will be used in decision making. Requirements are put forward that lack clarification on methodology, consideration of project scale, or recognition of what is already required in the permitting landscape. This is particularly relevant to some of the requirements of the baseline assessments requested—e.g., seasonal flow rates (?); 'visual impacts' (visual impacts to whom?, by what methodology?); 'direct, indirect and cumulative impacts to items B.1 to B.9 above' (sorry, but I don't even see items B.1-B.9 above in 19.600.115).

  Is the intent of requesting these data to support some type of analysis of carrying capacity as part of a spatial plan? If so, such studies are best conducted at the subbasin scale by a state-level entity, and not at the individual farm scale as there is simply too much uncertainty at smaller scales of resolution. And if that is the desire, then the permitting review process should first identify what type of capacity is being modelled (i.e., capacity for what) based on relevant data. For example, the WDNR

has already previously mapped drift cells for nearly all of Puget Sound—and from my recollection all shoreline areas of Thurston County. Is it adequate to simply note in an application in which cell the parcel would be located, and the predominate direction of long-shore drift? It should be, as anything further to that level of resolution would have extremely questionable value and the level of study required to refine the resolution over tidal cycles and seasons as proffered would be extreme.

Relatedly, there are loads of decision support and data analysis tools in practice for which spatially relevant decisions can be drawn (e.g., MarXan, EcoPath, InVEST, Atlantis, bow-tie analysis, Bayesian belief networks, etc.). Examples of such applications are abundant in the literature. The lack of clarification in the language of the SMP for how study results would be interpreted and by what tool, and, even—in many cases—how they would be done, creates so much uncertainty and cost into the process that we can only view the potential process and outcome as highly discriminatory--particularly against small growers. As small growers, we have typically hired low-skilled laborers under contract because of the part time hours that can be offered given the vagaries of inconsistent tides. When small farms are lost, and even modest opportunities for expansion are blocked by regulatory uncertainty and associated costs, opportunities for such contractors are also lost. As such, it becomes an environmental justice issue.

- ENVIRONMENT DESIGNATIONS

In 3a., geoduck farming, regardless of land zoning (i.e., natural, rural, etc.), is to be considered for authorization only with a conditional use permit. If a 'conditional use', as proposed, this would imply that geoduck farming is a non-conforming activity for the waters of the county. As geoduck farming is simply the aquaculture of a native clam species, and aquaculture is recognized elsewhere in the SMP language as a preferred use, then it simply does not stand to reason that geoduck farming should be singled out as requiring a conditional use permit in contrast to all other forms of shellfish aquaculture and other water dependent use permits. All forms of shellfish aquaculture require the use of gear over the course of the culture cycle. While the use of inert pvc tubes for a small portion of the geoduck culture cycle is not visibly appealing to some vocal minorities, it is just that--gear. We are working to find alternatives that are less visible and still functional for the purpose of improving early life stage survival of planted geoduck, but assigning a separate permit category for geoduck is not in keeping with the acknowledgement in the SMP language of aquaculture as a water dependent and preferred use.

3b further places into question what would constitute 'normal' use of surface waters. Lacking definition, this appears to place another potential financial and time burden on growers, and sets up applicants for continued appeals based simply on another's view of 'normal'. Access has never been restricted to beach goers walking or paddling across our beach/farm, even when they might have not had the best intentions. This criterion should be clarified; as it represents another area of uncertainty with how the regulations could be interpreted, again potentially placing a disproportionate financial burden on growers attempting to defend against highly subjective alternative views. My perception as a shoreline property owner (who also happens to run a farm), should be at least as valued as those who simply have a philosophical desire to eliminate all forms of aquaculture in their viewshed (or in

entirety), regardless of the science that would otherwise support it or the ecosystem services shellfish provide.

For many years, the permitting of shellfish aquaculture in Washington State has suffered from an uncoordinated regulatory system that has been heavily influenced by a vocal minority of opponents. They are entitled to their philosophy and opinions, but the regulatory systems in place at all levels of government should strive for objectivity based on the weight of evidence of scientific proof of environmental impact (both positive and negative), and in consideration as well to social and socioeconomic drivers. The Washington Shellfish Initiative's goal of improving permitting processes to maintain and increase sustainable aquaculture recognized these challenges 7 years ago. An offshoot of this initiative was the interagency regulatory review team for shellfish aquaculture applications for which Thurston County has been a participant. As such, many of the requirements identified in the draft SMP language are challenging to fathom in their present state. Shellfish farmers go through a rigorous permitting process including Tribal, Federal, and State requirements already. The SMP should be consistent with these requirements, and not duplicative and should also reflect the recognition of ecosystem service values derived from shellfish aquaculture.

Notwithstanding the given objective of shellfish growers to employ sustainable farming practices that do not adversely impact natural resources or habitat functions, the paradox of perception of a few opponents to shellfish farming should not be allowed to override the weight of scientific evidence on the otherwise benign and beneficial effects on ecosystem health and function accrued from shellfish and shellfish culture. The water quality effects of shellfish farming on denitrification, nutrient mitigation, and carbon sequestration; the role that farm-produced shellfish provide for national and local food security; the important employment driver to the local community; and the role of shellfish farm product in supporting the growing international demand for seafood—none of these important environmental and socioeconomic benefits be should trivialized. Uncertain and expansive permitting programs that are not transparent with respect to either how requirements should be met, nor the decision making process involved, will not be effective in practice. We encourage the county to strive for consistency with other existing processes in play at the state, federal and tribal level, and remove costly and cumbersome requirements where their role in decision making cannot be clarified and justified objectively.

Date: November 28, 2018

To: Mr. Brad Murphy, Thurston County
From: Jeff Fisher, PhD, Stacy Fisher, 9735 Steamboat Island Rd NW, Olympia, WA

RE: Thurston County Shoreline Master Program Update

Dear Mr. Murphy,

We have reviewed the proposed amendments to the county's Shoreline Master Program, with particular interest in relation to the proposed permitting requirements for shellfish aquaculture. We are tax paying shoreline property owners living in the county since 2000, and owning shoreline property since 2005; we are owners of a family-run shellfish farm on that property since 2006. Indeed, the value of the property—the express purpose for purchasing it initially, is based on its suitability for shellfish farming and the tide lands it encumbered. As a small grower, we have hired dozens of workers over the years at contracted wages substantially above minimum. The income we obtain from the farm, besides being an important source of finance for the contract workers we have used, has been fundamental to addressing family health challenges in addition to basic needs, and is factored into our future financial planning to support family educational costs. It's hard work that we enjoy, that we look forward to handing on to our children, and that we hope will provide fundamental support of our family and our workers for many years to come. In this light, we are a somewhat typical family farm operation—we would likely 'do better' with economies of scale and more time, but are working with what we have at present.

Sustainable aquaculture practices are the desire of all growers, and the maintenance of good water quality and functional habitat are paramount amongst growers; indeed, growers have been fundamental at championing these needs for decades. We will continue to work to improve our practices, like most in the industry are challenged to do. As such, a reasonable and predictable regulatory system is appropriate and certainly not something we would oppose. In the nature of what is called for in the revised SMP language, however, we have serious concerns about several key areas of the proposed language, some of which are highlighted below.

- Elements of the requirements in B2. reflect a desire for a level of environmental review by the county for which the purpose is questionable as to how the data will be used in decision making. Requirements are put forward that lack clarification on methodology, consideration of project scale, or recognition of what is already required in the permitting landscape. This is particularly relevant to some of the requirements of the baseline assessments requested—e.g., seasonal flow rates (?); 'visual impacts' (visual impacts to whom?, by what methodology?); 'direct, indirect and cumulative impacts to items B.1 to B.9 above' (sorry, but I don't even see items B.1-B.9 above in 19.600.115).

  Is the intent of requesting these data to support some type of analysis of carrying capacity as part of a spatial plan? If so, such studies are best conducted at the subbasin scale by a state-level entity, and not at the individual farm scale as there is simply too much uncertainty at smaller scales of resolution. And if that is the desire, then the permitting review process should first identify what type of capacity is being modelled (i.e., capacity for what) based on relevant data. For example, the WDNR

has already previously mapped drift cells for nearly all of Puget Sound—and from my recollection all shoreline areas of Thurston County. Is it adequate to simply note in an application in which cell the parcel would be located, and the predominate direction of long-shore drift? It should be, as anything further to that level of resolution would have extremely questionable value and the level of study required to refine the resolution over tidal cycles and seasons as proffered would be extreme.

Relatedly, there are loads of decision support and data analysis tools in practice for which spatially relevant decisions can be drawn (e.g., MarXan, EcoPath, InVEST, Atlantis, bow-tie analysis, Bayesian belief networks, etc.). Examples of such applications are abundant in the literature. The lack of clarification in the language of the SMP for how study results would be interpreted and by what tool, and, even—in many cases—how they would be done, creates so much uncertainty and cost into the process that we can only view the potential process and outcome as highly discriminatory--particularly against small growers. As small growers, we have typically hired low-skilled laborers under contract because of the part time hours that can be offered given the vagaries of inconsistent tides. When small farms are lost, and even modest opportunities for expansion are blocked by regulatory uncertainty and associated costs, opportunities for such contractors are also lost. As such, it becomes an environmental justice issue.

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From:	Brad Murphy
To:	SMP; PlanningCommission
Subject:	FW: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations
Date:	Tuesday, December 4, 2018 11:30:57 AM

From: Rebbecka Allen [mailto:rebbeckaallen@pcsga.org]
Sent: Tuesday, December 04, 2018 11:19 AM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Cc: margaretpilaro@pcsga.org
Subject: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Margaret Pilaro, Executive Director
PCSGA
120 State Avenue NE #142
Olympia WA 98501
(360) 754-2744
margaretpilaro@gmail.com

December 4, 2018

Thurston County Planning Commission
via Brad Murphy, County Planner
2000 Lakeridge Drive SW
Olympia, WA 98502-1045

Dear Mr. Murphy,

Re: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Thank you for the opportunity to provide comments on proposed amendments to the Thurston County Shoreline Master Program (SMP). Pacific Coast Shellfish Growers Association (PCSGA) is based here in Thurston County as it has been for over 100 years. It began as the Olympia Oyster Growers Association, and in the early 1900's was vital in ensuring that wood waste and other pollutants where removed from Southern Puget Sound so that shellfish could grow. PCSGA now has members in Washington, Alaska, Oregon, California and Hawaii, with the majority in Washington and several right here in Thurston County, who sustainably grow healthful shellfish including oysters, clams, mussels and geoduck.

The tradition of growing shellfish in Thurston County is woven into our community's fabric. Oystermen of the early 1900's put this region on the map sending oysters throughout the west; they provided jobs and food to our fledging community and adamantly fought for a healthy marine environment. Many of the families that farmed oysters back then still farm here today. They still provide jobs, still contribute to the County's economy, still provide food, and are still completely committed to a healthy environment. It is because of the commitment of our members that PCSGA has a keen interest in ensuring that local shoreline master programs are consistent with state law and policy in their regulation of shellfish aquaculture.

As currently written, Section 19.600.115 of the Draft SMP is inconsistent with the State Shoreline Management Act which encourages the use of the state's shorelines for aquaculture as a preferred water dependent use. The intent of this section is also inconsistent with the Washington State Shellfish Initiative, originally enacted by Governor Gregoire and re-affirmed by Governor Inslee, with the goal to promote this preferred use of statewide interest.

I know some PCSGA members who have shellfish businesses in Thurston County have provided detailed comments on how the proposed language would directly impact them. I've reviewed most of these comments and wish to reiterate that the current form of the language unnecessarily places the burden on shellfish growers. Proposed application requirements for shellfish aquaculture are significantly more extensive than any other use regulated within the SMP, conveying a message that the County no longer wants this preferred water dependent use along its shoreline. Many of the requirements are especially burdensome for smaller growers including complex assessments relating to littoral drift, flushing rates, visual assessment. Compounding the burden is that these requirements mirror, and in some cases duplicate, state and federal requirements. This means that a grower would have to do the same study twice in order to meet the county's specific requirements. While some larger companies may be able to meet these onerous requirements, smaller farms interested in expanding as well as new farms looking to start a business in the county will likely not. The county, through this SMP, is in a unique position to encourage and support a diverse community of shellfish growers, which in turn will support both a healthy marine ecosystem and healthy economy.

PCSGA appreciates the extensive and thoughtful work of the County Staff and Community members in developing these proposed updates. However, there is concern that if these policies and regulations on aquaculture prevail, they will stifle the industry, by first eliminating small family farms. PCSGA respectfully requests changes be made to the proposed language to include recognition of the following:

- Aquaculture is a preferred, water dependent use in the Shoreline Management Act.
- Shellfish farming has been an important industry in Thurston County for over 100 years and shellfish farms have and continue to provide the community with both family-wage jobs and high quality, sustainably produced local food to members of the community.
- Shellfish farmers have a long history of environmental stewardship. They depend on clean water and healthy ecosystems for our shellfish to thrive.
- Changes to the application requirements in Section 19.600.115 that make it possible for all shellfish growers- new and established, small and large - to apply for and maintain shellfish farms in Thurston County.
- Changes to the policy and regulations of Section 19.600.115 that are consistent with the Washington Shellfish Initiative's goal of improving permitting processes to maintain and increase sustainable aquaculture. The SMP should also acknowledge, and be consistent with, the rigorous permitting processes that shellfish farmers must complete including Tribal, Federal, and State requirements.

Thank you again for the opportunity to provide comment and for your consideration of these comments. If you would like to discuss this further, or need additional information, please do not hesitate to contact me at 360-790-8264 or margaretpilaro@pcsga.org.

Respectfully,

Margaret A. Pilaro
Executive Director, PCSGA

Sent by:

Rebbecka Allen, Administrative Assistant
Pacific Coast Shellfish Growers Association
120 State Ave. NE #142
Olympia, WA 98501
(360) 754-2744
www.pcsga.org

Ian Lefcourte

From: Brad Murphy
Sent: Tuesday, December 4, 2018 3:58 PM
To: SMP; PlanningCommission
Subject: FW: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Categories: Duplicate Public Comment

From: John Hutchings
Sent: Tuesday, December 04, 2018 3:03 PM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Subject: FW: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Hi Brad,

Please add this email to your records for public comment on the SMP.

Thank you,
Kelli

Kelli Lee
Executive Assistant to John Hutchings
Thurston County Commissioner, District #1
360-357-2470 office|360-485-2474 mobile

From: Rebbecka Allen [mailto:rebbeckaallen@pcsga.org]
Sent: Tuesday, December 04, 2018 11:05 AM
To: John Hutchings <john.hutchings@co.thurston.wa.us>
Cc: margaretpilaro@pcsga.org
Subject: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

PCSGA
PACIFIC COAST SHELLFISH GROWERS ASSOCIATION

Margaret Pilaro, Executive Director
PCSGA
120 State Avenue NE #142
Olympia WA 98501
(360) 754-2744
margaretpilaro@gmail.com

December 4, 2018

Commissioner John Hutchings, District 1
Thurston County Courthouse, Building One, Room 269
2000 Lakeridge Drive SW
Olympia, WA 98502-1045

Dear Commissioner Hutchings,

Re: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Thank you for the opportunity to provide comments on proposed amendments to the Thurston County Shoreline Master Program (SMP). Pacific Coast Shellfish Growers Association (PCSGA) is based here in Thurston County as it has been for over 100 years. It began as the Olympia Oyster Growers Association, and in the early 1900's was vital in ensuring that wood waste and other pollutants where removed from Southern Puget Sound so that shellfish could grow. PCSGA now has members in Washington, Alaska, Oregon, California and Hawaii, with the majority in Washington and several right here in Thurston County, who sustainably grow healthful shellfish including oysters, clams, mussels and geoduck.

The tradition of growing shellfish in Thurston County is woven into our community's fabric. Oystermen of the early 1900's put this region on the map sending oysters throughout the west; they provided jobs and food to our fledging community and adamantly fought for a healthy marine environment. Many of the families that farmed oysters back then still farm here today. They still provide jobs, still contribute to the County's economy, still provide food, and are still completely committed to a healthy environment. It is because of the commitment of our members that PCSGA has a keen interest in ensuring that local shoreline master programs are consistent with state law and policy in their regulation of shellfish aquaculture.

As currently written, Section 19.600.115 of the Draft SMP is inconsistent with the State Shoreline Management Act which encourages the use of the state's shorelines for aquaculture as a preferred water dependent use. The intent of this section is also inconsistent with the Washington State Shellfish Initiative, originally enacted by Governor Gregoire and re-affirmed by Governor Inslee, with the goal to promote this preferred use of statewide interest.

I know some PCSGA members who have shellfish businesses in Thurston County have provided detailed comments on how the proposed language would directly impact them. I've reviewed most of these comments and wish to reiterate that the current form of the language unnecessarily places the burden on shellfish growers. Proposed application requirements for shellfish aquaculture are significantly more extensive than any other use regulated within the SMP, conveying a message that the County no longer wants this preferred water dependent use along its shoreline. Many of the requirements are especially burdensome for smaller growers including complex assessments relating to littoral drift, flushing rates, visual assessment. Compounding the burden is that these requirements mirror, and in some cases duplicate, state and federal requirements. This means that a grower would have to do the same study twice in order to meet the county's specific requirements. While some larger companies may be able to meet these onerous requirements, smaller farms interested in expanding as well as new farms looking to start a business in the county will likely not. The county, through this SMP, is in a unique position to encourage and support a diverse community of shellfish growers, which in turn will support both a healthy marine ecosystem and healthy economy.

PCSGA appreciates the extensive and thoughtful work of the County Staff and Community members in developing these proposed updates. However, there is concern that if these policies and regulations on

aquaculture prevail, they will stifle the industry, by first eliminating small family farms. PCSGA respectfully requests changes be made to the proposed language to include recognition of the following:

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- Shellfish farming has been an important industry in Thurston County for over 100 years and shellfish farms have and continue to provide the community with both family-wage jobs and high quality, sustainably produced local food to members of the community.
- Shellfish farmers have a long history of environmental stewardship. They depend on clean water and healthy ecosystems for our shellfish to thrive.
- Changes to the application requirements in Section 19.600.115 that make it possible for all shellfish growers- new and established, small and large - to apply for and maintain shellfish farms in Thurston County.
- Changes to the policy and regulations of Section 19.600.115 that are consistent with the Washington Shellfish Initiative's goal of improving permitting processes to maintain and increase sustainable aquaculture. The SMP should also acknowledge, and be consistent with, the rigorous permitting processes that shellfish farmers must complete including Tribal, Federal, and State requirements.

Thank you again for the opportunity to provide comment and for your consideration of these comments. If you would like to discuss this further, or need additional information, please do not hesitate to contact me at 360-790-8264 or margaretpilaro@pcsga.org.

Respectfully,

Margaret A. Pilaro
Executive Director, PCSGA

Sent by:

Rebbecka Allen, Administrative Assistant
Pacific Coast Shellfish Growers Association
120 State Ave. NE #142
Olympia, WA 98501
(360) 754-2744
www.pcsga.org

Ian Lefcourte

From: Brad Murphy
Sent: Wednesday, December 5, 2018 12:16 PM
To: SMP; PlanningCommission
Subject: FW: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

Categories: Duplicate Public Comment

From: Erin Birklid
Sent: Wednesday, December 05, 2018 11:52 AM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Subject: FW: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

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From: Rebbecka Allen [mailto:rebbeckaallen@pcsga.org]
Sent: Tuesday, December 04, 2018 11:12 AM
To: Bud Blake <bud.blake@co.thurston.wa.us>
Cc: margaretpilaro@pcsga.org
Subject: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

PCSGA
PACIFIC COAST SHELLFISH GROWERS ASSOCIATION

Margaret Pilaro, Executive Director
PCSGA
120 State Avenue NE #142
Olympia WA 98501
(360) 754-2744
margaretpilaro@gmail.com

December 4, 2018

Commissioner Bud Blake, District 3
Thurston County Courthouse, Building One, Room 269
2000 Lakeridge Drive SW
Olympia, WA 98502-1045

Dear Commissioner Blake,

Re: Thurston County Shoreline Master Program Update, Aquaculture Policies and Regulations

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Margaret A. Pilaro
Executive Director, PCSGA

Sent by:

Rebbecka Allen, Administrative Assistant
Pacific Coast Shellfish Growers Association
120 State Ave. NE #142
Olympia, WA 98501
(360) 754-2744
www.pcsga.org

avast! Antivirus: Outbound message clean.

Virus Database (VPS): 181203-8, 12/03/2018
Tested on: 12/4/2018 11:12:13 AM

From: Brad Murphy
To: SMP; PlanningCommission
Subject: FW: Thurston County Shoreline Master Program comments
Date: Monday, December 3, 2018 9:49:28 AM

-----Original Message-----
From: Joe Scharf [mailto:j.scharf@me.com]
Sent: Thursday, November 29, 2018 6:18 PM
To: Brad Murphy <brad.murphy@co.thurston.wa.us>
Cc: John Hutchings <john.hutchings@co.thurston.wa.us>; Gary Edwards <gary.edwards@co.thurston.wa.us>; Bud Blake <bud.blake@co.thurston.wa.us>
Subject: Thurston County Shoreline Master Program comments

Dear Mr. Murphy and commissioners,

I wanted to be sure to take the time to write a short statement about my experience with shellfish farming in Thurston County, as it seems to be under attack again by opponents.

My family has owned property on Eld Inlet (Young Road, specifically) since 1971. For many years we had an au natural beach - meaning there was only mud, seaweed and various shellfish. We had the occasional clam chowder, but for the most part we just enjoyed the view. This became more and more difficult in the 1990s, as taxes began to take a bigger bite of income, and for several years we thought we would need to give up our home because we couldn't afford the taxes.

Just as our worries were reaching their peak, we got an offer from a startup shellfish harvester to dig clams on our beach. We agreed, and were pleasantly surprised to get one or two thousand dollars from the venture. Then, in the late 1990s or early 2000s, Chelsea Farms asked us if we would like to lease our tidelands to them for geoduck farming. We agreed again, and five years later were the happy recipients of nearly $30,000 from our first harvest. We were very happy to be able to keep our house.

In the nearly 20 years of farming on our beach, we have easily cleared $150,000 in income; perhaps even $200,000 (I don't know the exact number). My wife and I have built a new house, we have sent our children to college, made improvements to our property such as a new gate, landscaping, and (most importantly) a new septic system. Property taxes are a worry of the past. These are all benefits we as a family have directly seen.

In addition to the direct benefits to us as individuals, we feel we have contributed to employment in the county, taxes (our own, the employees', Chelsea Farms'), helped in some small way to reduce the trade deficit, fed many people, and helped to clean Puget Sound.

We have never had any issues at all with farming on our land. Chelsea Farms is fastidious in keeping their equipment picked up, they come out if I tell them there may be something of theirs loose on the beach - even if it's not theirs they come get it - and they are very considerate of how much noise they make and how visible their workers are on summer days. Overall they are highly desirable neighbors and I would much rather have them out front than motorboats and jet skis.

Harvesting out front of our house has also been a non-issue. The water jets leave small craters in the beach for a couple of weeks at the most, and within a month, or two at the outside, you would never be able to tell anything had happened there. Small shellfish, crabs, seaweed, starfish, and whatever else you might find on a typical non-farmed beach are back within weeks. I know this because I have lived on the same property for almost 50 years, and have seen it unfarmed for nearly 30 years, and farmed now for 20 years. There is no noticeable difference that I can see. There is also no effect on any wildlife - air or water - that I have seen. We have bald eagles more so now than at any point in my life, seals are always out front, there are fish and crabs aplenty. I think the water is cleaner than it has ever been since I have lived here.

All in all, I think it is counterproductive to regulate shellfish farming in Thurston County to the point it is being suggested, which would make it nearly impossible to get a new permit. If there is any provable deleterious effect which shellfish farming has had, I have never been presented with the data. I am aware that some of the arguments are from the aesthetic perspective, and in my opinion that is what all the arguments boil down to, although opponents to shellfish farming won't admit it. Some of my neighbors are very angry about shellfish farming and will actually walk onto my property to verbally abuse the workers. Their arguments have been "the boat is ugly" or "I don't like the tubes." There is no scientific or economic reasons (of which I am aware) that suggest shellfish farming is harmful in any way.

I would put myself firmly in the "shellfish farming is beneficial" camp, and urge you to not make shellfish farming difficult to the point of being impossible. Thurston County gains many benefits from it, not the least of which is a much cleaner Puget Sound, tax dollars, and employed citizens.

Thank you for your consideration.

Joe Scharf
7342 Young Rd NW
Olympia, WA 98502

November 20, 2018

Thurston County Planning Commission
Thurston County Courthouse Complex
2000 Lakeridge Drive SW
Olympia, WA 98502-1045

RE: Thurston County Shoreline Master Program Update

Dear Thurston County Planning Commission:

I am a Biological Project Manager for Taylor Shellfish Farms, and I am submitting this letter on behalf of Taylor Shellfish regarding Thurston County's draft Shoreline Master Program ("SMP") update, which is currently under development at the County.

Taylor Shellfish is a fifth-generation, family-owned company headquartered in Shelton, Washington. Taylor Shellfish has grown shellfish on Washington State shorelines for over 100 years, and the company currently cultivates a variety of shellfish species in south Puget Sound, including oysters, clams, geoduck, and mussels. Taylor Shellfish has a strong commitment to sustainable shellfish cultivation in all areas that it farms, and it has received independent, third-party sustainability certification from Food Alliance in recognition of this commitment.

Taylor Shellfish is significantly invested in Thurston County. Taylor Shellfish has been farming shellfish in Thurston County since the early 1900's, and it currently manages shellfish farms encompassing almost 600 acres in the County. Many of the beds that Taylor Shellfish operates have been farmed for decades, and some were specifically conveyed by the State to private parties for the purpose of shellfish cultivation under the Bush Act of 1895. Taylor Shellfish provides jobs for approximately 60 permanent and 20 seasonal employees who work in the County. Numerous other shellfish farmers operate in the County, helping to sustain and diversify the local economy.

A. Aquaculture Is A Preferred, Water-Dependent Use.

The Legislature enacted the Shoreline Management Act ("SMA"), chapter 90.58 RCW, to advance numerous objectives after recognizing the problem posed by uncoordinated shoreline planning. The policy of the SMA is "to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses." RCW 90.48.020. And, while all reasonable and appropriate uses are to be fostered, the SMA identifies a particular subset of uses that are preferred—those that "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." *Id.*

The SMP Guidelines development by the Department of Ecology specifically identify aquaculture as a water-dependent, preferred shoreline use that provides important ecological benefits. WAC 173-26-241(3)(b)(i)(A) states:

> Aquaculture is 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 managed wildstock geoduck fishery.
>
> 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.

Various uses enjoy a preferred status under the SMA, but no other type of use is specifically recognized in the SMP Guidelines as being in the statewide interest and capable of producing long-term benefits and protecting the resources and ecology of the shoreline. The fact that aquaculture is also a commercial activity that provides thousands of jobs throughout the state, helps sustain and diversify the state's economy, and produces nutritious food for human consumption further reinforces the need for SMPs to foster this preferred use.

Because aquaculture is a preferred, water-dependent use that can result in long-term benefits and protect the shoreline, the SMP Guidelines require SMPs to encourage this use and protect it from damage by other activities. Specifically, WAC 173-26-241(3)(b)(i)(D) requires local governments to "ensure proper management of upland uses to avoid degradation of water quality of existing shellfish areas."

Shellfish beds—including commercial, subsistence, and recreational—are also unique in that they are specifically identified as constituting critical saltwater habitat, a recognition that no other type of human use or activity receives. WAC 173-26-221(2)(c)(iii)(A). The SMP Guidelines further recognize "[c]ritical saltwater habitats require a higher level of protection due to the important ecological functions they provide." *Id.* The SMP Guidelines also require that "[m]aster programs shall include policies and regulations to protect critical saltwater habitats and should implement policies and programs to restore such habitats." *Id.*

B. Additional State and National Laws and Policies Support the Preservation and Expansion of Shellfish Aquaculture.

The SMA's classification of aquaculture as a preferred, water-dependent use aligns with numerous additional state and national laws and policies that promote the preservation and expansion of shellfish aquaculture. Key federal laws and policies include:

- The National Aquaculture Act of 1980, 16 U.S.C. §§ 2801-2810. Congress passed this act in response to findings that the nation has potential for significant aquaculture growth, but that this growth is inhibited by many scientific, economic, legal, and production factors. A driving purpose of the act is to encourage aquaculture activities and programs that will result in increased production. The act identifies several strategies for implementing this policy, including a national aquaculture development plan, an interagency aquaculture coordinating group, a capital requirements study and plan, and appropriations for the departments of Agriculture, Commerce, and Interior.

- The Marine Aquaculture Policy. This policy was adopted in 2011 by the National Oceanic and Atmospheric Administration ("NOAA") against the backdrop of a growing dependence on imported seafood.[1] In 2011, approximately 84 percent of the seafood consumed in the United States was imported, and domestic aquaculture provided only about 5 percent of the seafood consumed in the country. This policy reaffirms that aquaculture is an important component of NOAA's efforts to maintain healthy and productive marine and coastal ecosystems, protect special marine areas, rebuild overfished wild stocks, restore populations of endangered species, restore and conserve marine and coastal habitat, balance competing uses of the marine environment, create employment and business opportunities, and enable the production of safe and sustainable seafood.

- The National Shellfish Initiative. Also adopted by NOAA in 2011, this initiative's goal "is to increase shellfish aquaculture for commercial and restoration purposes, thereby stimulating coastal economies and improving ecosystem health."[2] This initiative recognizes shellfish aquaculture provides a broad suite of benefits by improving water quality, conserving habitat, stabilizing coastlines, restoring depleted species, and creating jobs. Key strategies of the National Shellfish Initiative include enhancing shellfish restoration and farming, and streamlining permitting.

Washington State has a long history of supporting local aquaculture production, dating back to the time of statehood and continuing through to recent Governor-led initiatives.

The Legislature passed the Bush and Callow Acts in 1895 to stimulate shellfish farming in Washington State, in recognition of the State's excellent potential for shellfish farming and its importance to local economies. Laws of 1985, chs. 24, 25. The Bush and Callow Acts were re-codified in 2002. This legislation allows for the use of Bush and Callow lands to cultivate clams and edible shellfish in addition to oysters. RCW 79.135.010. The legislative findings for this legislation reinforce that shellfish farming continues to be of the utmost importance to the state:

> The legislature declares that shellfish farming provides a consistent source of quality food, offers opportunities of new jobs, increases farm income stability, and improves balance of trade. The legislature also finds that many areas of the state of Washington are scientifically and biologically suitable for shellfish farming, and therefore the legislature has encouraged and promoted shellfish farming activities, programs, and development with the same status as other agricultural activities, programs, and development within the state. It being the policy of this state to encourage the development and expansion of shellfish farming within the state and to promote the development of a diverse shellfish farming industry, the legislature finds that the uncertainty surrounding reversionary clauses contained in Bush act and Callow act deeds is interfering with this policy. The legislature finds that uncertainty of the grant of rights for the claim and other shellfish culture as contained in chapter 166, Laws of 1919 must be fully and finally resolved. It is not the intent of this act to impair any vested rights in shellfish cultivation or current

[1] Available at: https://www.fisheries.noaa.gov/noaa-aquaculture-policies
[2] Available at: https://www.fisheries.noaa.gov/content/national-shellfish-initiative

> shellfish aquaculture activities to which holders of Bush act and Callow act lands are entitled.

ESHB 2819 (2002 c 123 § 1). The Legislature has further emphasized the importance of aquaculture to Washington State through the Aquaculture Marketing Act, which contains similar legislative findings and encourages increased aquaculture production. RCW 15.85.010.

Consistent with these legislative and policy directives, former Governor Christine Gregoire launched the Washington Shellfish Initiative in 2011 to encourage shellfish farming in the state.[3] This initiative recognizes shellfish aquaculture is critically important to the state's ecology, economy, and culture. Shellfish help filter and improve water quality and are an important part of the solution to restore and preserve the health of endangered waters. Accordingly, the Washington Shellfish Initiative lists several programs to restore and expand shellfish resources throughout the state, including improved guidance for local SMPs to protect against habitat impacts and planning to minimize use conflicts.

Following up on these initial efforts, Governor Jay Inslee launched Phase II of the Washington Shellfish Initiative in 2016 "to promote critical clean-water commerce, elevate the role that shellfish play in keeping our marine waters healthy and create family wage jobs."[4] Washington State leads the country in the production of farmed clams, oysters, and mussels (10,500 metric tons in 2013) with an estimated total economic contribution of $184 million in 2010. Washington shellfish growers directly and indirectly employed over 2,700 people in the State in 2010, and are among the largest private employers in some counties. A key goal of Phase II is to improve permitting processes to maintain and increase sustainable aquaculture.[5]

Streamlining permitting requirements is critical to increasing shellfish production in Washington State, as shellfish farmers are subject to numerous federal, state, and local permitting requirements that can be extremely costly and difficult to navigate. A Shellfish Interagency Permitting ("SIP") team was convened pursuant to the Washington Shellfish Initiative to formalize clear and efficient coordination for permitting and licensing. The SIP team was tasked with developing and implementing a model permitting program that would improve timeliness of permit decisions while ensuring regulatory compliance.[6]

These national and state efforts to support aquaculture production align with the Puget Sound Partnership's effort to restore and protect Puget Sound. The Puget Sound Partnership is the state agency leading the region's collective effort to restore and protect Puget Sound, and it works with several other agencies and stakeholders in this endeavor. The Partnership's Action Agenda for Puget Sound identifies certain Strategic Initiatives to direct the agency's action where it can address the most significant problems, with viable solutions, in a way that will create meaningful

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[3] Available at: https://www.governor.wa.gov/sites/default/files/documents/WSI_WhitePaper2001.pdf
[4] Washington Shellfish Initiative – Phase II Policy Brief, available at: http://www.governor.wa.gov/sites/default/files/shellfishoverview.pdf
[5] Washington Shellfish Initiative – Phase II Work Plan, available at: http://www.governor.wa.gov/sites/default/files/ShellfishWorkPlan.pdf
[6] Additional information regarding the SIP team, including products developed by the team to assist shellfish growers in navigating the complex permitting requirements for shellfish farming in Washington State, is available at http://www.ecy.wa.gov/programs/sea/aquaculture/sip.html.

improvements for Puget Sound. One of the Strategic Initiatives is focused on shellfish, with the goal of protecting and recovering shellfish beds.[7]

These numerous federal and state policies and laws are consistent with the SMA and SMP Guidelines. They all identify aquaculture as a preferred use that must be encouraged by local, state, and federal governments, and protected from potentially harmful activities.

C. Shellfish Aquaculture Is Highly Regulated, and the County SMP Should Streamline Permitting Requirements.

Ecology's Shoreline Master Programs Handbook ("SMP Handbook") for Aquaculture recognizes "[a] complex framework of state and federal requirements for aquaculture is in place."[8] Appendix 1 of the SMP Handbook for Aquaculture provides an overview of state and federal aquaculture requirements useful for informing SMP updates, listing over 20 different state, federal, and tribal programs applicable to aquaculture in Washington State. In light of these complex regulations, and given aquaculture is a strongly encouraged shoreline use with recognized environmental, economic, and cultural benefits, the SMP Handbook for aquaculture emphasizes the need to streamline and coordinate permitting requirements. Not only is this a major focus of the national and state policies for aquaculture described above, but it is also "[i]n keeping with the SMA direction to consider all plans, studies and information from other agencies [RCW 90.58.100(1)(c)]." SMP Handbook Ch. 16, p. 8. The SMP Handbook states "SMP regulations should not confound state and federal regulations and preclude an applicant's ability to comply with state and federal permits and the local SMP [RCW 90.58.360]" and encourages local governments "to avoid including SMP provisions that duplicate state or federal requirements." *Id.*

At the federal level, the United States Army Corps of Engineers ("Corps") requires permits for shellfish aquaculture activities in Washington State under section 404 of the federal Clean Water Act and section 10 of the Rivers and Harbors Act. In 2017, the Corps reissued Nationwide Permit 48 ("NWP 48") under these authorities, authorizing both new and existing activities in navigable waters necessary for commercial shellfish aquaculture operations. Issuance and Reissuance of Nationwide Permits, 82 Fed. Reg. 1860, 1924 (Jan. 6, 2017). Nationwide permits may only be issued for activities that have minimal individual and cumulative environmental impacts. 33 U.S.C. § 1344(e); 33 CFR § 322.2(f). Hence, the Corps' reissuance of NWP 48 confirms commercial shellfish aquaculture activities throughout the nation that comply with the broad scope of the permit, including activities in Washington State and Thurston County, have minimal cumulative environmental impacts. In fact, the Corps concluded that shellfish farms have numerous beneficial environmental impacts, including improved water quality, secondary production that results in food, and habitat for other organisms in the waterbody including fish and invertebrates 82 Fed. Reg. at 1924.

[7] Puget Sound Partnership, Shellfish Strategic Initiative. Available at: http://www.psp.wa.gov/action-agenda-what.php

[8] SMP Handbook Ch. 16, available at: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Shoreline-Master-Plan-handbook

D. Recent Washington Shorelines Hearings Board Decisions Confirm Shellfish Aquaculture Is a Preferred Use with Insignificant Environmental Impacts.

The Washington Shorelines Hearings Board ("SHB") has issued numerous recent decisions confirming shellfish aquaculture is a preferred use that has insignificant environmental impacts. Most of these cases have addressed geoduck aquaculture. For example, the SHB has issued four decisions in recent years addressing challenges to permits issued by local governments for geoduck farms under SMPs. *Coalition to Protect Puget Sound Habitat v. Pierce County*, SHB No. 11-019 (July 13, 2012); *Coalition to Protect Puget Sound Habitat v. Thurston County*, SHB No. 13-006c (October 11, 2013); *Coalition to Protect Puget Sound Habitat v. Pierce County*, SHB No. 13-016c (January 22, 2014); and *Coalition to Protect Puget Sound Habitat v. Pierce County*, SHB No. 14-024 (May 15, 2015).

Opponents have raised every argument imaginable in contending permits should be denied or reversed for new geoduck farms, and they have often raised the same arguments repeatedly. With one limited exception pertaining to the appropriate buffers for eelgrass beds,[9] the SHB has consistently rejected these arguments, holding impacts from geoduck farms would be insignificant and minimized through reasonable permit conditions. Arguments pertaining to the following issues have been raised and rejected by the SHB:

- Forage fish spawning areas [SHB No. 11-019 (Findings of Fact ("FF") 7, 12, 14, 18, and Conclusions of Law ("COL") 6); SHB No. 13-006c (FF 17-29, and COL 10-13; SHB No. 14-024 (FF 19-25 and COL 13, 16)]

- Consumption of forage fish larvae [SHB No. 11-019 (FF 7, 8, and COL 6); SHB No. 13-006c (FF 29 and COL 13); SHB No. 13-016c (FF 67)]

- Juvenile salmon [SHB No. 11-019 (FF 7, 18); SHB No. 13-006c (FF 33-35 and COL 14); SHB No. 13-016c (FF 68-71 and COL 15); and SHB No. 14-024 (FF 19-25 and COL 13, 16]

- Waves, currents, and sediment transport [SHB No. 11-019 (FF 6, 14, 16, and COL 6, 14); SHB No. 13-006c (FF 24-26, 30-32 and COL 13, 15); SHB No. 14-024 (FF 32-38 and COL 13, 19)]

- Microplastics [SHB No. 11-019 (FF 9); SHB No. 13-006c (FF 41-42 and COL 16); SHB No. 14-024 (FF 44-47 and COL 13, 20)]

- Marine debris [SHB No. 11-019 (FF 10, 11, and COL 6, 14); SHB No. 13-006c (FF 36-42 and COL 16); SHB No. 14-024 (FF 39-43, 47 and COL 13, 20)]

- Impact to the benthic community [SHB No. 11-019 (FF 17); SHB No. 13-016c (FF 64, 74-77 and COL 15); SHB No. 14-024 (FF 15 and COL 13-14)]

[9] SHB No. 13-016c. The SHB specifically found "a lack of complete and/or reliable scientific evidence in the record to support a buffer of this size at this Site given the scale and density of the commercial geoduck farming proposed in both intertidal and subtidal zones, and the conditions found at this Site." Finding of Fact 51. As indicated in this finding, the SHB did not find that evidence was presented proving that the farm would harm eelgrass, only that insufficient evidence was presented to support the buffers in the shoreline permit.

- Cumulative Impacts—State Environmental Policy Act [SHB No. 11-019 (FF 21, and COL 9); SHB No. 14-024 (FF 52-59 and COL 27-30)]

- Cumulative Impacts—SMA [SHB No. 11-019 (FF 15); SHB No. 13-006c (FF 46-48 and COL 21-27); SHB No. 14-024 (FF 52-59 and COL at 23)]

- Recreation and navigation [SHB No. 13-006c (FF 43-45 and COL 17-20); SHB No. 13-016c (FF 59-62 and COL 15); SHB No. 14-024 (FF 50-51 and COL 13, 22)]

- Marine Mammals [SHB No. 14-024 (COL 17); SHB No. 13-016c (FF 72-73 and COL 15)]

- Birds [SHB No. 13-016c (FF 78-79 and COL 15); SHB No. 14-024 (FF 26-28 and COL 13, 17)]

- Farm preparation [SHB No. 14-024 (FF 12-13 and COL 13-14)]

- Predator protection netting [SHB No. 14-024 (FF 14-15 and COL 13); SHB No. 13-006c (FF 16-18)]

- Harvest activities [SHB No. 14-024 [FF 16-18 and COL 13, 15; SHB No. 13-006c (FF at 24-26, 30-32); SHB No. 11-019 (FF 13-18, 22, and COL 14)]

- Density, Genetics, Diseases, Parasites [SHB No. 14-024 (FF 29-31 and COL 13, 18); SHB No. 11-019 (FF 8)]

- Property values [SHB No. 14-024 (FF 48-49, 51 and COL 13, 21)]

The SHB findings and conclusions regarding the environmental impacts of geoduck aquaculture in these cases are based largely on research conducted by Washington Sea Grant. In 2007, the Legislature directed Washington Sea Grant to review existing scientific information and commission research studies related to geoduck aquaculture according to six priorities. Washington Sea Grant issued its final report in November 2013, and it concludes geoduck aquaculture has limited disruptions within the range of natural variation experienced by benthic communities in Puget Sound. Highlights from the final report include:

- Geoduck harvest practices have minimal impacts on benthic communities of infaunal invertebrates, with no observed "spillover effect" in habitats adjacent to cultured plots, suggesting that disturbance is within the range of natural variation experienced by benthic communities in Puget Sound.

- Differences in the structure of mobile macrofauna communities between planted areas with nets and tubes and nearby reference beaches do not persist once nets and tubes are removed during the grow-out culture phase.

- Nutrients released from a typical commercial geoduck operation are low and localized effects are likely to be negligible.

- Geoduck aquaculture practices do not make culture sites unsuitable for later colonization by eelgrass.

Many of the findings reached by the Washington Sea Grant geoduck research program have been published in peer-reviewed journals, including the following articles: Glenn R. VanBlaricom et. al, *Ecological effects of the harvest phase of geoduck (Panopea generosa Gould, 1850) aquaculture on infaunal communities in southern Puget Sound*, Washington, Journal of Shellfish Research Vol. 34, No. 1, pp. 171-87 (2015); P. Sean McDonald et. al, *Effects of geoduck (Panopea generosa Gould, 1850) aquaculture gear on resident and transient macrofauna communities of Puget Sound*, Washington, Journal of Shellfish Research Vol. 34, No. 1, pp. 189-202 (2015); McPeek et. al, *Aquaculture Disturbance Impacts the Diet but not Ecological Linkages of a Iniquitous Predatory Fish*, Estuaries and Coasts (Nov. 8, 2014).[10] These studies demonstrate that, similar to other forms of shellfish aquaculture, geoduck farming does not have significant environmental impacts when properly managed.

E. Suggested Revisions to the Draft SMP Update.

Taylor Shellfish appreciates the County's efforts in developing the draft SMP update. Many of the policies and regulations in the current draft are consistent with the laws and policies applicable to shellfish farming outlined above, but some are not. Taylor Shellfish respectfully requests that the County make the following changes to the draft SMP update to ensure the document properly regulates and protects shellfish farming (suggested deletions are in ~~strikethrough~~ and additions are in underline).

Section 19.150.310

> Eelgrass: a native 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 comanaging tribes shall be consulted in order to assist with the determination.

Both native and non-native species of eelgrass are present in Washington State. The non-native species, *Zostera japonica*, is a noxious weed that should be controlled, not protected. RCW 17.10.080; WAC 16-750-015. Ecology's SMP Handbook acknowledges that the state listing of Japonica "changed the policy interpretation of the SMP Guidelines regarding eelgrass protection … [l]ocal governments are now required to protect only native eelgrass." SMP Handbook, Ch. 16, p. 3. "Ecology interprets eelgrass and eelgrass beds as used in the SMP Guidelines to only mean Z. marina eelgrass and beds. Ecology recommends local governments define eelgrass as Z. marina if an eelgrass definition is included in the SMP." *Id.* p. 27.

Section 19.600.115.A.3.a

> A CUP shall be required for all new commercial geoduck aquaculture ~~and existing aquaculture being converted to commercial geoduck aquaculture~~;

[10] These articles are available at Washington Sea Grant's shellfish and aquaculture webpage: https://wsg.washington.edu/research/aquaculture/

Taylor Shellfish recognizes that, consistent with WAC 173-26-241(3)(b), conditional use permits ("CUPs") will be required for new commercial geoduck aquaculture operations. The decision to require a CUP for converting existing non-geoduck farms to geoduck, however, is discretionary. As discussed above, extensive empirical research has recently been conducted on commercial geoduck aquaculture activities, and that research has largely concluded geoduck farming has insignificant impacts that are similar in scale and intensity to natural weather events. Geoduck farming is already highly regulated by other agencies, including the Corps, and any existing farms that convert species to geoduck will comply with these regulatory requirements and conditions. Allowing existing shellfish farms to change species to geoduck without requiring CUP permits will provide growers needed flexibility to respond to changing market and environmental conditions. It will also support a diverse and vibrant shellfish industry consistent with federal and state laws and policies.

Section 19.600.115.B

Section 19.600.115.B should be stricken. This subsection contains extensive permit application requirements unique to aquaculture that are above and beyond the general permit application requirements in Section 19.500.105(C). The general application provisions already require submittal of a Master Application, a Joint Aquatic Resource Permit Application, and a State Environmental Policy Act checklist.

The additional application requirements specific to aquaculture in Section 19.600.115.B are voluminous, unnecessary, and will significantly discourage aquaculture throughout the County. The draft SMP provides no explanation or justification for these application requirements, and while it notes some information may not be applicable, it imposes a burden on applicants to affirmatively demonstrate why information is not applicable and obtain concurrence from the County. Many of the specific requirements would be very costly and difficult to obtain and would be unnecessary to ensure an adequate review of proposals (e.g. bathymetry, tidal variations, current flows, flushing rates, littoral drifts, sediment dispersal, a survey of aquatic and benthic organisms, etc.).

These application requirements will make it particularly difficult for smaller companies or individuals to site a new shellfish farm in the County, but they will also discourage larger companies with more resources from pursuing aquaculture opportunities in the County. The requirements will therefore undermine numerous laws and policies that support a thriving shellfish aquaculture industry, including efforts to streamline application review under the Shellfish Interagency Permitting framework.

These prescriptive application requirements do not provide adequate latitude or flexibility for aquaculture applicants, in conflict with guiding policies identified earlier in the draft SMP update (e.g. Section 19.300.130, Policy SH-30 and SH-31). Finally, they are unnecessary, as the County already has authority to require applicants to submit additional information on a project-specific basis as needed to review for compliance with conditions of permit approval. TCC 20.60.030 ("During project review, additional information or studies may be requested in writing by the department if needed to address particular aspects of the project or site").

Section 19.600.115.1.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~~ initially install the use or development 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 provision, as currently stated, is confusing if not internally inconsistent. The five-year term appears to be based on RCW 90.58.143(3), which states: "Authorization to conduct construction activities shall terminate five years after the effective date of a substantial development permit." RCW 90.58.143(3) applies to constructing buildings and the like but has no clear application to farming activities, which by their very nature are ongoing and cyclical. To the extent the County finds it important to include a five-year provision in the aquaculture context, it should be limited to the initial installation of the farm. Further, the following sentence appears to suggest that it would be appropriate for the County to require a new permit for each cultivation cycle as a condition of permit approval. It would be infeasible and unwarranted to require farmers to obtain new permits for every crop cycle. For this reason, Ecology's SMA guidelines recognize subsequent cycles of planting and harvest shall not require new permits. *See* WAC 173-26-241(3)(b) (the specific provision stating this is in the context of geoduck aquaculture, but the rationale supporting this provision applies equally to all cultivated shellfish species).

Section 19.600.115.C.1.n.vii

> When determined necessary to ~~minimize~~ avoid significant aesthetic and habitat impacts of largescale 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

Taylor Shellfish strongly believes that all uses, including aquaculture, should avoid significant aesthetic and habitat impacts. This provision as currently stated, however, is not limited to avoiding significant impacts but would instead authorize the County to require phased operations to minimize impacts that are already insignificant. This is an overly prescriptive approach and would likely yield *de minimis* aesthetic or habitat benefits, particularly for projects that satisfy all other permit criteria. Therefore, phased operations should only be required when necessary to avoid significant impacts.

* * * * *

Thank you for your time and consideration of these comments. Taylor Shellfish looks forward to continuing to work with Thurston County through development of the SMP update.

Sincerely,

Audrey Lamb
Biological Project Manager

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Invited Commentary

Microplastics in the Context of Regulation of Commercial Shellfish Aquaculture Operations

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EDITOR'S NOTE:

This is 1 of 15 invited commentaries in the series "Current Understanding of Risks Posed by Microplastics in the Environment." Each peer-reviewed commentary reflects the views and knowledge of international experts in this field and, collectively, inform our current understanding of microplastics fate and effects in the aquatic environment.

ABSTRACT

Shellfish aquaculture in the Salish Sea (encompassing the Strait of Juan de Fuca, Puget Sound, and the Georgia Strait) is a major source of clams, oysters, and mussels in the United States and Canada. Plastic gear is necessary for the viability of many of these operations. During the past few years, shellfish farm permits issued in Washington State have been challenged on various bases that have included allegations that the plastic gear is releasing microplastics, commonly defined as particles less than 5 mm in diameter. Published survey data on sources of marine plastic debris demonstrate the very limited contribution of aquaculture gear. Both permits and industry codes of practice provide procedures to minimize loss of gear to the marine environment. Plastic gear is also designed specifically to maintain its integrity and not degrade in the marine environment. Plastic degradation is greatest on beaches with high UV exposure, whereas aquaculture gear is mostly underwater and/or covered by biofoulants. Available data for microplastics in water, sediment, and biota of the Salish Sea do not suggest significant release of microplastics from shellfish aquaculture operations. *Integr Environ Assess Manag* 2017;13:522–527.

Keywords: Microplastics Aquaculture Shellfish Marine debris

INTRODUCTION

Loss of fishing gear, such as nets and fishing line, is among the many sources of plastics thought to threaten marine life (Ocean Conservancy 2007; European Commission 2011). More recently, questions have arisen regarding potential contributions of aquaculture to marine debris and to the formation of microplastic particles. Aquaculture is a significant contributor to sustainable fisheries globally with a value of approximately US$120 billion, reflecting dramatic increases in aquaculture, whereas the amount of wild-caught seafood has stayed the same (National Oceanic and Atmospheric Administration Fisheries 2016). Asia is responsible for 89% of global aquaculture output, with 62% from China alone. Although aquaculture is growing in the United States and Canada, these countries are small contributors to the global total. In the United States, 91% of the seafood eaten (by value) is imported, with half of that amount from aquaculture. Two-thirds of US aquaculture by value is from clams, oysters, and mussels (National Oceanic and Atmospheric Administration Fisheries 2016). Unlike commercial fishing gear, which may be lost in the open ocean, farmed shellfish operations occur close to coastlines, and associated plastic gear is subject to greater control, as well as recovery if released.

Shellfish aquaculture in the Salish Sea (encompassing the Strait of Juan de Fuca, Puget Sound, and the Georgia Strait) is a major source of clams, oysters, and mussels in the United States and Canada. Plastic gear is necessary for the viability of many of these operations. Plastic gear is primarily used to exclude predators. During the past few years, shellfish farm permits issued in Washington State have been challenged on various bases that have included allegations that the plastic gear is releasing microplastics, commonly defined as particles less than 5 mm in diameter (Shoreline Hearings Board [SHB] 2012, 2013, 2015). This commentary describes the uses of plastic aquaculture gear and reviews published survey data on sources of marine plastic debris and the relative contribution of aquaculture gear, factors controlling plastic degradation in the marine environment, and available data for microplastics in water, sediment, and biota of the

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Shellfish permitting process and issues

Commercial shellfish farmers must obtain approvals from numerous regulatory bodies before operating a farm. For example, to permit a new shellfish farm in Washington State, an applicant must obtain approvals from up to 8 different agencies, in addition to addressing Tribal treaty rights. It often takes a farmer several years to navigate this complex permit process, which requires detailed reviews of the environmental and other potential impacts from a proposed farm, including impacts associated with the cultured species, methods, and gear.

In addition to obtaining permits, shellfish farmers may be required to defend permitting decisions in appeals. Several commercial shellfish aquaculture permits issued by local governments have recently been appealed in Washington State to the SHB. Appellants have raised numerous issues during many of those appeals, including claims that plastic gear, such as PVC tubes and high-density polyethylene mesh tubes and netting, will degrade into microplastics and cause adverse environmental impacts (SHB 2012, 2013, 2015). The SHB rejected these claims in each case, finding that aquaculture gear is not likely to produce significant levels of microplastics, and that environmental conditions and best management practices minimize the potential for gear to create microplastics (SHB 2012, 2013, 2015).

Sources of marine plastic debris

On global and larger regional levels, shellfish aquaculture has not been identified as a major contributor to marine plastic debris. Land-based sources provide the largest contribution to marine plastic debris, with recent global estimates suggesting more than 80% of marine plastics arise from land-based sources (Ocean Conservancy 2015). A 2009 United Nations Environmental Programme report identifies the major land-based sources as including wastes from dumpsites located on coasts or on banks of rivers, as well as industrial outfalls, and discharge from stormwater drains and municipal treatment plants, which are often conveyed to oceans via rivers. Other land sources cited by the United Nations Environmental Programme (2009) include littering of beaches and coastal picnic and recreation areas, and tourism and recreational use of the coasts. The major sea-based sources of marine litter identified by the United Nations Environmental Programme (2009) include all kinds of shipping; fishing activities and associated gear (including vessels, angling, and fish farming); offshore mining and extraction (vessels and oil and gas platforms), as well as legal and illegal dumping at sea; and natural disasters.

The predominant sources of marine plastic debris vary in different parts of the world, with losses from uncollected waste and uncontrolled land waste sites being a larger problem in undeveloped countries (Jambeck et al. 2015; Ocean Conservancy 2015). Nevertheless, even in a developed country such as the United States, land-based sources still predominate. The National Marine Debris Monitoring Program, conducted by the Ocean Conservancy, surveyed marine debris on US beaches during a 5-year period from 2001 to 2006 (Ocean Conservancy 2007); the findings showed that plastic items dominated the debris collected. For debris found along the US west coast (not limited to plastics), land-based debris made up 54.2% of all collected items (including 29.1% plastic straws and 13.9% balloons), with 34.4% of items from general sources (not specifically land or marine based, including 20.6% plastic bottles and 12.1% plastic bags), and only 11.3% of items from ocean-based sources. Among the more frequent ocean-based sources (including 3.2% rope, 2.2% floats and buoys, 1.6% fishing line, 0.9% traps or pots, and 0.8% pipe-thread protectors), none is uniquely associated with shellfish aquaculture. Similar results were found in other regions of the United States.

Limited data are available for the Salish Sea. Cluzard et al. (2015) sampled Salish Sea sediments at 14 locations around Denman Island off the eastern Vancouver Island shore, where many shellfish farms are located. They report an overall average of 0.045 microplastic particle per gram wet weight of sediment, citing polypropylene blue rope used by the oyster-farming industry as a source of some particles. Cluzard et al. (2015) did not sample areas without farms or urban areas, but sediment microplastic concentrations that they report are similar to concentrations reported in other areas of the world. Samples collected from a geoduck farm in south Puget Sound did not find any polymeric particles samples close to the PVC tubes or in an updrift control area when examined by optical microscopy for polymeric particles (i.e., microplastics; detection limit of 1 particle in 10 000 particles) (ENVIRON 2011). This farm had been in operation for 10 years, and this was the 2nd time period with PVC tubes. Davis and Murphy (2015) found the lowest levels of plastic marine debris in beaches of south Puget Sound, including areas with the highest density of aquaculture. They also found that most anthropogenic beach debris by count (as opposed to by weight) was expanded polystyrene foam (69% of total) versus plastic fragments and glass (11% each). Their counts include both macrodebris and microdebris, with 77% of the debris by count (8% by weight) being microdebris (<5 mm) of all kinds (i.e., foam, plastic fragments, glass, film, filaments, pellets, among others). By weight, plastic fragments were 37% of all debris, but only 3% of plastic fragments was microdebris. Debris was higher near urban areas and appeared to be locally generated. Surface water trawls confirmed the urban origin of most Salish Sea anthropogenic debris, which was dominated by microfragments of expanded polystyrene foam (Davis and Murphy 2015). An undated poster (pdf file created 15 June 2011) by LaRoque, Masura, and Baker (n.d.) titled "Concentrations of Marine Microplastics in Puget Sound and Chesapeake Bay" reports on tows with a specially designed manta net in the upper 0.5 m of the water column. They found that concentrations were lowest in remote areas and highest in urban areas, with plastic concentrations ranging from 0 to 0.08 μg/L (i.e., mg/m^3) found in Quartermaster Harbor (more remote), compared with 0 to 0.2 μg/L in an urban area called the Thea Foss (with 1 outlier of 7.5 μg/L).

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and British Columbia (British Columbia Shellfish Growers Association) have developed codes of practice for shellfish farmers (Pacific Coast Shellfish Growers Association 2011; British Columbia Shellfish Growers Association 2013). These codes of practice contain numerous standards for the use and maintenance of gear, including routinely inspecting gear, designing and constructing equipment to withstand extreme weather conditions, and repairing and replacing gear as needed. Regulatory conditions of approval often provide similar requirements to use appropriate gear, frequently monitor gear, replace damaged gear, and remove gear when it is no longer needed or not actively being used (USACE 2015). These management practices and conditions have been recognized as being effective to avoid and minimize the potential for generation of microplastics from shellfish aquaculture gear (SHB 2012, 2013, 2015).

Microplastics in shellfish

Although dozens of studies have reported the presence of microplastics in seabirds and fish, there are few studies of the presence of microplastics in bivalves collected from marine waters. Studies of mussels and oysters document the presence of microplastics in bivalves (De Witte et al. 2014; Mathalon and Hill 2014; Van Cauwenberghe and Janssen 2014; Van Cauwenberghe et al. 2015). These studies generally include a depuration period, so that microplastic concentration in tissues is reported. Concentrations of microplastic fibers were generally less than 1 fiber/g of tissue wet weight. De Witte et al. (2014) did not observe spherical and granular particles, and speculate such particles were removed during depuration. Orange fibers from mussels collected at a Belgian harbor site were thought to be related to fisheries activities. More recently, Davidson and Dudas (2016) studied microplastics in undepurated clams collected in Baynes Sound on the eastern shore of Vancouver Island in British Columbia, finding an average of 0.9 (±0.9) particle/g in wild clams and 1.7 (±1.2) particles/g in farmed clams collected from underneath predator netting. The difference between the 2 kinds of clams was not statistically significant. Approximately 90% of the particles were fibers of various colors. The authors also note that even with laboratory procedures designed to minimize contamination of samples, blank control samples had substantial numbers of fibers (5.8 ± 2.2 particles per filter paper vs 8.4 ± 8.5 particles per wild clam and 11.3 ± 6.6 particles per farmed clam). Taken together, these studies indicate potential limited increases in microplastic particles in farmed bivalves from direct contact with aquaculture gear, within the range of background levels from other sources.

DISCUSSION

Myriad sources of plastic marine debris of all sizes exist, but land-based sources predominate. Low concentrations of microplastics are ubiquitous in the marine environment. Many microplastic particles enter oceans directly from land or from sewage releases. The contribution from larger marine plastic debris to microplastic formation is greatest on beaches where UV light and wave action can enhance degradation. Microplastic concentrations are highest in urban embayments, reflecting the predominant role of land-based sources. Conditions under which aquaculture gear is used in the Salish Sea are expected to minimize potential for degradation because the gear is submerged the majority of the time, temperature and light levels are low, and gear is rapidly colonized by algae that covers the surface. Plastic gear from aquaculture operations does not accumulate on beaches where it would be more vulnerable to degradation because of codes of practice and permit requirements that include frequently monitoring gear, replacing damaged gear, and removing gear when it is not actively being used. Limited evidence suggests that farmed bivalves in direct contact with aquaculture gear may have marginally higher concentrations of microplastic fibers compared with wild bivalves. Available data for the Salish Sea indicate debris was higher near urban areas and appeared to be locally generated, whereas areas with high density of aquaculture activities do not appear to have greater levels of plastic marine debris. Thus, potential contribution of aquaculture gear to marine microplastic loads is very low.

Disclaimer—R Schoof has provided expert testimony on behalf of shellfish farmers at Washington State SHB permit appeals. J DeNike represents shellfish farmers on multiple issues related to permitting aquaculture operations. No funds were provided for this commentary by shellfish farmers, and the opinions presented are our own.

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From: McGowan, Chiara V CIV USARMY CENWS (US)
To: Pozarycki, Scott V CIV USARMY CENWS (US)
Subject: RE:
Date: Tuesday, March 07, 2017 9:54:00 AM

Ok thanks!

-----Original Message-----
From: Pozarycki, Scott V CIV USARMY CENWS (US)
Sent: Tuesday, March 07, 2017 9:53 AM
To: McGowan, Chiara V CIV USARMY CENWS (US) <Chiara.V.Reillo@usace.army.mil>
Subject: RE:

It was never finished. It's nonsense in its current version.

-----Original Message-----
From: McGowan, Chiara V CIV USARMY CENWS (US)
Sent: Tuesday, March 07, 2017 9:50 AM
To: Pozarycki, Scott V CIV USARMY CENWS (US) <Scott.V.Pozarycki@usace.army.mil>
Subject: RE:

Ok - I thought you had said you were or had been re-writing sections based on muffy's comments (in parallel to what I was editing)... Just want to make sure I have the latest version?

-----Original Message-----
From: Pozarycki, Scott V CIV USARMY CENWS (US)
Sent: Tuesday, March 07, 2017 9:40 AM
To: McGowan, Chiara V CIV USARMY CENWS (US) <Chiara.V.Reillo@usace.army.mil>
Subject: RE:

There isn't a current version other than the initial draft.

-----Original Message-----
From: McGowan, Chiara V CIV USARMY CENWS (US)
Sent: Monday, March 06, 2017 10:41 AM
To: Pozarycki, Scott V CIV USARMY CENWS (US) <Scott.V.Pozarycki@usace.army.mil>
Subject:

Can you send me your most current version of the cum ef paper - and the word document of assumptions / answers to your questions from last week? Thanks

Sent from my BlackBerry 10 smartphone.

RE: Meeting with the District Engineer on Nationwide Permit Reissuance

6 March 2017; 10 am

Attendees: Colonel Buck, Michelle Walker, Matt Bennett, Karen Urelius, Andrew Shuckhart

Chiara McGowan, Siri Nelson, Lori Morris, Jesse Winkler, Patricia Graesser, Amy Reese, Damon Lilly

Goal of meeting: Get Col. Buck comfortable with the decision document and prepare him to sign it.

By the end of the day, the Seattle District will be finished with all of the NWP supplemental decision documents, except for NWP 48.

Col. Buck is reviewing the decision documents.

Col. Buck will need to sign a cover letter.

Regulatory hopes to have NWP 48 done by tomorrow.

Discussion on aquaculture cumulative effects. Scott Pozaryzcki did an analysis that was beyond the scope of the NWPs. His cumulative effects analysis was a NEPA-level analysis. For the NWPs, NEPA is done at the HQ level. Regulatory will use this information to inform the NWP 48 cumulative effects analysis. Regulatory will consider the NWP general conditions and the regional conditions in the NWP 48 cumulative effects analysis. We need to overlay all the NWP conditions to understand cumulative effects from NWP 48.

Meeting with the NWIFC and Tribal representatives this afternoon will provide them with the DE's decision.

General Spellmon is meeting with the Swinomish Indian Tribal Community on Wednesday, March 8, 2017.

Siri Nelson is meeting with the Muckleshoot Tribe on Friday, March 10, 2017.

Written comments received during 12/5/18 Public Communications agenda item

Thurston County Planning Commission Meeting on 12/5/2018
Comments by Patrick Townsend

Two studies from Leah Bendell of Simon Fraser University in 2018 show that the PVC and HDPE aquaculture gear are toxic and create microplastics that are known to harm marine life.

Tamara N Kazmiruk, V.D. Kazmiruk, Leah Bendell. May 23, 2018
"Abundance and distribution of microplastics within surface sediments of a key shellfish growing region of Canada"
https://www.researchgate.net/publication/325325373_Abundance_and_distribution_of_microplastics_within_surface_sediments_of_a_key_shellfish_growing_region_of_Canada
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0196005
"Our findings have shown that BC's premier oyster growing region is highly contaminated with microplastics, notably microbeads. It would be prudent to assess the degree to which oysters from this region are ingesting microplastics. If so, it would have direct implications for Canada's oyster farming industry with respect to the health of the oyster and the quality of product that is being farmed and sets an example for other shellfish growing regions of the world."

"In addition to the shellfish aquaculture industry introducing microbeads into the intertidal environment, the industry also makes extensive use of High Density Polyethylene (HDPE), in the form of netting, oyster bags, trays, cages and fences (e.g., vexar) [37]. Each year, 3–4 tonnes of debris, comprised primarily of these plastic materials is recovered from the intertidal regions of Baynes Sound [38]. Sites where the greatest number of microfragments and microfibers were found (sites 5 and 15, and sites 13 and 15 respectively) also coincide with regions of extensive shellfish aquaculture equipment. Greater numbers of microfragments recovered from these regions could be a consequence of the continual mechanical breakdown of the HDPE materials over time and their subsequent accumulation within intertidal sediments. As well, recent research on the distribution of microplastics within the water column of Baynes Sound found concentrations of approximately 4000–5000 m^3 of which 80% were fibrous [39]. Examples of shellfish materials that could contribute to this high microfiber load include "oyster blue" plastic rope, and ropes used for netting and longline culture."

B., Munier and L. I. Bendell. Feb 14, 2018
"Macro and micro plastics sorb and desorb metals and act as a point source of trace metals to coastal ecosystems."
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0191759
"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."

Article about the above study with interview of Leah I Bendell April 3, 2018
https://www.newsdeeply.com/oceans/articles/2018/04/03/heavy-metal-the-new-toxic-danger-posed-by-ocean-plastic-trash
Related to plastics found on Canada's beaches:
"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."

Facts Regarding Deterioration of Shellfish Industry PVC

Thurston County Planning Commission Meeting on 12/5/2018
Comments by Patrick Townsend

The Taylor Shellfish farm manager, Brian Phipps, testified at one of the hearings appealing a geoduck operation that the company continually re-uses PVC. He testified that they have some PVC tubing that is 20 years old or so. This just goes to the fact that PVC deteriorates over time and bleeds microplastics and toxic chemicals into the environment. Taylor Shellfish brought in an expert on plastics (Ms. Schoof) who testified that there was no pollution concern about plastics. That is now refuted by the recent research by Leah Bendell

The PVC is not certified for use in a marine environment. In fact, the industry often uses septic field grade PVC in their operations. It is cheap, but not certified for marine use. Mostly this is ASTM 2729 drain field pipe, but the shellfish industry may user other PVC tubing also.

Lastly, it is interesting that this type of PVC cannot be recycled. Prior to the appeal to the hearing examiner I called Northwest Polymers in Molalla, Oregon and talked to them about PVC recycling. At that time they indicated they would not take used PVC from the shellfish industry as they could not recycle it because of marine contaminants and debris. They could only recycle clean PVC. So, the PVC in use by the industry can't even be recycled.

Leah I. Bendell, Peter C.Y Wan. April 15, 2010
"Application of aerial photography in combination with GIS for coastal management at small spatial scales: a case study of shellfish aquaculture"
http://www.caseinlet.org/uploads/Bendell-Aquaculture_GIS_Study.pdf
In Conclusion section: "Aerial photography coupled with GIS then seems to be a effective tool, however rather than first assess the anthropogenic impact and then the consequences of the impact, ideally the coastal manager would first establish the importance of a region from an ecological perspective and the services the region provides, and then develop the coastal region such that these ecological roles remain unaltered."

L. I. Bendell Feb 15, 2015
"Favored use of anti-predator netting (APN) applied for the farming of clams leads to little benefits to industry while increasing nearshore impacts and plastic pollution"
https://www.sciencedirect.com/science/article/pii/S0025326X1500003X?via%3Dihub

- The efficacy of anti-predator netting (APN) for clam farming is reviewed.
- There is little support for its use in predator prevention.
- APN is a source of plastics to the marine environment.
- APN degrades intertidal habitat.
- Clam gardens could provide a sustainable alternative.

Thurston County Planning Commission Meeting on 12/5/2018
Comments by Kathryn Townsend

1. With the new recommendations from the Orca task force to protect forage fish, eelgrass and salmon habitat—it is clear the tidelands of Puget Sound must be protected. The shellfish industry is the ONLY industry that converts tideland habitat to industrial use on a consistent basis.

2. The 2017 Army Corps document that we submitted previously is clear that the shellfish industry adversely affects forage fish, eelgrass and salmon habitat.

3. Thurston County has already allowed most of the County's bays and coves to be converted to industrial aquaculture. How is Thurston County planning to meet the goal of preserving forage fish, eelgrass and salmon habitat?

4. I have attached a map of existing and proposed shellfish aquaculture sites as of 2012-2014 that is part of the Shorelines Hearings Board administrative record. The shows how much nearshore habitat has already been converted to industrial use.

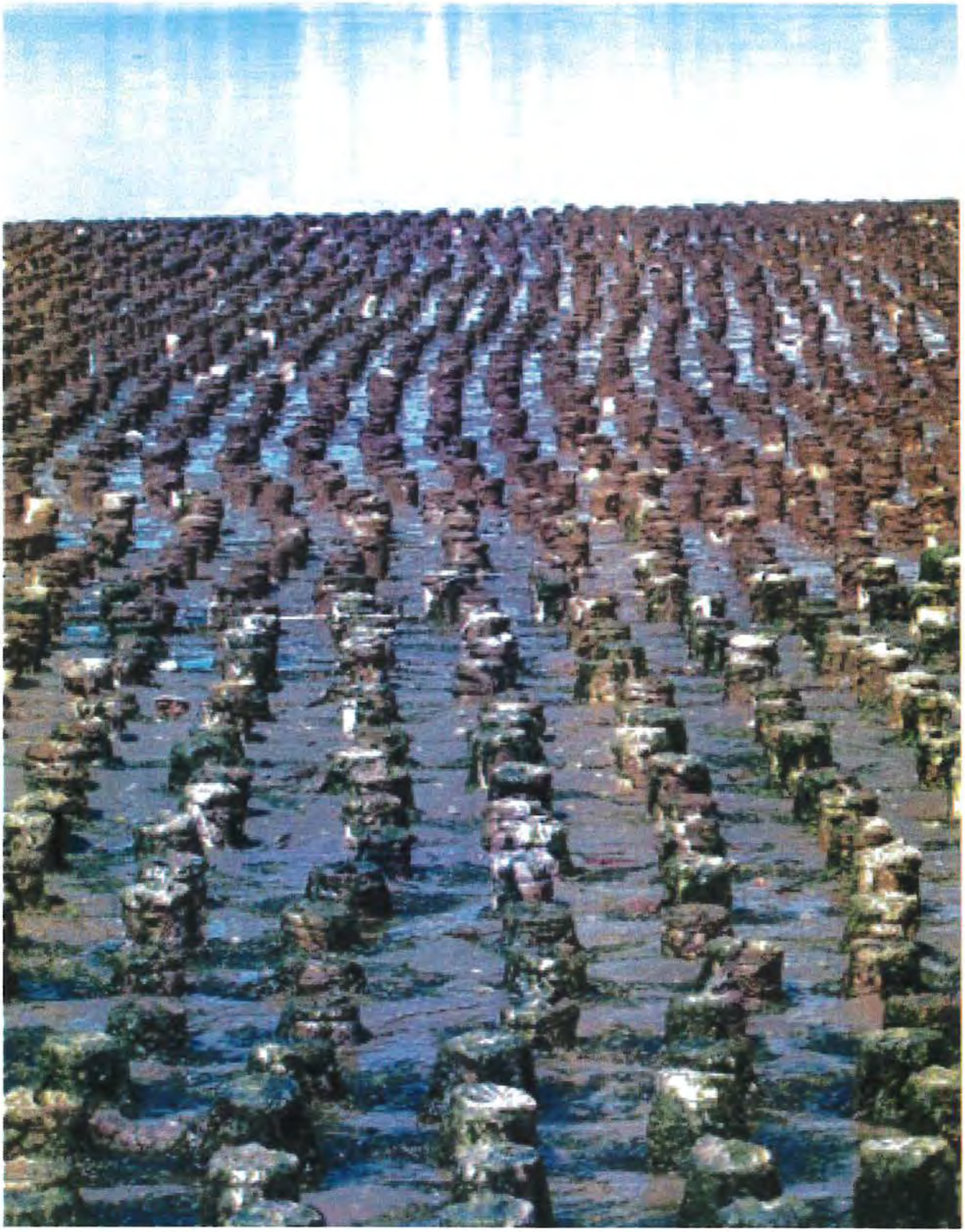
5. What program does the County and State have for surveying herring spawning beds, native eelgrass, burrowing shrimp and salmon smolts? Please provide this to interested citizen groups.

6. How does the County or WDFW actually "manage estuarine ecology." We have never been aware of any "management" of the three geoduck operations we can see on Dana Passage. The County doesn't even have a record of these operations.

7. Why are the state and the county so determined to turn the tidelands of Puget Sound over to an industry in which the main player, Taylor Shellfish has only 60 permanent employees and 20 seasonable employees, according to their own statistics?

8. This industry ships most of its geoduck product to Asia at $100 a pound or more because it is considered an aphrodisiac, not to feed the poor and the hungry.

9. The million-dollar question: how can are our state and county governmental entities continue to support putting seven miles of PVC and/or HDPE plastics in an acre of tideland, creating a monoculture, while at the same time claiming that they want to save the salmon and the orcas?



Thurston County Shoreline Stakeholders Coalition

4108 Kyro Rd SE. Lacey, WA 98503

December 5, 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)

The online meeting material, agenda and PowerPoint for tonight's meeting was confusing until changed this morning after we questioned two previous versions. This makes it very difficult for the public to prepare for and be a part of the meeting.

We see from the timeline put forth from the Planning Department that the redline/draft with updates is now proposed to be ready on February 20 vs. last week's proposal of February 6th. We see no reason that this document can't be available as promised on February 6th. This would give both the Planning Commissioners and the stakeholders additional time to review the redline document before further discussion on February 20th, March 6th & March 20th. Since the stakeholders only get 3 minutes to respond to the updated version at each meeting, we need more meetings to get our point in front of the Commissioners.

The Planning Department continues to recommend an open house on December 19th. Based on past poor performance of public notification and the holiday season, we again recommended that the open house be moved to the new year. If you choose not to move the meeting you should at least demand specifics on how the Planning Department will notify the public in an effective timely manner.

Respectfully submitted,

John Woodford, Chairman

Doug Karman, Vice-Chairman

Chapter 6
Public Participation

All phases
Shoreline Master Program Planning Process

Introduction

Public participation is essential when developing a Shoreline Master Program (SMP) that will be accepted by the local community and Ecology. Both the Shoreline Management Act (SMA) and the SMP procedural rules and Guidelines require public participation to ensure all interested parties have an opportunity to shape shoreline policies and regulations. Public participation at the local level should occur during Phases 1 through 5 of the SMP update process.

Major elements

The major elements of public participation for SMP updates include:

- Preparing a public participation plan and using it to guide the process. Community visioning, Task 3.1 of the SMP planning process, should be included in the plan. See Chapter 10, *Community Visioning*.
- Obtaining and sustaining public participation through a variety of outreach activities.
- Maintaining good records of public participation activities.

Chapter overview

This chapter discusses the legal basis for public participation during the SMP planning process and lists the components of a public participation plan. It provides examples of stakeholders and their roles, including citizens and technical advisory committees. The chapter discusses ways to reach and keep the public engaged in the SMP process, provides tips for choosing and organizing the right type of event, discusses how to keep the process on track, and reviews ways to manage public input. Attachments include a checklist of public participation meeting tasks and supplies and an example of a participation agreement for committee members.

Additional information on public participation is available from numerous sources. The Resources page has links to websites with additional information on public participation.

Legal basis for public participation

Public participation for SMPs is required by the SMA, the SMP Procedural rules, and the SMP Guidelines. Local governments and Ecology can face legal challenges on SMP approvals if public participation does not meet these legal requirements. These requirements apply to new SMPs, comprehensive updates of SMPs, and limited SMP amendments.

The RCW and WAC requirements are minimum requirements. Local efforts vary widely. Many jurisdictions far exceed the minimum requirements to ensure that citizens are adequately informed about, and have opportunities to participate in, the comprehensive SMP update process.

Shoreline Management Act

The SMA intent is to insure that those interested in SMPs have "full opportunity for involvement." The SMA states the local government and Ecology "shall not only invite but actively encourage participation by all persons and private groups and entities showing an interest in shoreline management programs" [*RCW 90.58.130*].

The SMA also requires local governments to invite participation from federal, state and local government agencies, including municipal and public corporations that have interests or responsibilities relating to shorelines.

RCW 90.58.130: To insure that all persons and entities having an interest in the guidelines and master programs developed under this chapter are provided with a full opportunity for involvement in both their development and implementation, the department and local governments shall:

(1) Make reasonable efforts to inform the people of the state about the shoreline management program of this chapter and in the performance of the responsibilities provided in this chapter, shall not only invite but actively encourage participation by all persons and private groups and entities showing an interest in shoreline management programs of this chapter; and

(2) Invite and encourage participation by all agencies of federal, state, and local government, including municipal and public corporations, having interests or responsibilities relating to the shorelines of the state. State and local agencies are directed to participate fully to insure that their interests are fully considered by the department and local governments.

Shoreline Master Program procedural rules

The SMP procedural rules require local governments to "make all reasonable efforts to inform, fully involve and encourage participation" of interested persons, private entities and local, state and federal agencies" [*WAC 173-26-090*]. Local governments planning under the Growth Management Act also must develop and disseminate a public participation program for comprehensive plan amendments and development regulations related to shorelines. Public participation shall be "early and continuous" and include "dissemination of informative materials, proposals and alternatives, opportunity for written comments, public meetings after effective notice, provision for open discussion, and consideration of and response to public comments."

WAC 173-26-100 requires local governments to solicit public and agency comment during the drafting of new or amended SMPs. The degree of involvement "should be gauged according to the level of complexity, anticipated controversy, and range of issues covered in the draft proposal." Local governments must conduct at least one public hearing on the draft proposal.

As part of the SMP submittal requirements, local governments must provide copies of all comments received and names and addresses of interested parties involved in the SMP process [WAC 173-26-110(7)]. All e-mail addresses must be included with the interested parties' mailing list.

Shoreline Master Program Guidelines

The SMP Guidelines repeat these mandates and specifically require communication with state agencies and affected Indian tribes [*WAC 173-26-201(3)(b)*]. "Before undertaking substantial work, local governments shall notify applicable state agencies to identify state interests, relevant regional and statewide efforts, available information, and methods for coordination and input." The Guidelines also require local governments to be "prepared to describe and document their methods to ensure that all interested parties have a meaningful opportunity to participate."

The SMP Guidelines require local governments to notify affected tribes about their SMP updates. Indian tribes are interested in shoreline issues, especially as it relates to their livelihoods and treaty rights. Tribal information is available at the Governor's Office of Indian Affairs website at http://www.goia.wa.gov/.

The SMP Guidelines also require local governments to "be prepared to describe and document their methods to ensure that all interested parties have a meaningful opportunity to participate" [WAC 173-26-201(3)(b)(i)].

Public participation plan

The public participation plan lays out how local governments will gain broad participation throughout the SMP process. Local governments that have SMP grant agreements with Ecology must submit a public participation plan (Task 1.2 of the SMP Planning Process). Public participation updates are also required as part of the quarterly progress reports. Ecology encourages public participation plans for all local governments preparing SMP comprehensive updates and limited amendments.

Framework for participation

The initial plan will be a framework for public participation activities throughout the SMP update process. The plan is likely to change as the SMP process evolves and you learn more about community needs for participation. Be sure and keep track of the changes and inform your Ecology grant officer. Significant changes may require approval by the grant officer.

Asking the public directly how they want to be communicated with and involved is a simple way to increase the success of a public participation process. Workshops, surveys and stakeholder interviews are common techniques to gather early input on a public participation plan. Although this takes more work upfront, having the public co-design the plan ensures more buy-in to the process and outcome. It also can provide an opportunity for disparate stakeholders to identify the common values, messages and materials that resonate across a wide range of stakeholders.

Components of plan

The public participation plan should:

- Describe the SMP amendment process.
- Provide descriptions and timelines for public participation activities and dates or milestone targets for SMP products.
- Identify key stakeholders. (See the "Stakeholders" section, below.) Indicate key outreach techniques for each stakeholder group, emphasizing approaches designed to seek and acquire input from the full range of community interests.
- Identify opportunities for the public to provide input, obtain information, review draft documents, receive notice of public participation activities, file appeals, and other SMP tasks.
- Clearly articulate the role of the public, citizen advisory committees, Planning Commission and elected officials. This should include expectations of time commitments, responsibilities and activities. Also, address whether participants are in an advisory or decision making capacity. For jurisdictions planning under the Growth Management Act, be consistent with public participation plans developed and maintained for local comprehensive plans and development regulations, as they relate to shorelines of the state. See *RCW 36.70A.130* and *WAC 173-26-090*.

Your public participation plan will depend on the size of your jurisdiction, the complexity of shoreline issues, the diversity of your stakeholders and other factors. A small city may need different techniques than a large county divided by mountains or water bodies.

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

Local officials
Neighborhood planning advisory groups
Planning Commission
SMP advisory groups
Elected officials

Others
Neighboring jurisdictions
Shoreline contractors (bulkheads and homes, for example)

Roles of stakeholders

Stakeholders have various roles and levels of authority during the SMP planning process. For example, individuals not affiliated with particular organizations may attend meetings and provide oral or written comments. Shoreline recreational user groups, port districts, homeowners groups and other organizations may develop position papers that they present to the planning commission and council. State and federal agencies may provide technical expertise and information about laws and regulations. The Washington Department of Ecology will provide technical expertise and formal comments during its review and approval of the SMP.

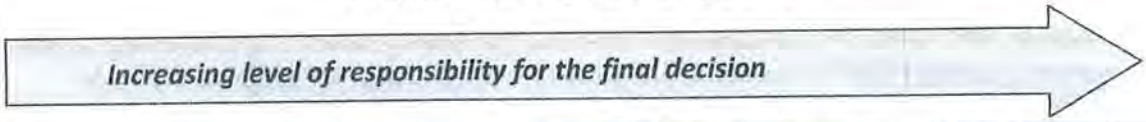
Appointed advisory committees such as technical or citizen advisory committee will generally be more involved than many other stakeholders. Technical committee members typically will suggest and review scientific studies and other data about the local shoreline, analyze the inventory and characterization information, and provide science-based recommendations about shoreline issues. The citizens committee typically looks at the public participation plan, shoreline policy issues, reviews the inventory and characterization, and recommends goals, policies and regulations. The citizens committee also may help organize and conduct public participation events.

Appointed and elected officials such as planning commission members and county or city council members also are stakeholders. A planning commission usually reviews all available information and recommendations from advisory committees, hears public comment at workshops and public hearings, and makes a recommendation to the council. The council considers available info and the planning commission recommendation, then decides whether to adopt that recommendation or make changes to it. The council's decision is sent to Ecology for review and approval.

These roles should be clearly explained in the public participation plan and discussed at public participation activities and meetings with the advisory committees, planning commission and council. This helps to establish clear expectations and avoid frustration on the part of committee members and backtracking on decisions previously made.

The table below shows examples of stakeholders and their roles during public participation, with an increasing level of responsibility for making decisions from left to right.

Public Participation Spectrum



	Inform	Consult	Involve	Collaborate	Empower
Examples of stakeholders	General public	All interested parties	Citizen advisory committee, technical advisory committee, affected parties	Planning commission, citizen advisory committee, technical advisory committee	Local elected officials and Dept. of Ecology
Your public participation goal	To provide information to increase the public's understanding and encourage their participation.	To obtain feedback on analyses, alternatives and/or decisions.	To work directly with these stakeholders throughout the process, and to ensure that concerns and aspirations are consistently understood and considered.	To partner with these stakeholders in every aspect of the decision.	To provide information necessary for making the final decision.

Adapted from "Spectrum of Public Participation" by International Association for Public Participation, 2007.

Example – roles of stakeholders

The City of Bainbridge Island public participation plan provides clear descriptions of the roles of stakeholders, city staff, Environmental Technical Advisory Committee, Planning Commission, City Council and Department of Ecology. For example, the plan states:

> *Stakeholder Role and Authority: Informal advisory role, to provide input to staff and decision-makers. Citizen stakeholders may also exercise their authority indirectly by voting for elected decision-makers. (Page 7.)*
>
> *ETAC Role and Authority: Advisory role limited to the selection, peer review and use of scientific information. Specifically, ETAC provides technical and scientific advice to the City on environmental management issues and guidance on how science is applied related to the SMP Update. (Page 8.)*
>
> *City Council Role and Authority: As established in state law, to review draft SMP Update, gather public input, make changes as desired, and locally adopt the final SMP. The City Council is the legislative authority with the final local decision making authority for the local adoption of the SMP. (Page 8.)*

Department of Ecology (DOE) Role and Authority: As established in state law, the DOE provides assistance and guidance to local governments in preparing the SMP. The DOE issues the SMP Guidelines, and provides technical guidance, financial assistance and written comments on draft SMP components. DOE must review and approve all local SMPs. In addition, DOE approves certain shoreline permit decisions, i.e. conditional uses and variances. (Page 9.)

Citizens Advisory Committees

Many local governments form a Citizens Advisory Committee (CAC), although this is not required by the SMP Guidelines. This forum discusses shoreline management policy issues, sets goals, reviews technical work, proposes regulations, and promotes communication with the public on shoreline management issues. In some jurisdictions, planning commissions carry out these tasks. Some jurisdictions also form separate technical advisory committees that complement the work of the CAC (see discussion of TACs at the end of this section).

When deciding whether to form a CAC, consider the planning commission's workload. The lengthy and time-consuming SMP update process may overwhelm already-busy planning commissioners. Also, planning commission membership may not ensure adequate representation of all shoreline stakeholders. Appointing a CAC often works better. However, staff workload should also be considered, as managing a CAC takes considerable time and effort.

Selecting committee members

Committee members should represent a cross-section of interest groups and public values. All committee members should be able to work cooperatively and respectfully. Search for members who are committed to participating on the committee, not just those who are available. The committee should have no more than about a dozen members unless there are compelling reasons to include additional members. Larger groups can be unwieldy and prevent efficient work. The committee chair should remain neutral and not represent a particular group or interest. When there is a conflict, it should be the chair's primary task to direct the process and arrive at a conclusion – which might be consensus, majority position, or agreement that the perspectives have been accurately captured and it is time to move to the next topic.

Consider having a city council or county commission member attend CAC meetings to help avoid having the CACs recommendations challenged by the planning commission or elected officials later in the process. Appointing a member of the planning commission or the comprehensive-plan citizen committee can help link SMA and GMA planning and ensure consistency between the SMP and the comprehensive plan. Similarly, a port district representative on the committee can help identify potential use conflicts and avoid future inconsistencies between the SMP and the port's master plan.

Establishing the committee's role, rules and procedures

Use the first CAC meeting to introduce committee and staff members; outline the purpose, process and responsibilities of the committee; review issues needing attention; and establish ground rules and procedures. Generally, the committee will advise the planning commission, council or other decision-making body. Clarify the committee's tasks. Will the CAC members help prepare the SMP provisions? Will they review and approve or reject staff's language? Will they be given a choice among alternatives, or be able to suggest alternatives? When will their job be done?

The City of Bainbridge Island has developed a participation agreement for members of its citizen work groups. The agreement explains the group roles, composition and responsibilities, rules of conduct for participants, and structure of meetings. All members and alternate members of the work groups signed the agreement. The signature section notes that "egregious violation" of the agreement rules will result in removal from the work groups. The agreement is Attachment 1 to this chapter.

Successful committees establish and maintain reasonable expectations among committee members from the onset. Clearly describing the committee's authority, responsibilities and work procedures is an important step towards getting the committee off to a good start. Explaining their role as an advisory body avoids a future expectation that the decision-makers will concur with all the CAC's recommendations.

Additional important steps include:

1. Set a standard meeting time and place for committee meetings so all members can adjust their schedules. Meetings should begin and end on time. Long meetings that end well after the agreed-upon time quickly result in committee member burn-out.

2. Discuss the schedule, and explain that the process may take much longer. Turnover can be expected, so discuss how replacements will be selected.

3. Establish how the committee's decisions will be made and how differing views will be represented and conflicts resolved. Voting? Majority/minority reports? Clarify whether consensus is required.

4. Establish a protocol for recording committee recommendations, and communicating draft recommendations prior to meetings. It generally works best if the committee chair presents written options instead of simply asking for committee input. This provides a starting point and focuses discussion. To avoid getting bogged down with details, the options should begin as concepts and move towards greater detail as consensus is approached. A process for exchanging e-mails on changes to draft language should also be identified to avoid lengthy "word-smithing" discussions at meetings.

5. Record minutes at the meetings. Records of each meeting will provide an invaluable method for verifying committee decisions throughout the SMP amendment process.

6. Decide what will happen to the committee after the SMP is adopted. Unless there are specific tasks for the committee after adoption, the CAC should be officially disbanded.

7. Decide how other citizens may participate in committee meetings. Allowing all citizens to observe meetings is important, but opening the discussion to the general public throughout the meeting can be distracting and prevent progress. It may be best to limit public comments and discussion to specific times during the meeting.

Beginning the committee's work

A tour of the shoreline, especially a boat tour, is an ideal way to help committee members become familiar with the waterfront. Alternatively, walking the shoreline will help orient members.

Guest experts such as port officials, Department of Fish and Wildlife and Department of Ecology staff, maritime economists, special interest groups, and others can address the committee to provide background information. Ecology staff can introduce committee members and other interested parties to the SMP amendment process and emergent shoreline issues and concerns. This introductory training will help to identify many issues the committee will address throughout the SMP process.

Facilitating committee decision-making

Each difficult issue must be tackled in a way that looks for a solution satisfactory to all interests. Such a solution is not necessarily a compromise, but rather a response to a complex problem. One useful approach is to appoint a sub-committee to help resolve conflicts that arise. This avoids distracting the entire committee's attention from other issues and allows a smaller group to tackle solutions to the identified problems.

Ideally, a committee should act as a team that considers all objectives in resolving problems. The win-win negotiating technique described by Roger Fisher and William Ury in the book, *Getting to Yes*, provides a good model for solving potentially difficult conflicts. The approach features the following four elements in arriving at a fair solution to a conflict.

- **Separate people from the problem.** Emotions often get in the way of solving conflicts. Fisher and Ury suggest several methods for dealing with emotions, including acknowledging both sides' perceptions and prejudices, not responding to emotional outbursts, and using effective communication methods. The key is to build personal working relationships so all participants can work together to solve a problem, rather than creating a conflict in which each side tries to win. Informal meetings, such as a shoreline tour, help form and strengthen working relationships.

- **Focus on interests rather than positions** (describe what each party wants, not what they demand). An interest is a desire, a motivation or a concern. A position is a statement or demand. "I want to make sure that the safe, efficient operation of industrial activities is

not diminished by public access improvements" is an interest. "I don't want any public access in the industrial waterfront" is a position. Focusing on interests rather than positions allows both sides to explore areas where they are compatible and to tackle the problem rather than each other's positions.

- **Explore options for mutual gain**. Searching for creative solutions is preferable to simply trying to compromise. Staff members can assist in this effort by proposing solutions that optimize all interests. For example, in a conflict between industrial operators and public access advocates, all parties interests might be promoted by:

  1. Developing plans for public access features that do not impede industrial activities.
  2. Including an SMP provision that describes how to decide when public access is inappropriate.
  3. Or, explicitly describing where public access is not required and allowing off-site public access mitigation according to a specified plan.

- **Use objective criteria to make a decision**. Resolving the issue ultimately means arriving at a decision that may not please everyone. Before taking a potentially divisive vote, the committee should evaluate all options with respect to objective criteria. In this case, the criteria might be the General Policies section of the draft SMP. The preferred solution must conform to the SMA and the Guidelines, and if applicable, the priorities set for shorelines of statewide significance.

Getting to Yes develops these principles in detail and presents many useful techniques for their implementation. Ideally, all major issues are resolved to the maximum extent possible at the local level. Unresolved or contentious issues will likely re-surface at the state review and approval level as well, leading to delays in final SMP approval.

Nurturing the Citizen Advisory Committee

Committee members devote many hours to SMP-related work, providing an invaluable and difficult public service. Their reward is in knowing they are making an important contribution. Keeping the committee on track by meeting its objectives, verifying its role and occasionally reviewing its performance will enhance this feeling. Public recognition of their ongoing contributions is also important. In addition, each committee member deserves his or her viewpoint to be respectfully considered by the other members and the staff. Discourteous behavior should not be tolerated.

Organizing a Technical Advisory Committee

Most jurisdictions updating their SMPs also have a technical/science committee (Technical Advisory Committee or TAC). The TAC is usually comprised of state resource agency, municipal and tribal representatives with data and scientific expertise in shoreline resource issues, as well as citizens with similar training and expertise. Its main focus is on technical issues such as biological, geological and hydraulic processes, wetlands and engineering.

Local governments usually create the TAC when accumulating draft inventory data and developing draft reach maps. The committee often plays an important role in identifying or providing input on data sources. The suggestions for convening and effectively managing a CAC, above, apply equally to the TAC.

Example

Whatcom County posted the following description of its Technical Advisory Committee on its SMP update process website:

"The purpose of the SMP/CAO Technical Advisory Committee is to help focus technical discussions and identify key technical and policy issues associated with natural resources management in Whatcom County and take advantage of and contribute to the existing knowledge base in the county. The following governments and agencies have been invited to participate on the Technical Advisory Committee:

-City of Bellingham
-Lummi Nation
-Nooksack Tribe
-Small Cities Caucus
-Port of Bellingham
-Washington State Department of Fish and Wildlife
-Washington State Department of Natural Resources
-Washington State Department of Ecology
-U.S. Army Corps of Engineers
-Whatcom Conservation District/NRCS

In addition to regular participating governments and agencies, representatives from special districts within Whatcom County, such as the Watershed Improvement District and Shellfish Protection Districts will be invited for focused discussions related to their specific areas of interest or expertise. Additionally, specific members from other parallel planning processes in the county, such as WRIA Watershed Management Planning, Salmon Recovery, Lake Whatcom Management and MRC will be invited to participate in the discussions with the advisory committee as appropriate.

Technical Advisory Committee meetings will be open to the public and the meeting dates and locations are posted on the events calendar on this website as they are scheduled."

The CAC and the TAC can be the backbone of your SMP update process. The success of the process will depend in large part on the members' ability to listen, learn, share, and constructively debate issues that do not have easy answers. Taking the time to explain historic issues, educate committee members on shoreline management processes and challenges and provide input from shoreline experts will help ensure productive committee output.

Engaging the public

People vary in their preferences for participation. For example, some individuals may want to engage in one-on-one dialogue at an open house, but won't provide public testimony during a hearing. Others will check websites and provide only written comments, while some are comfortable testifying at formal hearings. Providing multiple routes for public participation can help avoid having the most visual and vocal individuals and groups dominate the process. It also ensures that a wide cross-section of your community is represented by the recommendations provided to elected officials.

To build integrity and trust with the public and increase attendance at subsequent events, be clear about why they should come to an event and how their input will be used, and follow through on what you promise.

Diversity of participants

Most jurisdictions have time-honored methods of soliciting public participation. Open houses, workshops, and public meetings are usually relied on for informing the public and getting input, and are promoted in print and online advertisements and through mailings to shoreline property owners and other interested parties. These methods work well for individuals and groups sophisticated about advancing their interests through SMA processes.

However, many stakeholders, for social, cultural or practical reasons, find it difficult to squeeze meetings into their schedule or are not accustomed to participating in planning processes. Examples include busy working parents, swing shift workers, non-English speakers, and shoreline users who live outside the immediate community.

Consider the time of day that's best to engage your community. Evening meetings from 7 to 9 PM are difficult for many to attend – this is dinner time or homework time. Vary the times of your participation events. Some local governments have had success with events scheduled from about 3 PM to 8 PM. This time period can capture people on their way to or from work or after work. Schedule some for Saturday mornings. Think about avoiding conflicts with other events – holidays, parades, races, summer vacation, and election day, for example.

Shoreline users who fish and gather shellfish may be recent immigrants with limited command of the English language. Many of these users do not typically participate in planning projects. Providing translated materials and interpreters is essential to getting meaningful comments. Posting signs at common gathering places (e.g. boat launches, parks, ethnic grocery stores) or putting articles in native language publications can reach these shoreline users. Working with ethnic community leaders to identify methods and tools that work for recent immigrants is vital to being successful.

Be sure to include all generations in the SMP process. Seniors have a lot to offer about historic use of shorelines, and children can help frame a community vision. Find teachers interested in community affairs and invite them to get their students involved. Having children at public meetings can help set a civil tone and encourage participants to find common ground. Making

the world a better place for future generations is often a commonly held value among various stakeholders.

Techniques to connect with the public

Look for new and diverse ways to reach interested parties. There are many ways to connect with the public throughout the SMP update process:

- **Sponsor expert-led field trips.** Field trips are one of the best ways to illustrate the challenges of shoreline planning and bring disparate stakeholders together. Field trips provide an opportunity to view real-life problems that need solutions, build camaraderie among committee members, and see issues from a new perspective.

- **Conduct a mail, online, or telephone survey early in the process to determine public opinion on shoreline management issues.** A survey can provide a gauge of the public values useful in formulating goals and evaluating possible regulations. Ecology conducted two statistically valid statewide public opinion surveys on shoreline management in 1983 and 1996. Survey questions asked people's opinions about their use of the shoreline, popular shoreline activities, attractive and unattractive shoreline qualities, shoreline management and other topics. For information about these surveys, see Ecology's summary publication: Public Opinion on Shoreline Management in Washington State (November 2004, Ecology publication 04-06-028).

- **Advertise the SMP planning process and specific meetings and activities on local radio and public television stations and in community event columns of local newspapers**, both print and online editions. Some jurisdictions also distribute flyers via newspapers or monthly utility bills. To engage special interest users, place ads or notices in organization or association publications.

- **Post meeting notices at popular gathering places around the community, and on reader boards.** Every community has an array of familiar "posting" places that the public is attuned to checking from time to time: grocery store bulletin boards, libraries, post offices, commercial reader boards, etc. Also, post notices at outdoor retailers, park kiosks, marinas, ethnic grocery stores, and other places particular to your community's shoreline and stakeholders.

- **Send notices to websites of shoreline user groups and community organizations.** Ask them to pass it along to their list of interested parties.

- **Participate in community events such as neighborhood festivals, fairs and farmers markets.** Set up information tables or booths at the mall or the high school's football game. You can distribute information, conduct surveys and talk with people about the SMP update. Provide comment forms for instant feedback.

- **Make presentations to key stakeholder groups, community organizations, and neighborhood associations.** This enables you to customize your message, answer questions specific to the group, address their concerns, and get their input.

- **Use your local government's website and social media (blog, Facebook, Twitter) to provide information on the planning process and invite public comment on draft products.** Sponsor a 'favorite shoreline' or slogan contest. Videotape presentations and put them on the website. The website provides a place to articulate planning goals, post public meeting notices and committee notes, display draft maps and other material, as well as take comment throughout the planning process. However, its utility in informing the public will be only as good as the information it contains and if the public knows it exists. The website should be kept updated and easy to navigate. Set up links to the Ecology website where people can find information about the SMA, SMP Guidelines, and frequently asked questions about SMPs. See Ecology's SMP home page.

Meeting format

Many public participation processes involve the public coming to a scheduled meeting at a set location. These may include an open house, workshop, charette, visioning process, or public hearing. Some meetings are combinations – for example, an open house followed by a public hearing.

To choose the right type of meeting, start with clearly identifying the intended audience and the specific objectives to be accomplished. Do you want to just provide information? Get input on a decision? Build positive relationships among stakeholders? Going back to early stakeholder interviews or surveys can help you select the right type of meeting for the stakeholders involved.

Early in the process, an open house may be helpful to introduce people to the SMA and SMP update process and find out what they value about local shorelines. Later on, when people have a sense of shoreline issues, a workshop with small group discussions may be appropriate. The community visioning process required by Task 3.1 should take place after the inventory and characterization report is prepared, so that participants have a good idea of local shoreline conditions and opportunities for preservation, restoration, public access and shoreline uses.

Information about additional techniques can be found through the resources listed in the Resources section at the end of this chapter. Two examples of meeting formats are discussed below.

Open house format

An informal "drop-in" open house that individuals may attend at any time has proven effective for a planning process and has been used for SMP updates. These typically run two to four hours. Staff and Citizen Advisory Committee (CAC) members are available to explain the process and discuss issues informally. Maps and displays help describe key concepts, jurisdictional boundaries, inventory and characterization results, etc. A survey form with space for general comments assists participants in expressing their concerns and values. These forms provide an

index of participant comments, provide feedback on the event, and solicit ideas for how to improve public participation. The advantage of the drop-in format is that it allows individual exchange of information in a relaxed setting.

Workshop

Workshops typically include a presentation to the audience, followed by small group discussion or exercises. Small group discussions and exercises are most effective when structured with work sheets, instructions and discussion questions, and a neutral facilitator. The presentation and group exercise promotes the exchange of viewpoints and helps participants to recognize the wide range of issues and trade-offs involved with shoreline management.

Organizing the event

To organize an effective public meeting, you need to answer a lot of questions.
Who is your audience? What time and place will be best for them? How will you advertise it? What supplies and equipment do you need?

Ecology developed a Public Participation Event Checklist to help you figure out what you need to get ready. Refer to the checklist (Attachment 2) for lists of tasks, needed materials and supplies, dates to keep in mind and other considerations.

Keeping the process on track

The SMP update timeline sometimes gets derailed when public participation is not well planned and conducted. For example, erroneous information that is circulated around the community takes up staff time to respond, reducing time spent on learning what the public thinks about the draft SMP. Or, participants focus on an outcome that is illegal under existing State law.

To help keep the process on track, get public input on the public participation plan to make sure it meets their needs. Clarify the public's role from the outset. Acknowledge early on situations where the community has limited power in decision making due to mandates of the SMA, SMP Guidelines, other regulations and facts that are at the core of the process.

At every meeting, remind people of what public participation activities have occurred, what's resulted from those, and what's coming up. Always display your list of public participation goals.

Dealing with "non-starter" issues

Failure to set the record straight on misinformation and rumors waste's everyone's time and can derail an SMP planning timeline. The local government should clearly provide the rationale for its position, such as State requirements. Dealing with non-starter issues emphatically and conclusively up-front and throughout the planning process can help eliminate them as barriers to agreement, and honors the public's investment in the process.

Developing a Frequently Asked Questions handout early in the process can avoid rumors from getting started. The process of writing one also can ensure elected officials, planners, media staff, and other employees are saying the same thing to the public. An FAQ is a living document that can be expanded over time. Ecology has both paper and web versions that local governments may use as a starting point.

Dealing with emotionally charged situations

Shoreline planning can have a significant effect on shoreline users and property owners. Some individuals or groups may view the outcome as a risk to their livelihood or basic constitutional rights. If members of your public view the outcome as high risk for them, the situation may become emotionally charged and contentious. The practice of risk communication has specific tips that planners may find useful in these situations.

- Listen. Acknowledge the importance of their values and feelings first before engaging them in solutions. Provide a forum for people to air their feelings before getting into planning tasks. You may have to do this in several different ways and settings.

- Recognize and be honest about the values incorporated in agency decisions. Be clear about the source of these values (prior planning processes and surveys, or prior work within this planning process, for example).

- Always use facts. Be open, honest and responsive.

- Develop a varied and fair process that allows for the less visual and vocal to be heard. Stand up for a fair, civil process where everyone has a voice.

For its public hearings on SMP updates, Ecology posts a "Code of Civility" at the entrance to the meeting room. The poster states:

> *Ecology employees ask that meeting participants engage in civil behavior and join them in:*
> - *Respecting everyone's right to speak and be heard, regardless of our differences.*
> - *Presenting truthful information and nurturing honest, open conversation.*
> - *Making this a safe place for ourselves and others, and to fully participate in a calm, respectful manner.*

For additional tips, visit the Peter M. Sandman Risk Communication Website. A downloadable primer on risk communication is also available from the Agency for Toxic Substances & Disease Registry.

Working with appointed and elected officials

Elected officials and planning commission members are stakeholders. Keep these officials informed about the SMP update throughout the process. Be clear about methods of

communication with them, their role in the process, and authority to make recommendations and decisions. Discuss how their input will be reflected in the final product, and the preferred way for the public to engage with them. Citizen or technical advisory committee members can assist with periodic briefings or presentations to elected officials

Encourage them to attend and join in public participation activities. The elected officials should buy off on the public participation plan. A good technique is to remind them of the public's investment in the process using both numbers (number of participants/comments received, hours spent, dollar value) and comments from participants. Be clear with the officials about the commitment being made to the public and any committees regarding the weight and treatment of their input (See Public Participation Spectrum table.)

Ecology managers are available to talk with or give presentations to elected officials. For local governments just starting an SMP process, it is helpful for elected officials to hear directly from Ecology about the unique SMP local-state government relationship.

If there is turnover on the commission or council, provide a briefing to new members as soon as possible. Treat the briefing like any other stakeholder interview. Find out their preferences for communication and information, any misinformation that needs clearing up, their current position on key issues, and how they see their role in the process. Share the public participation plan that's already been approved, and any promises to the public that have been made.

Engaging the services of a meeting facilitator

Ecology recommends using a trained and neutral meeting facilitator to run public events. The facilitator's responsibilities are distinct from the local planner at a meeting. A facilitator advises on the venue and agenda, ensures that everyone is heard and respected during the meeting, and keeps meetings running as smoothly as possible. Besides keeping meetings on time and on target, a facilitator draws out audience participation, helping to address topics in an orderly, clear manner and assuring that everyone has an opportunity to speak.

The planner can focus on technical and process issues while the facilitator manages public input. It is difficult for the planner alone to effectively run a public meeting, present information, call on speakers, take notes, stick to the agenda and keep order.

Keeping a good record

Whether your public participation process consists of several open-house events, combines a survey with several workshops, or takes another form altogether, you'll need to determine in advance how to manage the input you receive.

Managing public comments

Perhaps the most important advice is to manage it as you go along. It is much easier to keep the record current than to track down information and comments, organize them and describe how they influenced the process later on.

Typical tasks include:

- Creating an appropriate, up-to-date filing system for all input received. This might include a traditional filing system for paper copies, email folders, spreadsheets or other methods.

- Keeping a record of the comments and recommendations received.

- Developing a method to respond in writing to comments. A spreadsheet is typically used to list the comment and local government's response. This responsiveness summary responds to comments received during particular portions of the public process and discusses how the draft SMP addresses the issues identified in each comment, consistent with the SMA [RCW 90.58.020] and the SMP Guidelines.

  Responsiveness summaries are required at two particular points in the update process:
  - During Phase 5, Task 5.5, when a responsiveness summary is required following the local public comment period and public hearing.
  - During Phase 6, Task 6.1, when a responsiveness summary is required following the Ecology public comment period [WAC 173-26-120(6)].

- Keeping a current record of all public event attendees and their contact information.

- Maintaining a list of interested parties containing the names and addresses (and other contact information) of all individuals who participate in any way in the planning process. You should start this important list at the beginning of the process and update it regularly to keep all interested parties informed throughout the local and state review processes.

Using anecdotal information from citizens

Many participants in the SMP update process live or work along shorelines. They may have first-hand knowledge about shoreline issues and conditions that may not be generally known or

otherwise available. Anecdotal information can be valuable and collection of such information is supported by the SMP Guidelines (*WAC 173-26-201(2)(a)*).

Assessing the objectivity and accuracy of anecdotal evidence requires a measure of qualitative judgment. Information about erosion problems along a shoreline stretch from residents of the area merits further consideration. However, information from an individual who wants to start a commercial ferry service in his residential neighborhood and reports that shellfish productivity is increased by landing barges on tidelands might not be quite so valuable.

Local governments should document anecdotal information in the same manner as other data and information obtained during the SMP process: name and address of the person offering the information and a complete description of the information provided. It will also be helpful to describe the person's relationship to, or interest in, the subject and possible "credentials" for providing the information (i.e., has lived in a waterfront subdivision for 30 years, works for the Washington State Ferries, owns salmon net-pens, is a developer who builds in the shoreline).

Documenting the public participation process

Documentation of the public participation process is required for Ecology's approval of an SMP amendment. As part of the SMP submittal requirements, local governments must provide copies of all comments received and names and addresses of interested parties involved in the SMP process [WAC 173-26-110(7)]. All e-mail addresses must be included with the interested parties' mailing list.

WAC 173-26-110: A master program or amendment proposed by local government shall be submitted to the department for its review and formal action. A complete submittal shall include two copies of the following, where applicable.
(7) Copies of all public, agency and tribal comments received, including a record of names and addresses of interested parties involved in the local government review process or, where no comments have been received, a comment to that effect.

The SMP Guidelines require local governments "be prepared to describe and document their methods to ensure that all interested parties have a meaningful opportunity to participate" [WAC 173-26-201(3)(b)(i)]. Therefore, in addition to submitting the comments received and interested parties list, you also must provide Ecology with a record of all public participation activities.

As with managing process input, keeping current on public participation activities as you go along is much easier than trying to recreate your record after the fact. Keep a record of all public participation activities and results throughout the process. This includes taking meeting minutes; documenting workshops, open houses and other meetings and presentations; keeping advertisements and web posting of hearings; and keeping records of any mailings.

Resources

Georgia Department of Community Affairs. "Community Participation Techniques" comparison table. http://www.dca.ga.gov/development/PlanningQualityGrowth/programs/SPRs/SPR.PartTechniques.pdf

Institute for Local Government. (California State Association of Counties and the League of California Cities.) Public participation plan examples. http://www.ca-ilg.org/PPPlans

Involve (not for profit) and Headshift (website designer) in United Kingdom. *People and Participation.net* Review of various techniques with universal usefulness. http://www.peopleandparticipation.net/display/Involve/Home

Miskowiak, Douglas, Center for Land Use Education, University of Wisconsin – Stevens Point. 2004. *Crafting an Effective Plan for Public Participation.*

Municipal Research and Services Center of Washington. *Effective Communication and Citizen Involvement*. http://www.mrsc.org/subjects/governance/participation/participation.aspx

NOAA Coastal Services Center. *2009. Introduction to Conducting Focus Groups http://www.csc.noaa.gov/focus_groups/*

NOAA Coastal Services Center. 2010. *Introduction to Planning and Facilitating Effective Meetings.* http://www.csc.noaa.gov/publications/effective_meetings.html

NOAA Coastal Services Center. 2007. *Introduction to Stakeholder Participation. http://www.csc.noaa.gov/stakeholder/*

Simon-Brown, Viviane. Oregon State University Extension Service. 1999. *Effective Meetings Management*. http://seagrant.oregonstate.edu/sgpubs/onlinepubs/g99003.pdf

Washington Department of Commerce. *2009. A Short Course on Local Planning – Resource Guide. See Chapter 2, "Citizen Participation and the Public Process." http://www.commerce.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=7548&MId=944&wversion=Staging*

Washington Department of Commerce (formerly Washington Department of Community, Trade and Economic Development). 1991, updated 2008. *Shaping Washington's Growth Management Future: Citizen Participation and Community Visioning Guide.* http://www.commerce.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=6579&MId=884&wversion=Staging

Attachment 1

City of Bainbridge Island
Shoreline Master Plan Update
Citizen Workgroup
Draft Participation Agreement

Project Description
The City is updating the Shoreline Master Program (SMP), consistent with the 2003 Department of Ecology Guidelines (WAC 173-26) and the Shoreline Management Act (RCW 90.58). Citizen Workgroups have been established with the input of the City Council and Planning Commission to assist with the update of the SMP.

Authorization of Citizen Workgroups
The City of Bainbridge Island has an ongoing commitment to meaningful public input and participation in the City's long-range planning processes. Public involvement is also required under the Shoreline Management Act, its implementing rules and the Bainbridge Island Comprehensive Plan. The range of public involvement activities planned for the Shoreline Management Program Update is articulated in the *Shoreline Master Program Update Public Participation Plan*, which was prepared based upon community input.

Pursuant to the *Shoreline Master Program Update Public Participation Plan*, the City intends to use Citizen Workgroups as one of several methods to provide input on potential amendments to the SMP.

Group Roles, Composition and Responsibilities
The role of the SMP Citizen Workgroups is to informally advise the Planning Commission and city staff on potential amendments to the Shoreline Master Program. Members have been organized into three *workgroups* based on sets of clearly defined issue topics, and one larger *task force* that will also address specific issues, as well as broader goals and policies. The specific topics assigned to the groups and member composition are identified in Figure 1 at the end of this Participation Agreement.

Members and alternates of the SMP Citizen Workgroups are expected to:

- Read all materials provided to members of the work group in advance of meetings.
- Come to the meeting prepared to discuss the specific issues identified in Figure 1 and in the meeting agenda.
- Keep comments and discussion focused on the meeting agenda topics and avoid discussion of non-related or tangential topics during the scheduled meeting time.
- Formulate recommendations during open discussion at scheduled meetings to ensure transparency and allow for effective public participation. (Alternates participate in discussion and vote only when a regular member is absent.)
- Endeavor to attend all scheduled meetings if possible.
- Each workgroup will elect three representatives to serve on the task force and report on the progress of the module group(s) and recommendations. The purpose of this feature is simply to share information across groups; the task force will receive the report and recommendations from the Workgroups. With the exception of this reporting function,

the Task Force and Workgroups will operate in a similar fashion for the purpose of considering recommendations.

The SMP Citizen Workgroups are temporary bodies and will be disbanded no later than February, 2011, or as determined by the Shoreline Master Plan (SMP) Update Joint Planning Commission/City Council Policy Advisory Committee. A tentative scheduled has been proposed and additional meetings may be scheduled as needed. The task force will continue to meet after the workgroups are disbanded, but will not continue past November 1, 2011.

Conduct of Participants

The rules of conduct for all public officials and employees, as well as requirements for all public meetings are detailed in the *Manual of City Governance Policies, Procedures and Guidelines (The Manual).* In addition, rules regarding *Respect and Decorum* are identified in Section 4.6 of *The Manual.* While the rules regarding Citizen Workgroups are not detailed and the rules related to respect and decorum in *The Manual* pertain to City Council meetings, our intent is to provide similar rules of conduct for the SMP Citizen Workgroups to ensure a safe, civil and productive environment. Basic rules of conduct shall be as follows:

1. Maintain civil discussion, listen to those speaking, and refrain from side conversations.
2. Speak honestly and respectfully. No personal attacks, insults or disparaging remarks.
3. Meeting disruptions will not be tolerated. Any person who continues to disrupt will be asked to leave (Resolution 2010-15).
4. Stick to the topic – do not use this forum to voice unrelated concerns or tangential discussions. A member may be removed for continued or egregious offenses of this rule.
5. Listen to understand. Do not interrupt speakers – please wait your turn.
6. Respect the meeting facilitators and their role in moderating the discussion.
7. Focus on common ground. We will strive for consensus, but differing views shall be tolerated, acknowledged and may be communicated as minority reports.
8. Focus on the future; learn from the past. Try to be open to the possibility of new information and insights.

Structure of Meetings

Meetings will be run by an independent facilitator hired by the City. Meetings will include the following basic agenda elements:

1. The meeting will be opened by the facilitator and the agenda will be summarized.
2. Meetings will include an opportunity for City staff to detail specific goals, policies and regulatory alternatives for discussion by the Work Group. Only alternatives which, based on analysis by City Staff and its technical consultants, have the potential for meeting the Department of Ecology SMP Guidelines will be considered.
3. Next, group members may ask clarifying questions of City staff.
4. The bulk of the meeting will be a facilitated discussion and deliberation by group members on the issue topics.
5. In order to use time effectively, the facilitator will call for a recommendation on each topic during the meeting after a reasonable period of discussion as determined by the facilitator and dictated by the limits of available time.

6. To ensure transparency and allow for effective public participation, work group recommendations for the Planning Commission must be formulated through open discussion in facilitated meetings.
7. A recommendation will require acceptance by a majority of the members in that specific SMP Work Group. Acceptance is defined as agreement or a statement that the member can "live with and won't protest" a specific recommendation. A minority report may be provided when necessary
8. Each meeting will feature an opportunity for general public comment near the end of the meeting. Comments may be restricted to three minutes or less based on time and written comments are preferred.
9. Recommendations will be compiled and transmitted to the Planning Commission. Minority opinions will be transmitted to the Planning Commission.

Meeting summaries shall be prepared by City staff and the meetings may be recorded. Task force and/or workgroup members will present workgroup recommendations to the Planning Commission.

Agreement of Participant

I, _____, have read this participation agreement and agree to follow it to the best of my abilities. I understand that repeat or egregious violation of the above rules will result in my removal from the SMP Citizen Workgroups.

_____

Signature Date

Attachment 2

Shoreline Master Program
Public Participation Event Checklist

Some items may not be applicable

IMPORTANT DATES

Event date
Date deposit due for venue
News release submission deadline
Advertisement submission deadline
Mailing deadline (email and ground mail)
Event planning meetings, with staff

STAFF

Planners
Support Team

AUDIENCE (who, how many, key stakeholders)

HANDLING TOUGH ISSUES: What tough questions or comments do you expect to receive and what should your response be? Reach agreement on responses among staff that will be at the event. See Ecology Publications #10-06-012 on Tough Issues, #09-06-029 Frequently Asked Questions – Shoreline Master Programs and #10-06-003 Frequently Asked Questions – Marine Shoreline Armoring and Puget Sound.

TASKS

Pre-Event

- ☐ Pick date(s) and time(s).
- ☐ Reserve venue -- meeting hall, tour boat, access to private property (walking tour). Check for:
  - Adequate number of chairs and tables to accommodate participants, ADA accessible.
  - Good acoustics, sound system, lighting, and ventilation.
- ☐ Invite staff from state and federal agencies, tribes, consultants, technical experts.
- ☐ Arrange for facilitator, recorder, main contact for questions.
- ☐ Assign responsibilities.
  - Preparing materials.
  - Handling mailings.
  - Gathering supplies.
  - Staffing sign-in table.
  - Handling microphones.
  - Setting up equipment.
  - Setting up and taking down chairs, tables at venue.
- ☐ Arrange for light refreshments. (Need caterer?)
- ☐ Reserve needed equipment such as microphones, laptops, screens, projectors and arrange for technical support staff.

- ☐ Other.

Public Notice

- ☐ Paper announcements.
- ☐ Email announcements
- ☐ Legal ad (needed for formal public hearing).
- ☐ News release.
- ☐ Updated webpage with relevant documents and announcements.
- ☐ Other.

Materials for event

- ☐ Comment forms.
- ☐ Sign-in sheets.
- ☐ Agenda.
- ☐ Posters/information boards.
- ☐ Presentation.
- ☐ Poster with ground rules/code of civility.
- ☐ Shoreline maps.
- ☐ Copies of existing and draft SMP.
- ☐ Other.

Supplies

- ☐ Projectors and laptops (bring a back up set), screens, microphones.
- ☐ Extension cords and power strips.
- ☐ Digital/tape recorder.
- ☐ Comment form 'deposit' box.
- ☐ Blue and duct tape.
- ☐ Pens/pencils.
- ☐ Light refreshments.
- ☐ Road and door signs.
- ☐ Flip chart easels and pads.
- ☐ Colored markers.
- ☐ Name tags for staff and public.
- ☐ Other.

Other considerations

- ☐ Arrange for extra security staff; develop a contingency plan for a safe and secure event.
- ☐ Prepare a media kit.
- ☐ Arrange for communications manager to attend.
- ☐ Prepare a list of VIPs expected at the event and share with event staff.
- ☐ Submit legal ad for public hearings for publication.

After event

- ☐ Prepare list or summary of comments.
  Update website -- responses to comments, next steps.

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

Table of Contents

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.

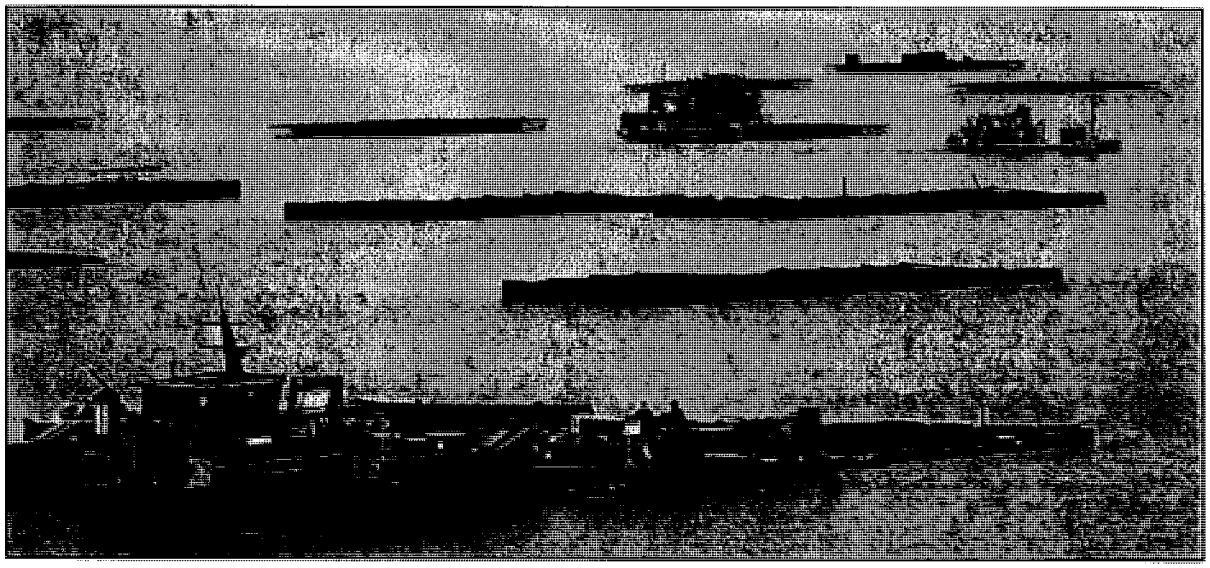


Figure 2-1. Penn Cove Shellfish mussel rafts and harvest barge (Everett Herald 2013)

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.

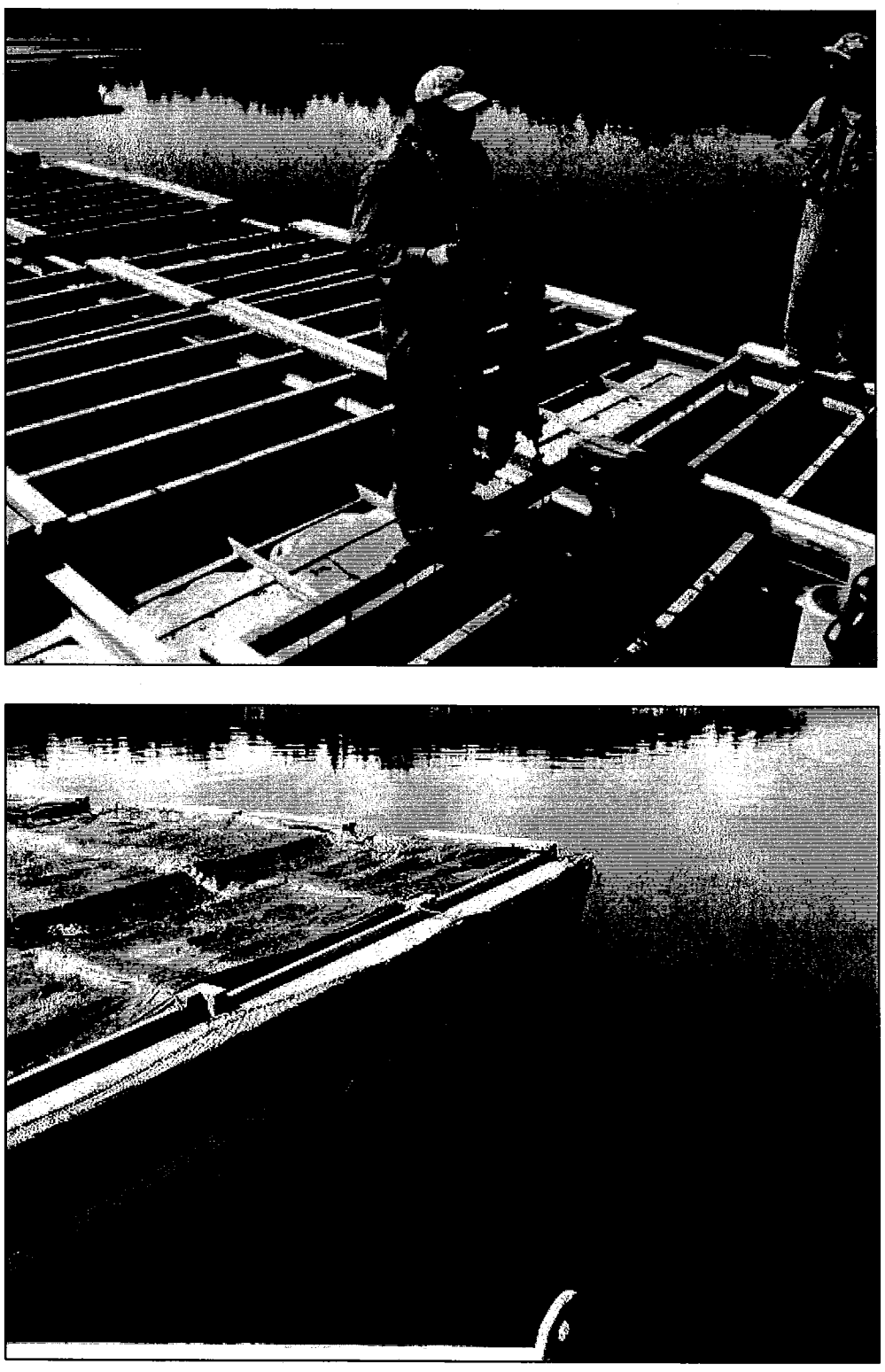


Figure 2-2. Commercial mussel raft in south Puget Sound (Corps site visit 2013)

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).

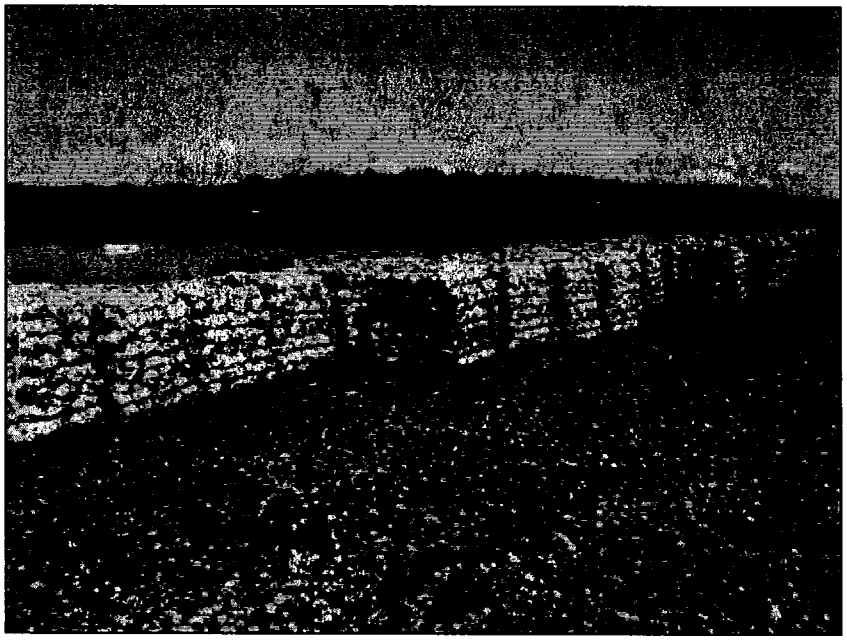


Figure 2-3. Oyster cultch shell with spat stacked on pallets (Corps site visit 2013)

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).

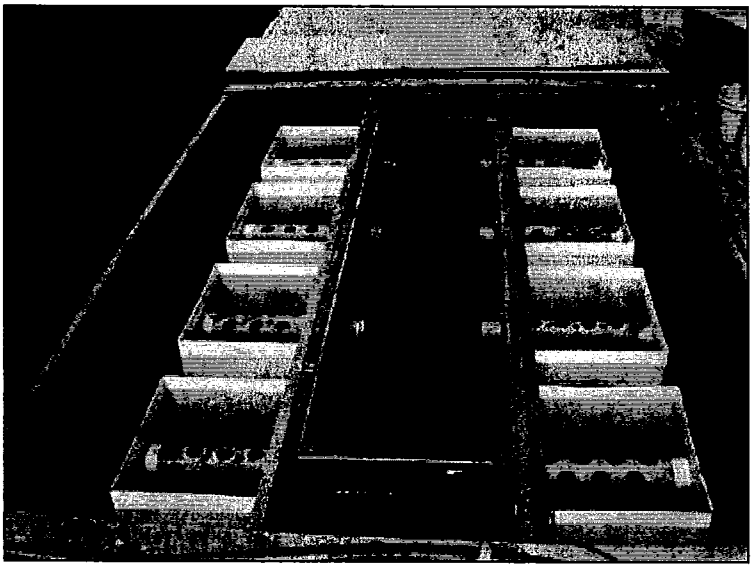


Figure 2-4. A FLUPSY (Fisher Island Oysters 2007 in PCSGA 2011)

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

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.

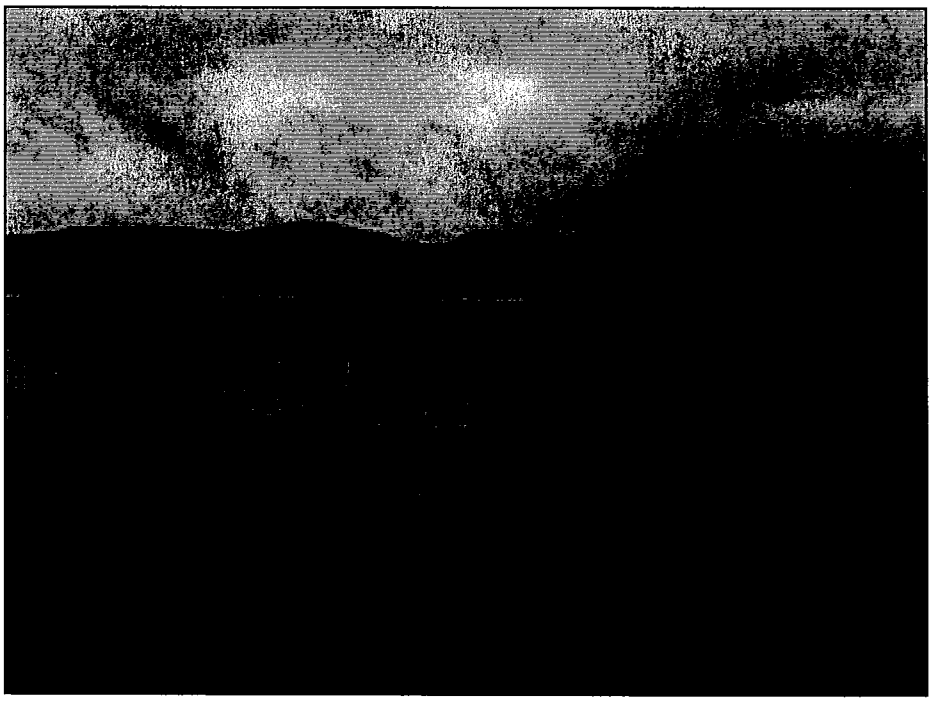


Figure 2-5. Oyster bottom culture (top) and hummocks (bottom), Willapa Bay (UW 2015)

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.

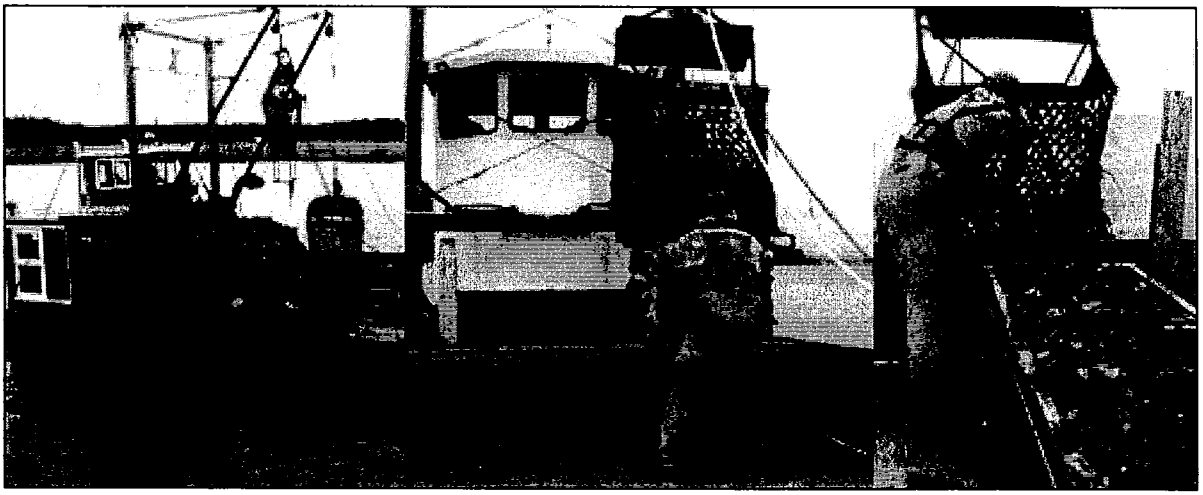


Figure 2-7. Oyster dredge in Willapa Bay (Bay Center Farms 2015)

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.

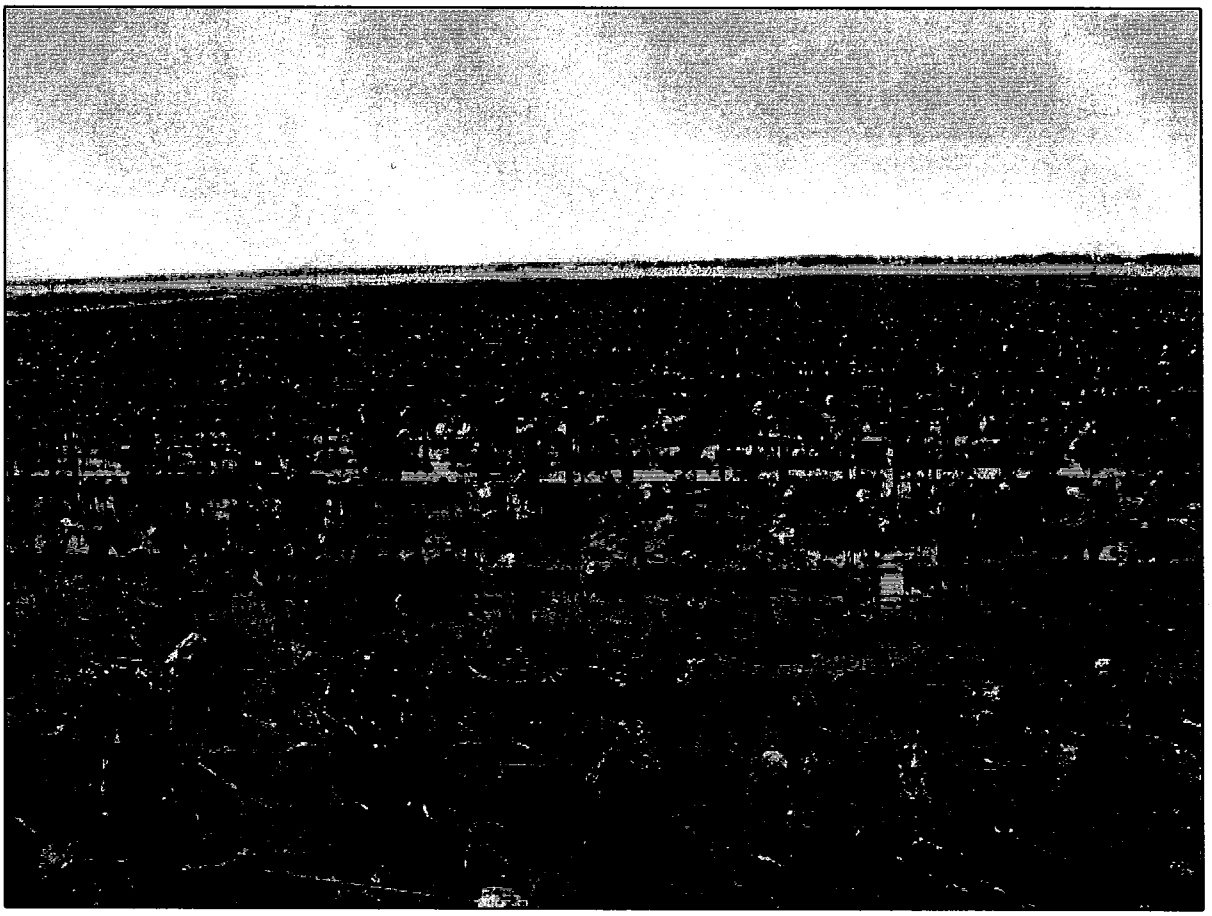


Figure 2-8. Oyster longline culture, Willapa Bay (Corps site visit 2014).

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.

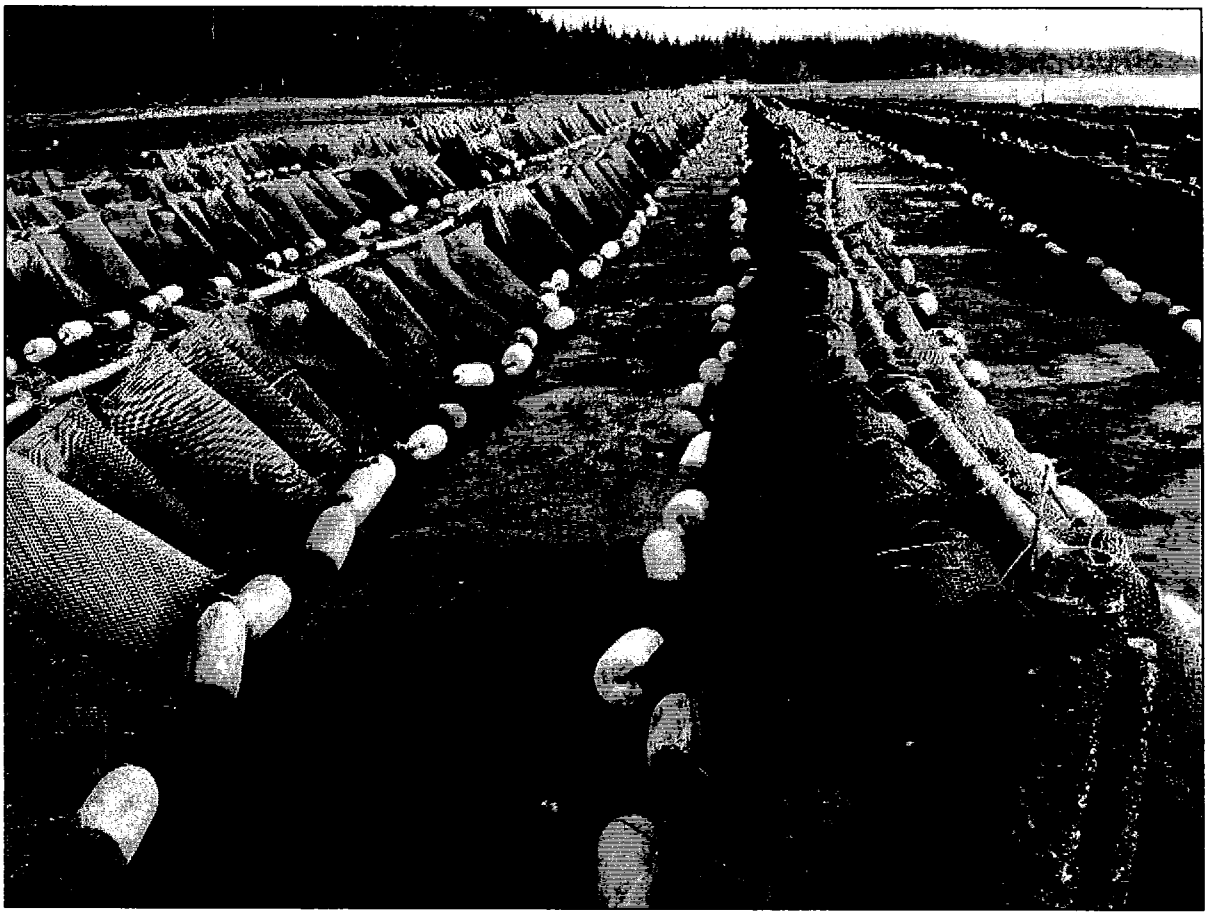


Figure 2-10. Oyster rack and bag tumbling system, South Puget Sound (Corps site visit 2013)

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

seed on an outgoing tide when the water is approximately two to three feet deep; or spreading seed at high tide from a boat.

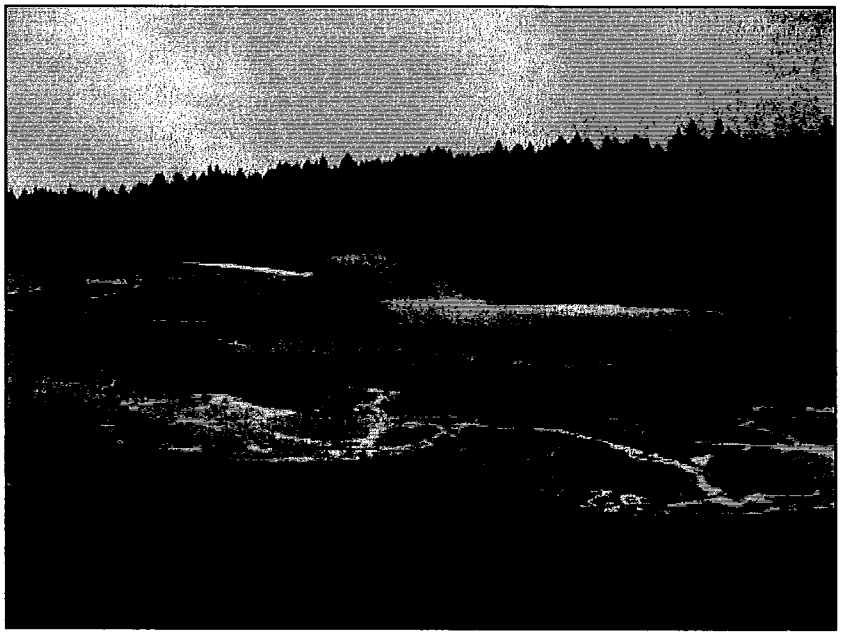


Figure 2-11. Adding gravel to a clam bed (i.e., graveling) (PCSGA 2011)

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

sand. Upland tanks are connected to the marine waters through intake and outfall structures (pipes) that are compliant with the NPDES.

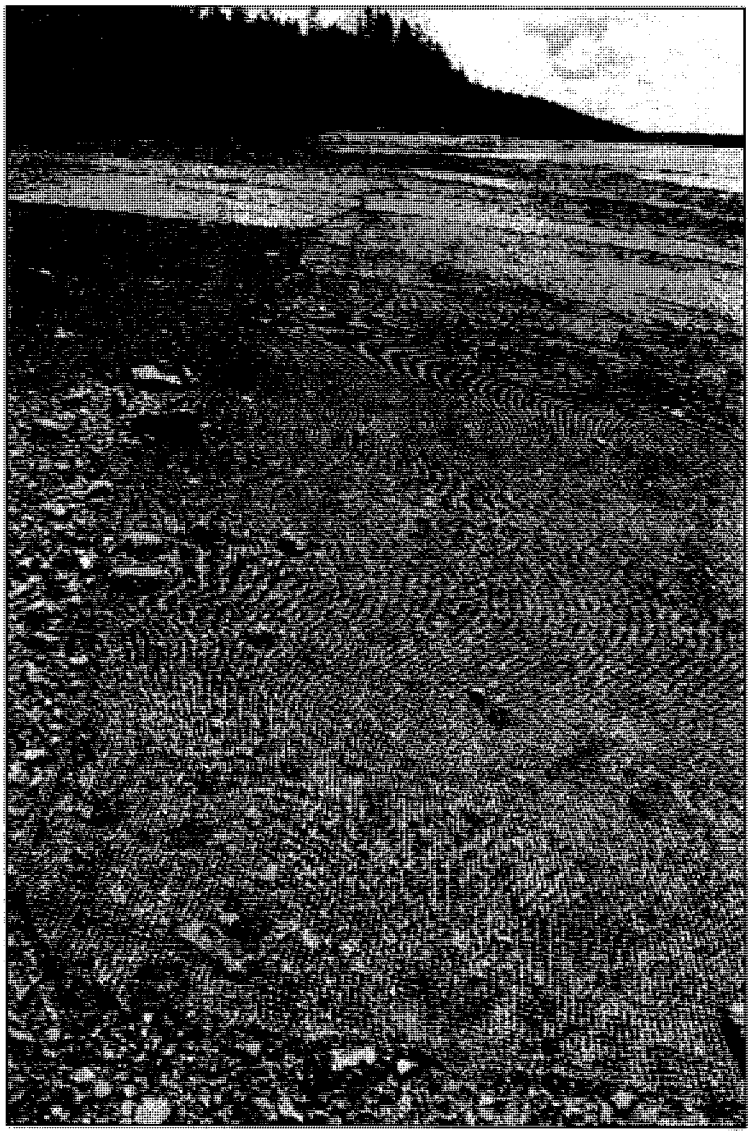


Figure 2-12. Clam cover nets in South Puget Sound (Corps site visit 2014).

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.

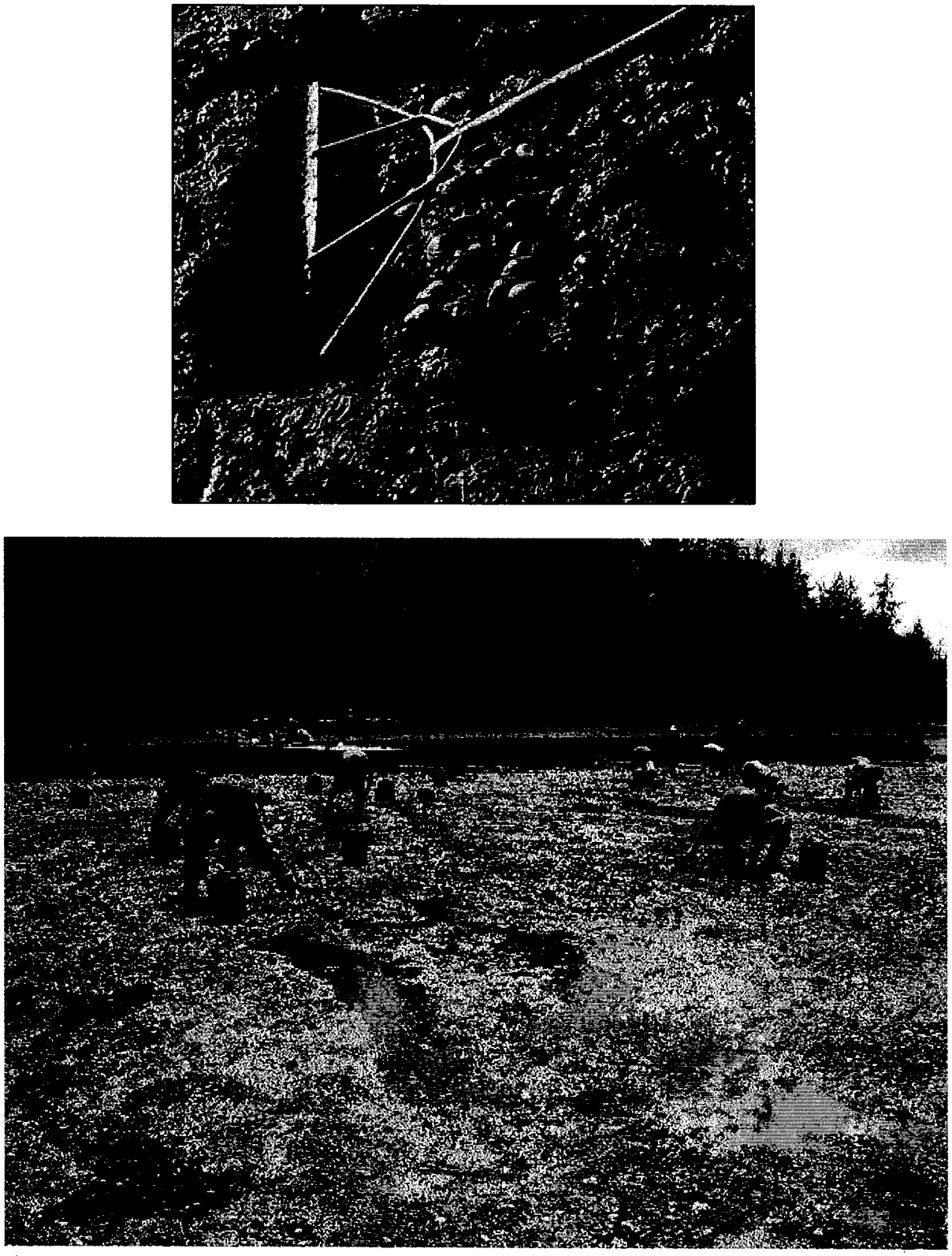


Figure 2-13. Hand harvest of Manila clams (top, Willapa Oysters 2007 in PCSGA 2011; bottom, South Puget Sound, Corps site visit 2013).

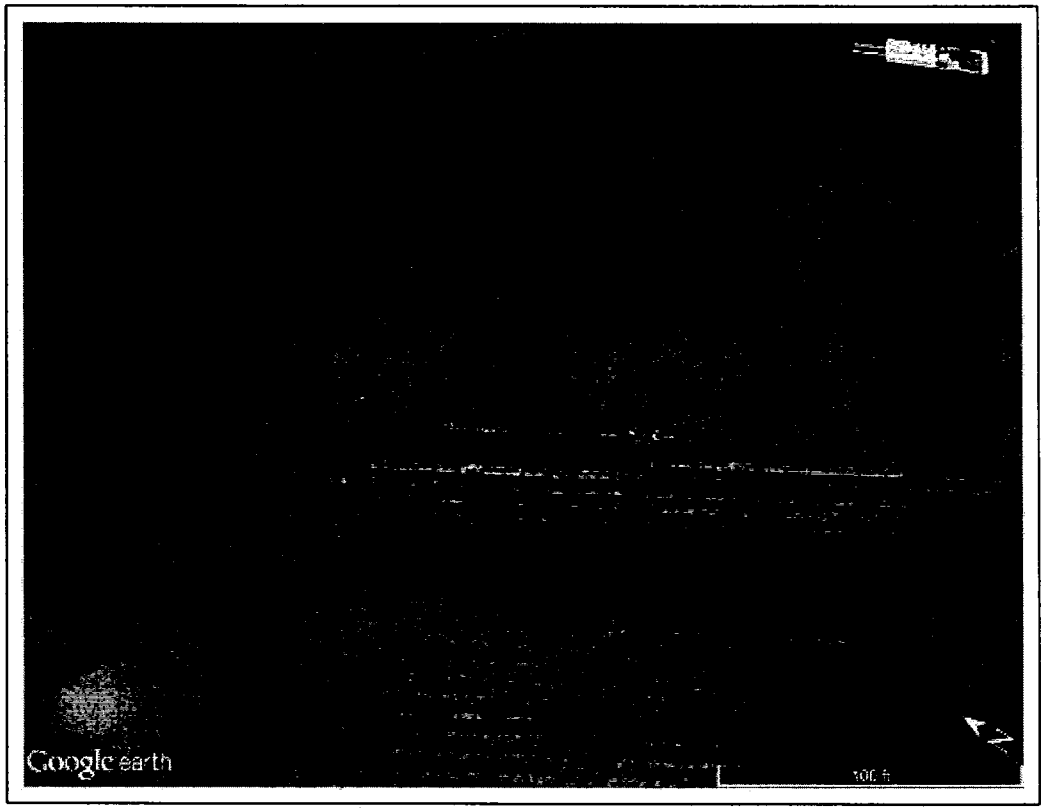


Figure 2-14. Mechanical harvest, low tide in North Puget Sound (GoogleEarth 2015; PSI 2015)

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.

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)

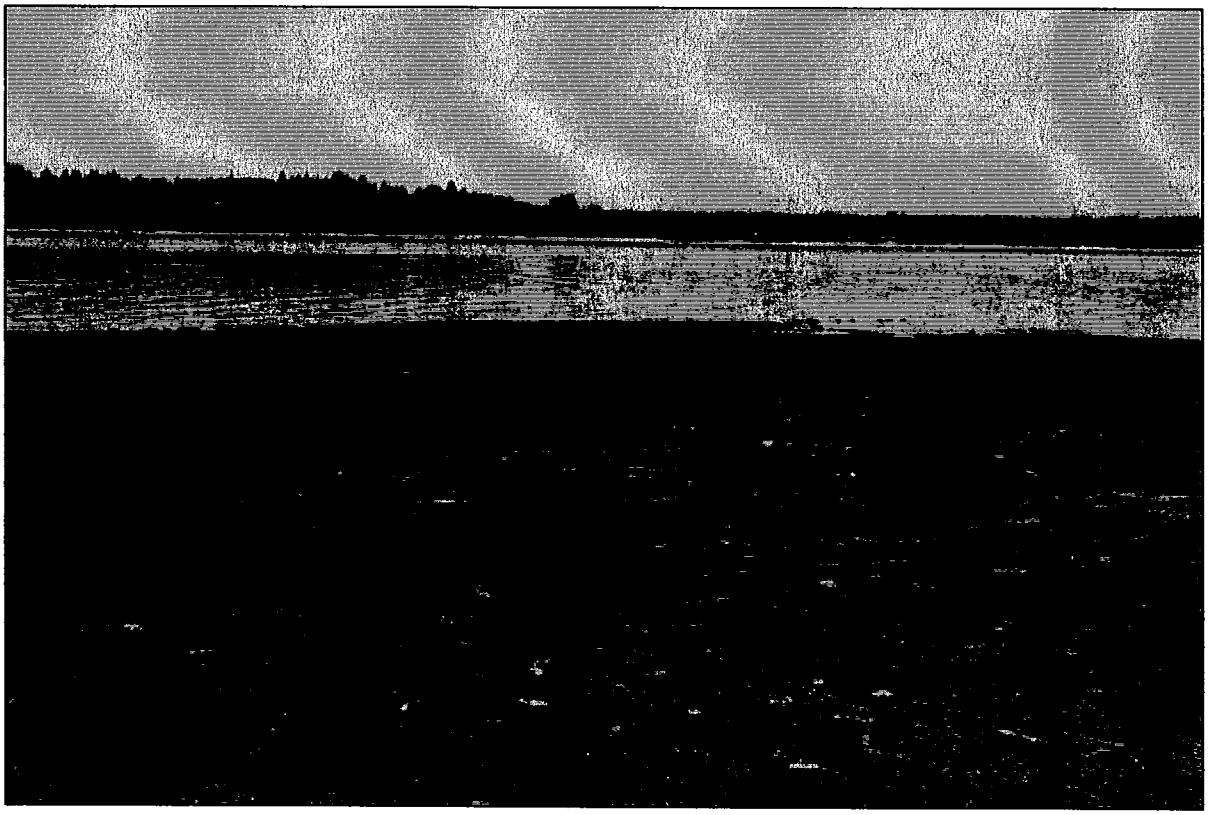


Figure 2-17. Cover netting placed over geoduck tubes, South Puget Sound (Corps site visit 2014)

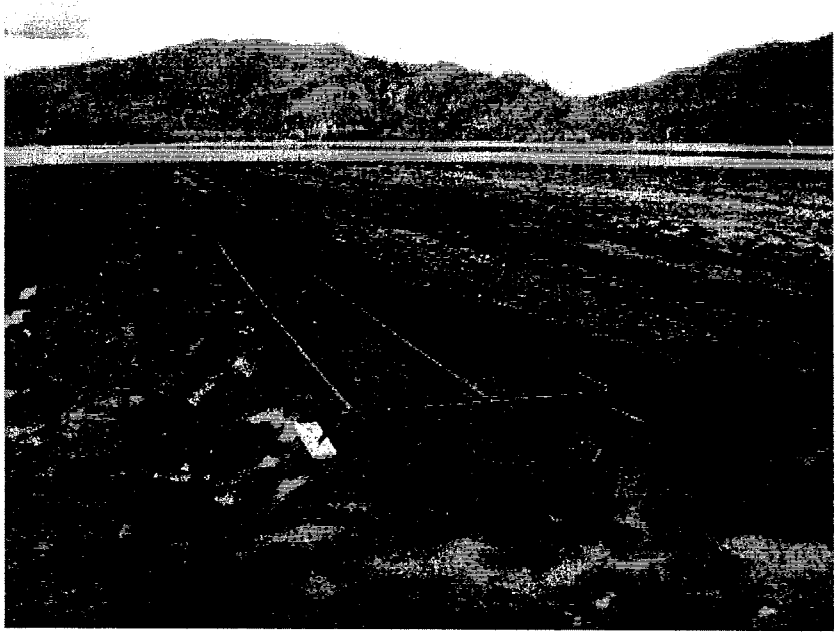


Figure 2-18. Geoduck tunnel net over rebar frame (Dewey 2013)

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.

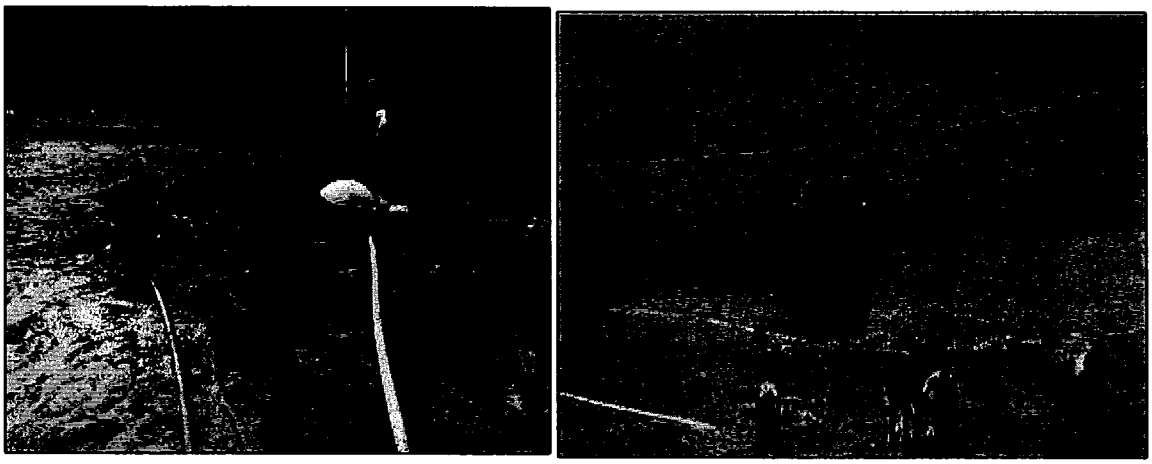


Figure 2-19. Harvesting geoduck at low tide (PCSGA 2011, CPPSH 2015)

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.

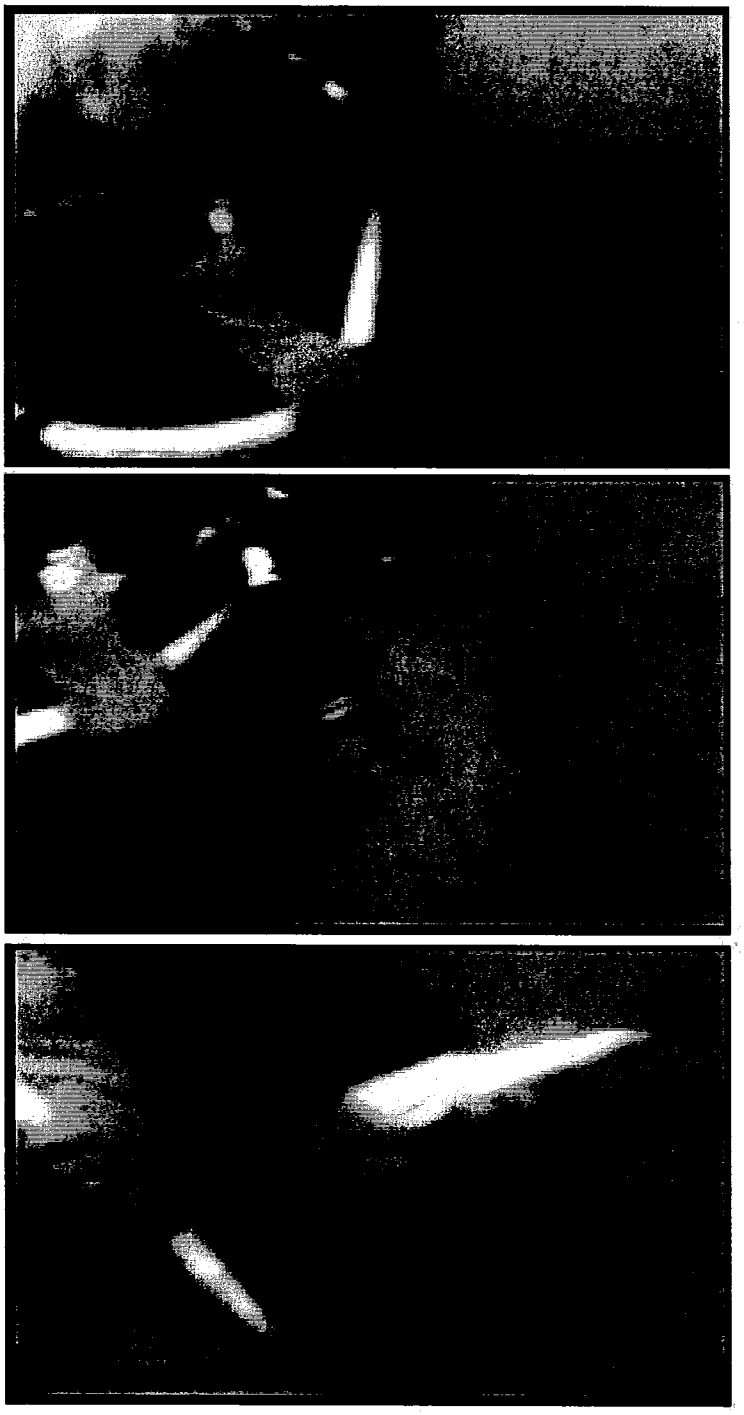


Figure 2-20. Geoduck dive harvest sequence (Anchor 2010)

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.

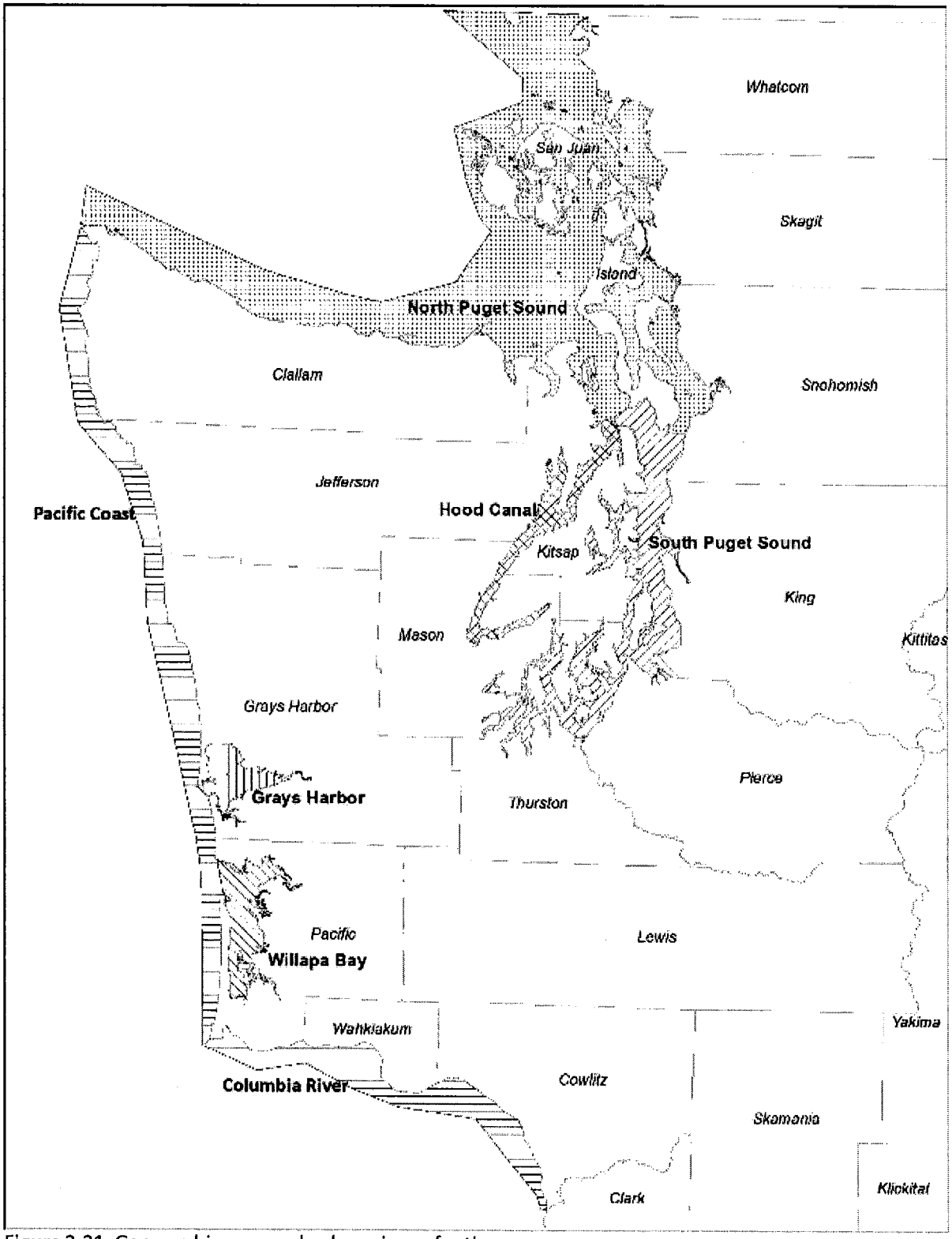


Figure 2-21. Geographic area and sub-regions of action

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.

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.

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

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.

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).

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

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

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).

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.

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

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

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

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

	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

# 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

% 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.

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.

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

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.

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

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).

	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).

- 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

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).

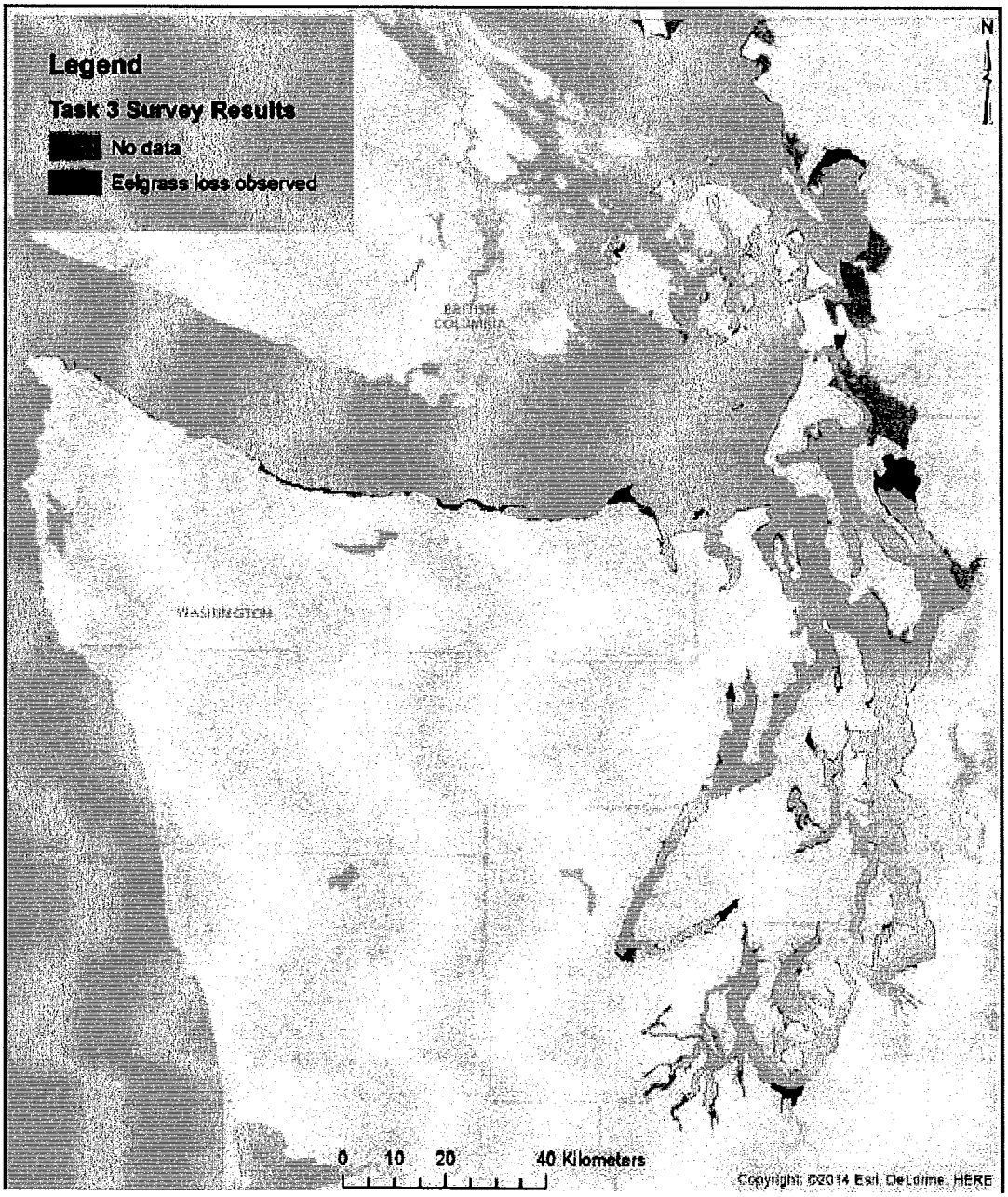


Figure 4-2. Areas identified as having previously contained eelgrass but currently is absent (from Thom et al 2014).

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:

- 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.

- 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.

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).

Figure 4-3. 2010 population density in western Washington State and mapped eelgrass

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).

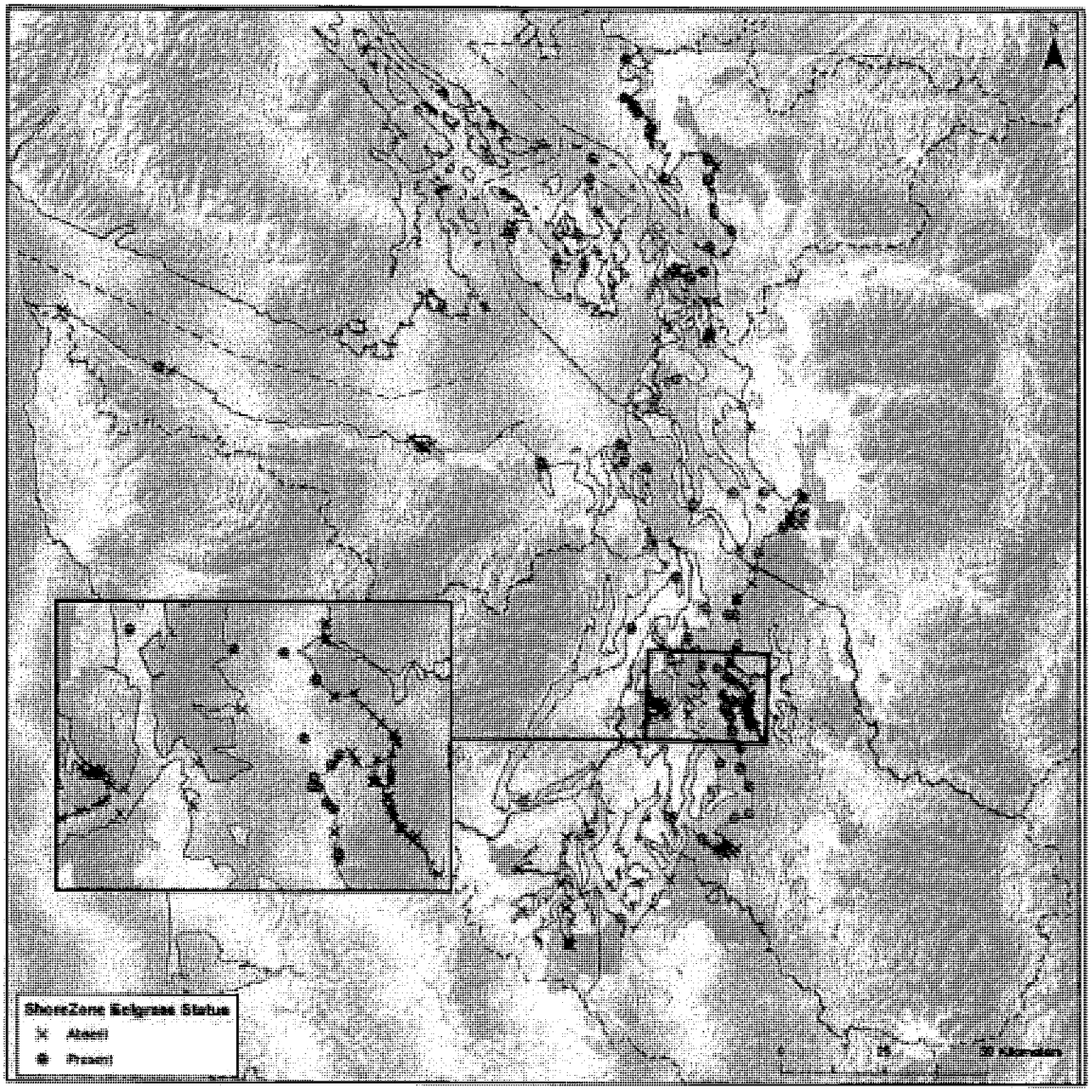
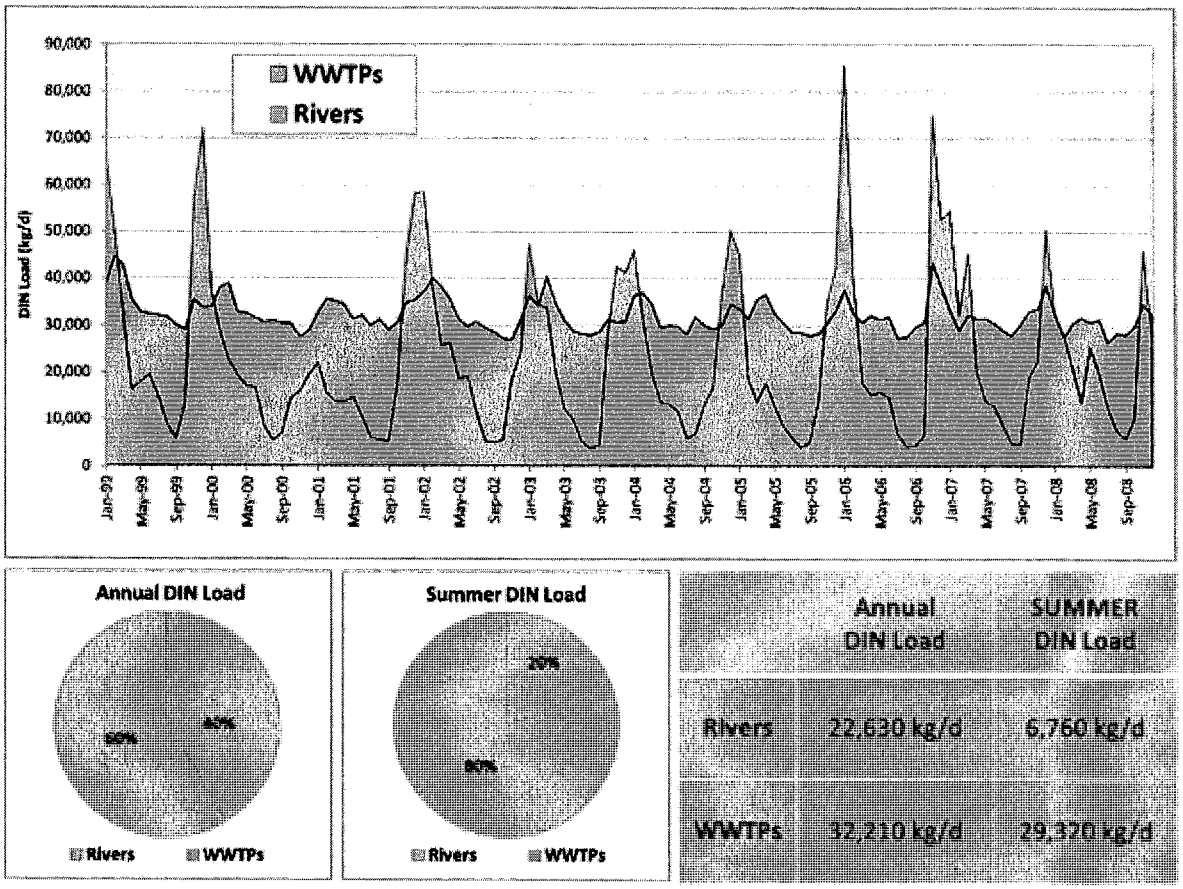


Figure 4-4. NPDES permitted outfalls in Puget Sound and eelgrass presence in adjacent shoreline segment from WDNR Shoreline inventory (2001). Figure reproduced from Geackel et al. 2015.

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.



	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.

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.

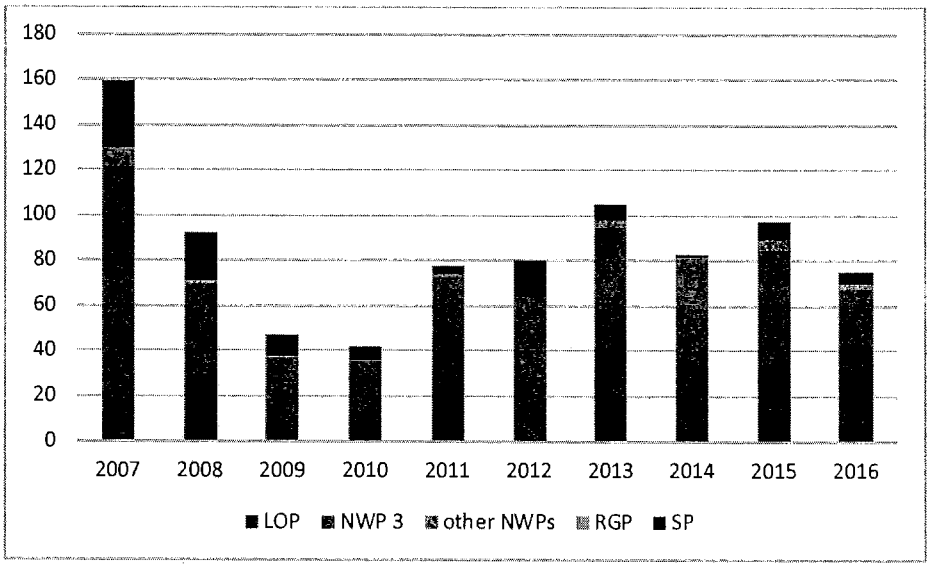


Figure 4-6. Overwater structure permitting 2007-2016

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.

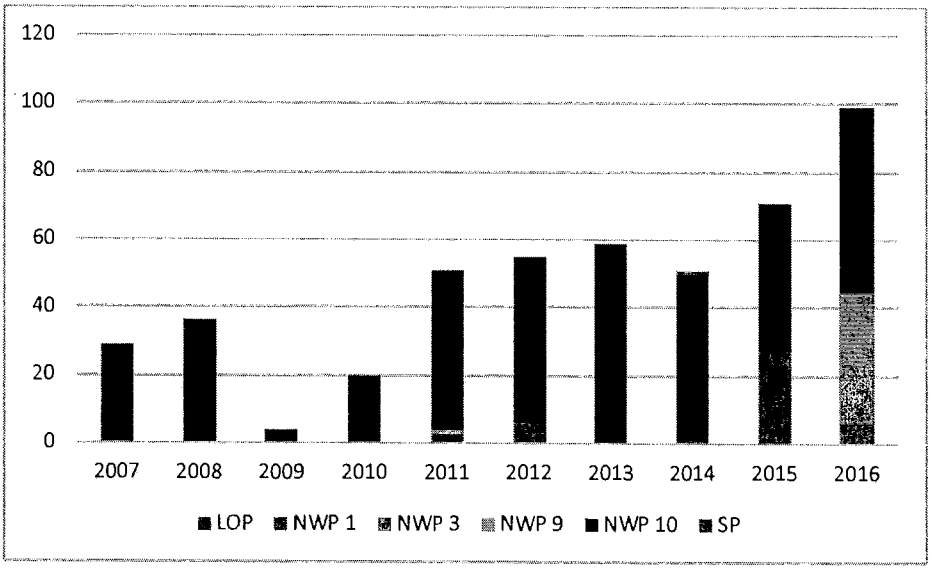


Figure 4-7. Recent Corps permits issued for mooring buoys in Washington State

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).

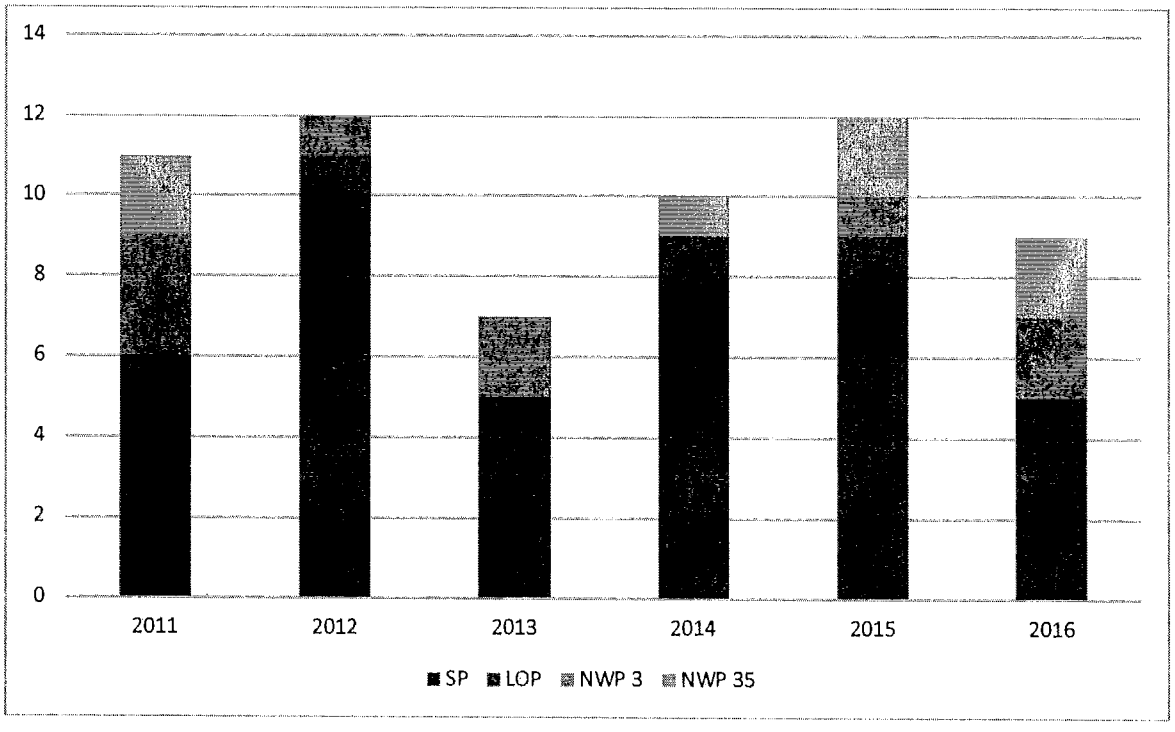


Figure 4-8. Dredge related Corps permitting 2011-2016

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;

- 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.

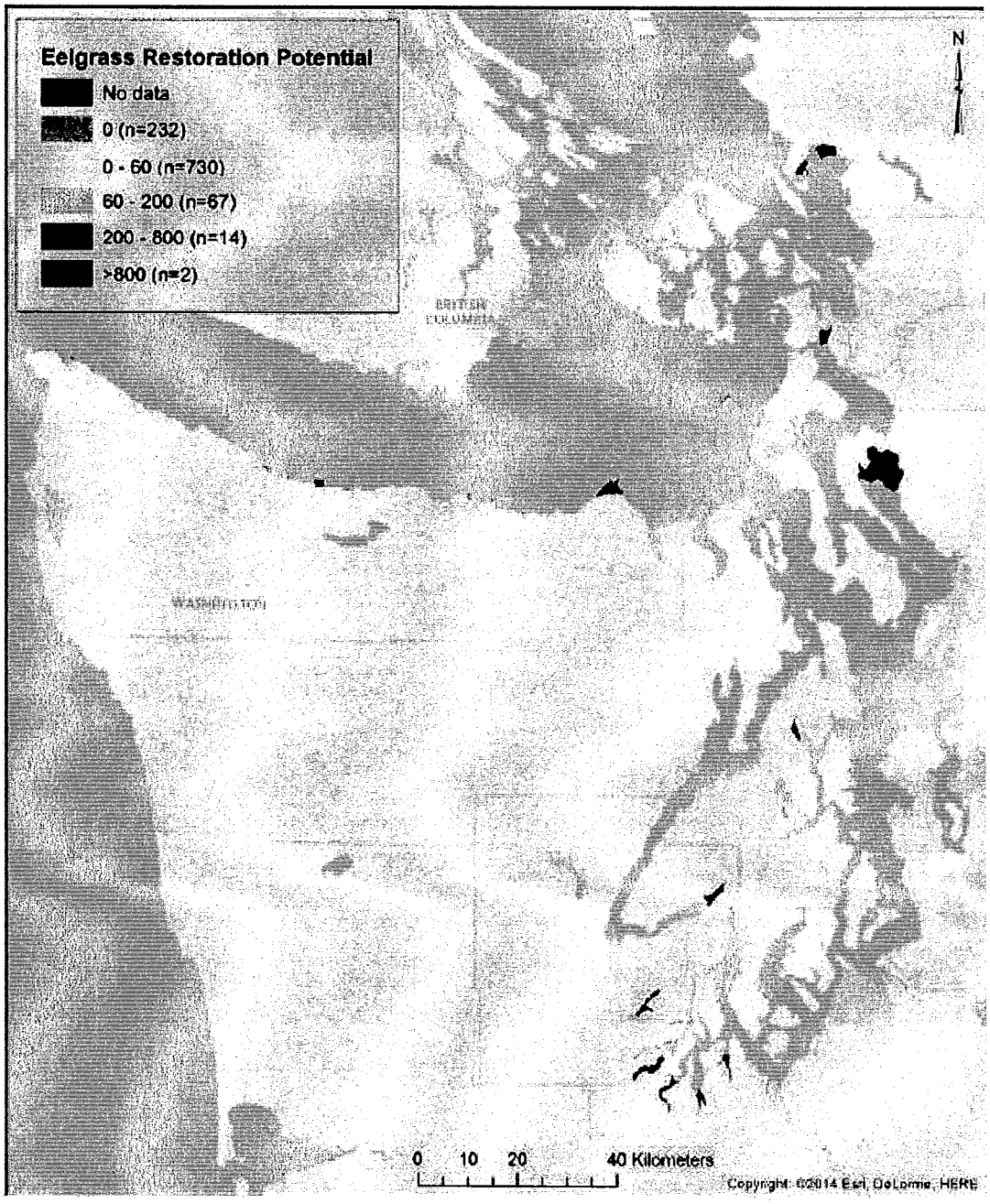


Figure 4-9. Areas identified with eelgrass restoration potential that are currently devoid of eelgrass. Higher eelgrass restoration potential score indicates greater potential (from Thom et al. 2014).

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

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.

Figure 4-10. Expected population growth in the counties surrounding the inland marine waters

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

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.

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.

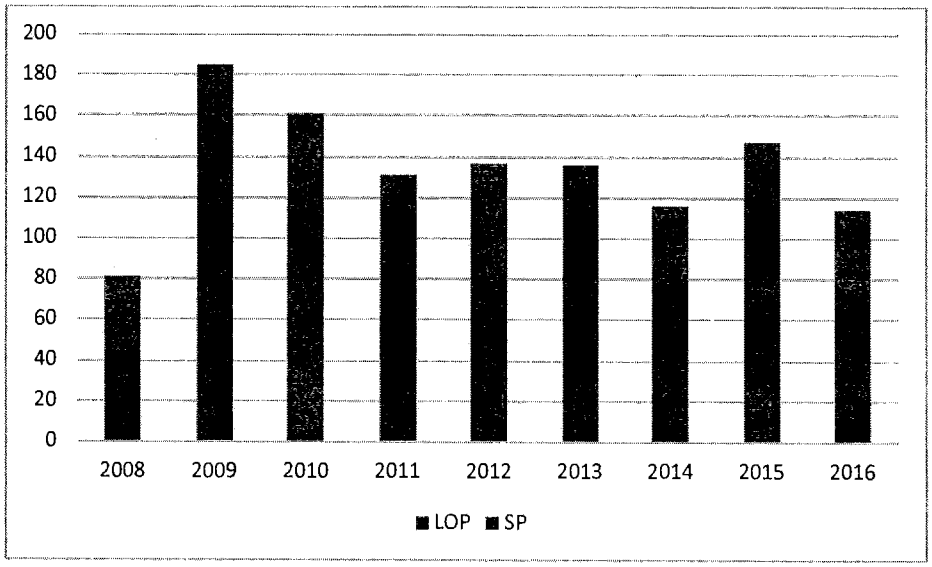


Figure 4-11. RHA Section 10 and CWA Section 404 standard permits and LOPs for all activities 2008-2016

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

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

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.

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

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).

- 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

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).

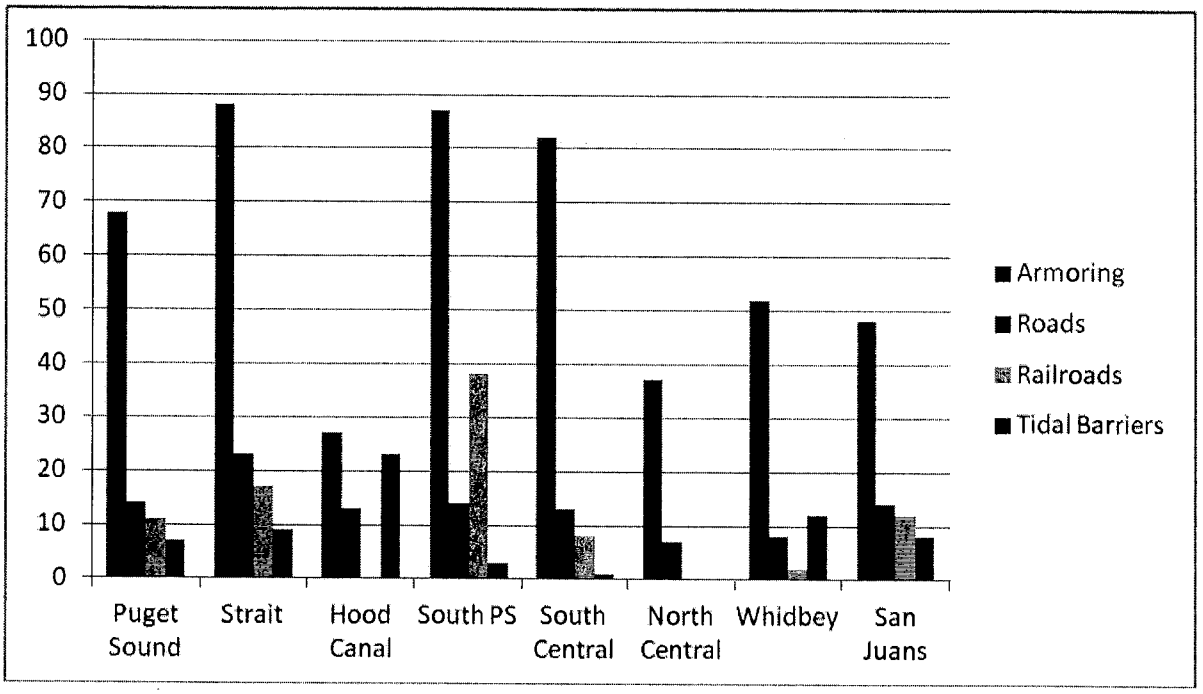


Figure 4-12. Presence of different stressors along mapped fill shoreline for Puget Sound and subbasins, expressed as a percentage (%) of fill length that stressors occupied (for example, Armoring was present along 68 percent of filled shoreline length in Puget Sound as a whole) (Strait, Strait of Juan 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

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.

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

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.

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.

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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

Ian Lefcourte

From: Paula Rudberg Lowe <pmrlowe@comcast.net>
Sent: Tuesday, December 11, 2018 10:12 AM
To: SMP; PlanningCommission
Subject: SMP comments and process

Importance: High

Categories: To Do Public Comment

Dear Planning Commission and SMP preparer (Brad Murphy),

I have been unable to attend meetings for the past few months because I often have a conflict at the meeting time and date, but I want you to know that I am carefully following the process online and through my fellow lake property owners.

I see a list of concerns by Thurston County Residential Shoreline Stakeholder Coalition and I heartily agree with their recommended changes.

Overall, I have been extremely disappointed with this SMP process: How it was publicized (and not publicized), how it has been handled (poorly), how many of us feel unheard and pushed aside, and more. I would like to see the SMP finalized soon — taking in all of the comments from the above-mentioned coalition and others.

Regarding publicity, very few people read The Olympian anymore — it's mostly for an older demographic. A younger demographic may read the online version. I suggest direct mail and emails to contact people who are interested in this process. You have a huge list from the meetings.

Also I WAS getting emails about the meeting, but I have dropped off the list. Would you please put me back on the list? pmrlowe@comcast.net

It is extremely disappointing that this public meeting is held during a busy time of the year for most folks — often a month that is dark and it's dangerous to drive at night.

Sincerely,

Paula R. Lowe
Pattison Lake

Ian Lefcourte

From: Robert Jensen <rvmijensen@hotmail.com>
Sent: Monday, December 10, 2018 2:55 PM
To: SMP
Cc: pmrlowe@comcast.net; mike beehler; Treesa Hertzel
Subject: Shoreline Management Master Program

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: To Do Public Comment

Dear Representative,

My name is Robert Jensen. My wife, María and I have been residents on Pattison Lake since 2003.

In the past several years, many of Thurston County's lakes have become plagued by periodic toxic blue-green algae blooms. I have been in communication with the Thurston County Health Department over these years, regarding the increasing incidence of these blooms in Pattison Lake. The blooms significantly impair the health and aesthetics, as well as the public use and enjoyment, of the lake.

Based on materials I have received from the Health Department, and upon my own experience as an attorney for the Department of Ecology, I am convinced the primary cause of these blooms is poorly managed and outdated septic systems.

This problem was not publicly recognized when the Thurston County Shoreline Master Program was last amended in 1990, nearly 20 years ago. Since then, there has been a significant proliferation of septic systems on the lakes. In addition, those that did and continue to exist, are that much older.

Today, the public, especially residents of many of our lakes, are clearly aware of the problem, and are searching for a solution.

For Pattison Lake, the ultimate solution will be the installation of sewer connections around the lake. This is called for in the Urban Growth Management Plan for the lake, which is in Lacey's urban growth district. Unfortunately, the prospect is this program is many years away. For other lakes, such as Summit and Black Lake, the prospect is even farther down the road.

I urge the County to not forfeit its opportunity, in its proposed amendments to its Master Program, to address the management of septic systems on our lakes which constitute shorelines (those over 20 acres); to the end of reducing and ultimately eliminating the continual degradation

of these lakes from these insidious toxic algae blooms. Specific measures, such as regular testing and pumping of septic tanks, would result in a significant reduction of the incidence of these blooms. This concept should be included as a part of the development standards for all residential structures on the lakes with septic systems, which drain into those lakes.

Respectfully yours,
Robert Jensen