

# WASHINGTON COASTAL MARINE ADVISORY COUNCIL MEETING

## Draft Summary

Wednesday, April 20, 2016 9:30 am – 3:30pm

Location: Port of Grays Harbor Commissioners Chambers, 111 S. Wooding St., Aberdeen, WA

**NOTE: A link to all the meeting materials and the meeting presentations can be found at the end of this document.**

<b>Council Members Present</b>	
Carol Ervest, Wahkiakum MRC	Mark Plackett, Citizen
Casey Dennehy, Recreation	Michal Rechner, DNR
Dale Beasley, Commercial Fishing	Michelle Culver, WDFW
David Fluharty, Educational Institution	Penny Dalton, Sea Grant
Garret Dalan, Grays Harbor MRC	Randy Lewis, Ports
Jeff Ward, Coastal Energy	R.D. Grunbaum, Conservation
Julie Horowitz, Governor's Office (phone)	Rich Osborne, Science
Larry Thevik, Commercial Fishing	Rod Fleck, N. Pacific MRC
Mark Cedergreen, Recreational Fishing	Jessica Helsley, WCSSP
Tiffany Turner, Economic Development	

<b>Council Members Absent</b>	
Alla Weinstein, Energy Industry	Joshua Berger, Dept. of Commerce
Brian Sheldon, Shellfish Aquaculture	Randy Kline, WA State Parks
Charles Costanzo, Shipping	Sally Toteff, Dept. of Ecology
Doug Kess, Pacific MRC	

<b>Liaisons Present</b>	
Katie Krueger, Quileute Tribe Liaison	

<b>Others Present (as noted on the sign-in sheet)</b>	
Kevin Zerbe, Cascadia Consulting, Note-taker	George Hart, USN
Jennifer Hennessey, Ecology (WCMAC Staff)	Katie Wrubel, Makah Tribe
Katrina Lassiter, DNR	Brice Boland, Surfrider
Libby Whiting, DNR	Gus Gates, Surfrider
Susan Gulick, Sound Resolutions, Facilitator	Kevin Decker, WA Sea Grant
Tim Stearns, Dept. of Commerce	Yunzhou Li, U.W.
Shelby Oliver, Portland State	George Galasso, NOAA
Jesse Doerpinghaus, WDFW	Corey Niles, WDFW

### 1. Welcome and Introductions – Agenda Review

Garrett Dalan welcomed everyone to the meeting. All attendees introduced themselves and were invited to provide updates. Members of the public were invited to provide comments

- Garrett informed the group of its newest member: Jessica Helsley, from the Washington Coast Sustainable Salmon Partnership.
- Casey Dennehy reminded the group that the coastal beach clean-up is Saturday, 4-23-16. Interested parties can go to [www.coastsavers.org](http://www.coastsavers.org) to find meeting locations. Rich Osborne also mentioned that following the clean-up, there will be an ocean and river film festival in Forks showcasing 12 locally produced films.
- Susan Gulick reviewed the agenda. No questions were asked or comments made.

### **Adoption of February Meeting Summary**

- No comments were made or questions asked at the meeting.
- ! The February Meeting Summary was adopted.

### **Public Comment**

- No public comments were made at the beginning of the meeting.

## **2. Overview of Relationship among WCMAC Spatial and Policy Recommendations; existing laws, policies and processes; and the Marine Spatial Plan**

Jennifer Hennessey gave a presentation on the Marine Spatial Plan (MSP) Conceptual Diagram. (A link to the presentation is included at the end of this document.) A print-out of the diagram and discussion guide were included in the meeting packet. (A link to the meeting materials/handouts is included at the end of this document.) Jennifer emphasized that the MSP is a foundation to provide baseline information on existing conditions and uses, and provides a lot of context around siting, monitoring, stakeholder engagement, etc.

### *Questions and Comments*

- Several members had questions regarding the pre-application process. What will that process entail and what agency would be responsible for reviewing the pre-applications and implementing the process? Examples from other states show that the pre-application process is flexible. Multiple members wondered whether WCMAC could be involved in discussions with applicants during the pre-application process, which could help applicants avoid problems down the road.
- Several members agreed that the pre-application process should provide enough information to allow the reviewing body to make a rational decision, but not require so much detail that it presents an exorbitant cost to the applicant and potentially cause Washington to lose bids for development.
- Some members suggested that the MSP should include specific fisheries protection, conservation, and recreation standards the applicant would have to acknowledge in their proposal.

### **Shoreline Master Programs, Federal Consistency, and Marine Spatial Planning FAQ document**

Jennifer Hennessey informed the group that the Coastal Zone Management Act allows state agencies to review federal actions in federal waters (i.e. beyond 3 miles from shore).

- State agencies can concur, concur with conditions, or object to federal actions, but an objection does not necessarily mean federal actions will be stopped.
- State agencies can request to review federal projects occurring in federal waters on a case-by-case basis. The MSP will not give the state authority to approve/deny federal actions, but information within the MSP can be used by the state to establish a “geographic locator description” that would initiate an automatic state review of federal activities in certain areas. This automatic review would allow the state to require a project to provide specific information (such as those recommended within the MSP) and to review a project for

consistency with the enforceable policies of its coastal program, including the Ocean Resources Management Act (ORMA).

### **WDFW Overview of Existing Laws & Policies that Protect Fishing**

Michele Culver presented a walk-through of the Ocean Resources Management Act (ORMA), Chapter 43.143 RCW, and how it can be used to protect fishing. She discussed how ORMA relates to WCMAC authority, fishing, and criteria for new activities in protection fisheries and other coastal resources. A handout outlining Michele's presentation was included in the meeting packet. Michele went over the draft WDFW Proposed Project Review Process (for fisheries), also included in the meeting packet.

#### *Questions and Comments*

- Garrett Dalan clarified that DFW is proposing that a recommendation of the MSP be that the sequence used for fisheries protection in ORMA be rolled into the MSP. Michele concurred.
- Many members agreed that a broader scope should be applied to fisheries and expressed appreciation for the ORMA handout and the importance of include ORMA considerations in the MSP.
- Rod Fleck asserted that applicants have the right to be present and receive meeting minutes when state/federal agencies make decisions regarding a project's consistency with state policies on the use of ocean and marine resources and/or schedule meetings with affected fishery advisory groups.

### **Timeline for MSP/WCMAC Recommendations**

Members reviewed the draft timeline and process to complete WCMAC Recommendations and MSP. Members were reminded that the final MSP is to be issued/adopted by the state in December of 2016. Following workshops in May and June on spatial scenarios, WCMAC hopes to have policy recommendations completed by June 15<sup>th</sup>.

### **3. Draft WCMAC Policy Recommendations**

Susan Gulick reminded the members that the recommendations to be reviewed today are not spatial recommendations, but are the draft overarching policy recommendations for the MSP. WCMAC did not do line-by-line wordsmithing and instead focused on specific issues raised by members before the meeting. Proposed changes to wording were written on index cards to be captured later. Garrett Dalan reminded the group that the goal of the exercise was consensus from the group that this was a package they could all approve.

#### *Questions and Comments*

##### *1.1 Economic Recommendations*

- Multiple members suggested citing existing policies where they overlap in these recommendations (e.g., WAC, ORMA).
- Mark Plackett suggested editing item 1.1.1.b to allow proponents to review/respond to an economic assessment in addition to a neutral third party.
- Many members expressed concerns over how to define a neutral third party. The idea is not that the project proponent will just present their economic analysis, but that the party doing the analysis as part of the permitting should be as neutral as possible.
- Several members suggested the economic assessments completed for the MSP process should be used as a baseline for the assessment, and applicants should state in the proposal how the project could change the baseline.

- Garrett Dalan asserted that 1.1.1.b be taken out and folded into 1.1.1.a.
- Dave Fluharty asked if the third party review will include a feasibility analysis. Other members suggested that it should not, that it is not the permitter's job to judge a project based on whether it thinks the project will be successful. It is best to let the economic analysis focus on impacts to existing uses, the community, and who pays for those impacts.
- Dale Beasley suggested adding to 1.1.1.c language about impacts to taxpayers and to include those impacts in the economic assessment. Others felt that this is already covered.

### *1.2 Infrastructure and Technology Recommendations*

- Dale Beasley wanted to add to 1.2.5 that a clear threshold for denial/approval should be established regarding aesthetics. Garrett Dalan reminded the group that SEPA already addresses aesthetics; staff will confirm.
- Many members agreed that 1.2.6 cite ORMA, as it is covered in that law.
- Regarding the note on 1.2.7 (entangled fishing gear): Larry Thevik suggested that language be added to the problem statement acknowledging that gear movement is common, and that gear recovery is essential to the fishing industry of Washington. WCMAC should take steps mitigate entanglement.
- Regarding the 1.2.7 Entangled Fishing Gear, the group decided to incorporate into the problem statement that entangled gear can pose risks to ecological stability and is an adverse impact for existing uses (i.e. fisheries). Overall, the recommendations cannot be too specific given they can address multiple issues. One possibility is to include in an approved permit that the collection of entangled fishing gear is the responsibility of the infrastructure's owner.
- On 1.2.2 (dredge disposal), Randy Lewis suggested replacing "mitigate coastal erosion problems" with "provide beneficial use to the greatest extent possible" to capture more than coastal erosion mitigation.

### *1.3 Ecological Recommendations*

- On 1.3.1, Jeff Ward is concerned about excess noise from tidal/offshore wind energy projects and the influence it can have on animal behaviors. .
- Members discussed invasive species and whether it was necessary to reference non-native species. Members decided to say "to avoid inadvertent introduction of invasive species". Some questions remained about the difference between non-native and invasive species.

### *2.1 Offshore Aquaculture Issues*

- Jennifer Hennessey stated that Dale Beasley's comment to add 2.1.4 regarding non-native finfish would be contrary to current state laws and policies within the Shoreline Management Act because aquaculture is a preferred use under that law. The group decided to remove this recommendation, but save it for consideration as a recommendation to the state legislature.
- There was a suggestion to add "predation" to 2.1.3 but it was decided that "fish health" covers this (you aren't healthy if you are being eaten), that finfish would be included there.
- Dale Beasley suggested adding a 2.1.5 (pesticide controls issue) because of the potential trophic level impacts of pesticides. Many members felt this was covered but didn't object to it being added.

### *3. Additional issues for consideration*

- Larry Thevik suggested a textual explanation in the problem statement of limited ocean space, unique limitations, and multiple uses.

- On 3.1.4, Rod Fleck suggested rejecting Dale Beasley's edit (changing "consider" to "conform") because counties cannot make federal agencies conform. Others agreed, but noted that federal agencies should be aware of the permitting process and try to align new projects with existing policies.
- On 3.1.2, Michelle Culver suggested to replace "fishery advisory board" with "project review process" to get broader participation from affected fishing license-holders. Other members requested including both as an option. Staff will work on language and come back with language to review.

#### **4. Spatial Recommendations: Update on Use Analysis**

Tim Stearns, from WA Department of Commerce, presented insights on the MSP from a commerce perspective. He stated that WCMAC recommendations are a key part in ensuring Washington meets its energy demand over the next 20 years through efficiency and renewable energy, as well as adhering to the Clean Power Plan regulations.

Jennifer Hennessey presented an update on the Use Analysis. (A link to the presentation is included at the end of this document.)

- The Use Analysis is a process to compile information on existing uses and sensitive environments and compare that renewable energy information. The state law requires the plan to provide a series of maps of areas with high potential for renewable energy that minimize conflict with existing uses and sensitive environments.
- Because of ORMA, estuaries are always considered important. The Use Analysis is focused on offshore uses, not the estuaries.
- Each hexagon is one square mile. The mapping application will show the final data products where users can select a hexagon and find a list of uses that occur there. There are over 8,000 total hexagons.

##### *Questions and Comments*

- Larry Thevik suggested adding a popup with textual descriptions and collection dates for each online data layer, given that fisheries change over time.
- Casey Dennehy pointed out that the military data layer does not reflect military activities on the southern coast. Jennifer clarified that this was best available information provided about in-water military uses. Dale Beasley asked if use by recreation boats were captured. Jennifer Hennessey informed the group that, according to recreational boating organizations, most recreation boats on the coast are fishing and would be adequately represented by the recreational fishing data. There are very few non-fishing recreational vessels and they are mostly long-distance travelers, so are not included in the vessel densities. Contextual information in the plan can describe the general routes these boats typically take.

#### **5. Spatial Recommendations Analyses and Scenarios: Introduction to MARXAN**

John Pierce, senior wildlife biologist with DFW, gave the members an overview of MARXAN – a software organization tool that enables spatial analysis of multiple sets of spatial data using different scenarios to produce different options that meet multiple planning objectives. Links to his presentation and to the discussion guide can be found at the end of this document.

- MARXAN was specifically developed for marine planning, with its first use for the Great Barrier Reef Marine Protected Area in Australia. It has been used in many marine and coastal planning processes in the US and around the world.
- John compared the Use Analysis maps with the energy suitability index created by the Pacific Northwest National Laboratory to identify hypothetical “best solution” sites for energy developments along Washington’s coast (according to those criterion). This analysis was done for illustrative purposes only
- Best solution sites identified by MARXAN do not mean “no impact” to existing uses. These sites are those with the smallest impact relative to other sites.
- More detail will be covered in the workshops coming up in late May and early June.

#### *Questions and Comments*

- Larry Thevik asked if it is possible to include a site’s community importance in MARXAN analyses. John Pierce informed him that it is possible if a numerical weight can be assigned to the site. The same can be done for other qualitative values.

## **6. Funding Decisions**

Katrina Lassiter updated the group about the NOAA research vessel that is conducting seafloor mapping along the Washington coast. A discussion guide was included in the meeting packet. NOAA has agreed to pay for the collection of bathymetry and water column data off of the Washington coast and share it with the state. However, the data will be in a raw format and would require extensive analysis. She informed the group that a member of Chris Goldfinger’s lab at Oregon State University has the expertise and is currently available to perform the data analysis at a cost of \$75,000. She reminded the members that WCMAC currently has between \$125 – 150,000 in uncommitted funds.

#### *Questions and Comments*

- Some members questioned whether these funds could be used for other expenditures.
- Several members advocated that the money be spent on processing the NOAA data given it will provide information of ecological use that is very important. Additionally, since the funds, raw data, and OSU analysts are available, it is important to take advantage of the opportunity.
- Mark Plackett did not agree that funds should be spent to analyze the NOAA data without a better understanding of other needs and potential uses for the funds.
- Consensus could not be reached. WCMAC was required to vote on this funding decision.
- ! Decision before WCMAC: Does WCMAC recommend funding of up to \$75,000 for processing the backscatter data and integrating it into the seafloor atlas?
  - 14 thumbs up
  - 1 thumb down
  - 3 abstentions
- ! The decision was passed.

## **7. Updates and Elections**

#### Steering Committee Members

- ! Rod Fleck and Mike Rechner were approved to remain as Steering Committee members.

## Technical Committee Leads

- ! Rich Osborne and Casey Dennehy were approved as the Technical Committee leads

## Workplan

- Finalized recommendations from WCMAC are needed by the September 28th meeting.
- Garrett Dalan reported the next MRAC meeting is next Monday, April 25, 2016 in Seattle. He sent an email on this topic via the WCMAC listserv.

## 8. Public Comment

- Gus Gates gave “kudos” to WCMAC for acknowledging the need for fisheries standards in the MSP. He expressed concern that the goal of completing the MSP by December is too ambitious and suggested the group meet more often or for longer periods of time. He was enthusiastic that the MSP be completely implementable, and said the opportunity to review before public comment is key to its success.
- Garrett Dalan, regarding more meetings, acknowledged it is realistic to think of adding a meeting in the fall.

Meeting adjourned at 3:51pm.

## Summary of Decisions

- ! The February Meeting Summary was adopted.
- ! The expenditure of \$75,000 for processing the backscatter data and integrating it into the seafloor atlas was approved by vote.
- ! Rod Fleck and Mike Rechner were approved to remain as Steering Committee members.
- ! Rich Osborne and Casey Dennehy were approved as the Technical Committee leads.

## LINKS:

Meeting Materials/Handouts: <http://www.ecy.wa.gov/programs/sea/ocean/pdf/April2016materials.pdf>

Presentations: <http://www.ecy.wa.gov/programs/sea/ocean/pdf/April2016presentations.pdf>

### Upcoming Meetings

- Tentative date: May 24 or 31, 2016 (Workshop)
- Tentative date: June 8, 2016 (Workshop)
- June 15, 2016 (WCMAC Meeting)
- September 28, 2016 (WCMAC Meeting)

*Meetings will be held in Aberdeen unless otherwise noted*

## Written Comments submitted by Key McMurry

The "Email Listserve"-Myself and several other members of the public people are on the list serve, but never get any information about WCMAC unless a WCMAC member forwards it to us.

2. The lack of public involvement with the entire CMSP process is been very limited. The "Draft CMSP" plan does not provide any time for public review. In fact I haven't seen any timeline for the plan.
3. The maps are still not very accurate in many areas. For example the fishing, the uses of Grays Harbor and Willapa Bay (should not just be listed as valuable).
4. I don't think the entire economic value of our Marine Resources or the impacts to the whole coastal economy has been captured very well. For example: it should not just be based on fish caught, but everything and every job it took to catch and eventually use/eat that fish. Things like boat repairs, restaurants, nets, tourism, fish licensing, deck hands, etc.
5. I fully support making our WDFW Fishing and Crabbing Rules and Regulations (State Authority) part of the "Enforceable Acts" in our Washington State Coastal Zone Management Program. In addition after our WDFW Fishing and Crabbing Rules and Regulations (State Authority) have become an Enforceable Act, I fully support a "Geographic Location Description" be developed. This would allow our Pacific County SMP rules to meet the 200 mile CZMA line. We the public have asked countless times to have the CMSP authority extended out to the CMZA line. Pacific County Commissioner Frank Wolf also suggested this at the meeting on 1/13/2016 with DOE, and NOAA.
6. I support the prohibition of any fixed/permanent structures, within Pacific County SMP/CMZA waters. Ocean energy is simply not cost effective, invades upon existing sustainable uses and jobs. Why not look more into solar power or land wind turbines?
7. We have had to repeatedly ask/fight for "existing sustainable uses" to be included in the plan. Somehow it keeps getting omitted, thanks to a Surfrider petition this wording got put back into the draft CMSP plan.

# Overview: Marine Spatial Plan Contents<sup>1</sup>

January 2016 Draft

## 1. INTRODUCTION

*This section provides background on the purpose, requirements, guiding principles, and planning process.*

- 1.1. Purpose and need for the Marine Spatial Plan
- 1.2. Marine Waters Management and Planning Act requirements
- 1.3. Plan goals and objectives
- 1.4. Planning process summary
- 1.5. MSP Study Area
- 1.6. Tribes – treaty rights
- 1.7. Olympic Coast National Marine Sanctuary

## 2. CURRENT CONDITIONS AND FUTURE TRENDS

*This section provides a detailed narrative description about current conditions, existing uses, and potential new uses. Each sub-section will include maps and other types of data (e.g. charts, graphs, tables) when available.*

*Each existing use section will include the following information when available:*

- Summary of history and current uses
- Maps of high value areas\* (when required and available)
- Economic impact of uses
- Related infrastructure
- Future trends

*Each potential new or expanded use section will likely include the following information when available:*

Summary of History, Current and Emerging Technology, Related Infrastructure, Potential Benefits and Use Compatibilities, Potential Environmental Effects, Potential Human Use Conflicts, Permitting, Resource Potential, Future Trends and Factors

- 2.1. Ecology of Washington's Pacific Coast
- 2.2. Cultural and Historical Resources
- 2.3. Socio-Economic Setting
- 2.4. Fisheries
- 2.5. Aquaculture
- 2.6. Recreation and Tourism
- 2.7. Marine Transportation, Navigation, and Infrastructure
- 2.8. Military Uses
- 2.9. Research and monitoring activities within the Plan area
- 2.10. Potential New/Expanded Uses
  - 2.10.1. Renewable Energy
  - 2.10.2. Offshore Aquaculture
  - 2.10.3. Dredge Disposal in New Locations
  - 2.10.4. Marine Product Extraction
  - 2.10.5. Mining- Sand and Gravel Mining and Gas Hydrate Mining
- 2.11. Climate Change

---

<sup>1</sup> This is an evolving document. Specific organization and section details may be revised as the plan progresses.

### 3. SPATIAL ANALYSES

*This section will provide a summary on the methods and key outputs of the spatial analyses.*

- 3.1. Ecologically Important Areas\*
- 3.2. Use Analysis

### 4. MARINE SPATIAL PLAN AND MANAGEMENT FRAMEWORK.\*

*This section provides background on the regulatory framework, as well as the recommended policies and spatial designations. It also includes an adaptive management strategy to ensure the plan adapts to future changes, new information, etc.*

- 4.1. Existing statutes, regulations and policies
- 4.2. Existing state and local authorities, including management plans and procedures, that govern plan implementation\*(SMPs, port plans, etc.).
- 4.3. Recommended designations and policies
  - 4.3.1. Maps of different designations/areas (e.g. multi-use, preferred new use areas, avoid, and conserve areas) and descriptions
  - 4.3.2. General policies
    - 4.3.2.1. Recommendations on phasing and scaling
    - 4.3.2.2. Recommendations on data and analysis needs for projects
    - 4.3.2.3. Other recommendations
  - 4.3.3. New use – policies specific to new use
  - 4.3.4. Recommendations for Federal Waters\*
- 4.4. Substantially inconsistent existing management plans and recommendations on aligning plans (if needed).\*
- 4.5. Framework for coordinating state agency and local government review of proposed renewable energy development uses\*
- 4.6. Adaptive Management Strategy\*
- 4.7. Ecosystem indicators and recommendations\*

### 5. ENVIRONMENTAL ASSESSMENT/SEPA REQUIREMENTS

(this may be a separate document)

### 6. APPENDICES

*The appendices may include technical reports prepared as background for the MSP as well as statutes, guidelines, and other relevant documents.*

**Note:** \*Asterisks denote legally required elements for the MSP [see RCW 43.372.040]

# Washington Marine Spatial Plan

## Chapter Introductions

### 1. Introduction

#### 1.1 Purpose and need for the Marine Spatial Plan

In progress

#### 1.2 Marine Waters Management and Planning Act Requirements

In progress

#### 1.3 Plan Goals and Objectives

In progress

#### 1.4 Planning Process Summary

To be written

#### 1.5 MSP Study Area

The Marine Spatial Plan (MSP) Study Area consists of marine state and federal waters along Washington's Pacific Coast. The Study Area extends from ordinary high water on the shoreward side out to 700 fathoms (4,200 feet) depth offshore and from Cape Flattery on the north of the Olympic Peninsula south to Cape Disappointment at the Mouth of the Columbia River. The Study Area encompasses estuaries along the coast, including two large estuaries: Grays Harbor and Willapa Bay. This area was chosen based on expected locations for potential new federal activities, is an area where effects are reasonably foreseeable on the coastal uses or resources and where the highest intensity of existing coastal uses exist, is ecologically meaningful, and maximizes the use of existing data and available information.

#### 1.6 Tribes-Treaty Rights

In progress

#### 1.7 Olympic Coast National Marine Sanctuary

Designated in 1994, the Olympic Coast National Marine Sanctuary (Sanctuary) is a place of regional, national, and global significance. The Sanctuary encompasses much of the northern half of the Marine Spatial Plan Study Area and is one of North America's most productive marine regions and pristine, undeveloped shorelines. The Sanctuary is a part of a system of 14 marine protected areas coordinated and administered by National Oceanic and Atmospheric Administration (NOAA).

### 2. Current Conditions and Future Trends

#### 2.1 Ecology of Washington's Pacific Coast

Washington's Marine Spatial Plan (MSP) Study Area is a highly productive, diverse ecosystem. Ocean resources within this ecosystem are the foundation to Washington's ocean uses, and the health and status of its species, habitats, and ecosystem are of primary importance to ocean and estuarine users, coastal residents, Tribes, and the State of Washington. The Study Area has several federally and state

designated protected areas, designed to protect and foster the health of important habitats and species off Washington's coast.

This chapter describes the ecology of the MSP Study Area by summarizing the physical oceanography, water quality status, geomorphology, biology, and ecological stressors of Washington's outer coast. Information presented here can be used to understand not only the ecological context of Washington's ocean and estuaries, but also for considering potential future new uses and how they may affect the ecological status of the Study Area.

## 2.2 Cultural and Historic Resources

Cultural and historic resources are an important part of the modern context and uses of the Washington coast and MSP Study Area. Washington's coastal area is rich with cultural resources including archaeological sites providing prehistoric records of native peoples' marine-oriented uses and traditional cultural properties for cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. Maritime history is embedded along Washington's coast, with many existing historic resources representing Euro-American maritime culture and shipwrecks.

## 2.3 Socioeconomic Setting

Washington's coastal communities adjacent to the MSP Study Area are generally rural, with natural resources playing an important part in the economy and cultural character of these communities. Parks, forests, and natural areas cover much of the land area of the four coastal counties: Clallam, Jefferson, Grays Harbor, and Pacific. The Pacific coastal areas of Clallam and Jefferson counties are quite remote and sparsely populated, while Grays Harbor and Pacific Counties have several small incorporated and unincorporated communities along the coast. Key industries include natural resource-based industries (fishing, aquaculture, and timber), tourism, manufacturing, and government services. The five federally recognized tribes: Makah, Quileute, Hoh, Quinault Indian Nation, and Shoalwater Bay, are also an integral part of the socioeconomic character of the coast. Coastal communities are exposed to several natural hazards and unique coastal challenges such as tsunami events and resulting inundation. Continued participation in marine-resource based industries, a healthy marine ecosystem, and a future with a sustainable local economy are among commonly shared visions of many coastal residents.

Funding through MSP was provided to gather social and economic information for coastal counties and tribes adjacent to the MSP Study Area. This socioeconomic chapter briefly summarize the extensive information provided through these projects<sup>1</sup>. Readers are encouraged to consult these reports and other references for further details on the socioeconomic context of Washington's coastal communities.

## 2.4 Commercial, Recreational, and Tribal Fisheries

In progress

## 2.5 Aquaculture

Aquaculture is a major use within the large coastal estuaries of the MSP Study Area. The shellfish aquaculture industry provides income and jobs to the region and the state, promotes environmental monitoring in the estuaries, and is a key part of the cultural history and identity in Pacific and Grays Harbor Counties. As a state, Washington ranks first in aquaculture shellfish sales in the nation, with

---

<sup>1</sup> Economic information specific to each marine industry is provided under the relevant chapters within Part 2 of this MSP.

Pacific and Grays Harbor counties producing a substantial portion (about 29%) of the state's mollusk sales in 2012. The industry has a long history within the region and has adapted to several challenges to sustain a thriving industry. Current challenges such as invasive and nuisance species management, regulatory complexities, and climate change will continue to influence the future of aquaculture.

This chapter summarizes the history and current use of shellfish aquaculture in the MSP Study Area. Economic impacts, related infrastructure, and future trends of the industry are also presented here to outline the context of aquaculture and its role in the Washington coastal region.

## 2.6 Recreation and Tourism

In progress

## 2.7 Marine Transportation, Navigation, and Infrastructure

To be written

## 2.8 Military Uses

The military has a prevalent historical and current presence within Washington State and the MSP Study Area. Primary ocean activities include the United States Department of the Navy training and testing ranges and the United States Coast Guard operations for navigation, search and rescue, vessel safety, and coastal defense.

## 2.9 Research and Monitoring Activities

Marine waters off Washington's outer coast host a wide variety of research and monitoring activities conducted by numerous institutions and government agencies, many focused on baseline data to understand oceanographic conditions. Other research includes fisheries and other marine animal population surveys, habitat surveys, and tectonic research. Emergent issues such as hypoxia, ocean acidification, water temperature, and harmful algal blooms are already a focus of research and will likely continue to expand in the future.

## 2.10 Potential New/Expanded Uses

### 2.10.1 Marine Renewable Energy

Marine renewable energy is the conversion of potential energy from offshore wind<sup>2</sup>, waves, and tidal currents to electric power through the installation of energy generating devices in the marine environment. The State of Washington, the United States, and several other countries around the world have identified marine renewable energy as a potential option to help diversify their energy portfolio and reduce carbon emissions from traditional energy sources, such as coal, oil, and gas (Copping et al., 2013; Musial & Ram, 2010). The State of Washington's Energy Independence Act of 2006, also known as Initiative 937, enacted a Renewable Energy Portfolio Standard that requires electricity utilities with 25,000 or more customers to acquire a minimum percentage of their power from eligible renewable

---

<sup>2</sup> Offshore wind energy is wind energy extracted over water and is therefore included as marine renewable energy in the MSP.

energy resources. Minimum percentage targets were set at 3% of total load from renewable energy by January, 2012, 9% by January 2016, and 15% by January 2020 (RCW 19.285).<sup>3</sup>

The types of renewable energy that qualify under the Renewable Energy Portfolio Standard include marine renewable energy (i.e. offshore wind, wave, and tidal currents)<sup>4</sup> and other renewable energy types such as terrestrial wind<sup>5</sup>, solar, biomass, and biodiesel. Most hydropower (i.e., energy derived from hydroelectric dams) is not included as an eligible renewable energy source to meet the Portfolio Standard (RCW 19.285). Solar, biomass, biodiesel, ocean thermal energy conversion, and other renewable energy resources are currently not relevant options within the Marine Spatial Plan Study Area and therefore are not addressed within the Plan.

Marine renewable energy is a potential new use of ocean space within the Study Area and state law requires marine renewable energy to be addressed within the Marine Spatial Plan. Specific requirements include a series of maps which summarize locations with high potential for marine renewable energy production with minimal potential for conflicts with other existing uses or sensitive environments (RCW 43.372.040(6)(c)). Also required is a framework for coordinating state agency and local review of proposed energy projects (RCW 43.372.040(6)(f)).

The Marine Spatial Plan is non-regulatory, meaning that this Plan does not have the authority to explicitly approve or prohibit marine renewable energy projects. The Plan can identify key information about offshore wind, wave, and tidal current technologies, suitability, related infrastructure, environmental concerns, potential compatible uses, potential conflicts, and potential locations where energy generating facilities could be sited to reduce environmental and user conflicts. This information is used as context to inform Plan recommendations made by the State and shaped by stakeholders. The following sections within this chapter provide key information about marine renewable energy.

### 2.10.2 Offshore Aquaculture

A potential new use of Washington's Pacific coast is offshore aquaculture. Aquaculture, the culture or growing of fish, shellfish, or other aquatic plants and animals, has been a part of Washington's landscape for thousands of years. Current aquaculture activities are important sources of food, income, and livelihood for many Washingtonians, including native peoples.

No aquaculture activities are currently taking place outside of the estuaries on Washington's Pacific coast. The potential expansion of aquaculture activities into ocean waters beyond the estuaries becomes increasingly possible due to technological advancements. The expansion of aquaculture into deeper, offshore waters is driven by the ever increasing demand for high quality protein and the limited space and suitability of coastal waters (Lovatelli, Aguilar-Manjarrez, & Soto, 2013; Rubino, 2008). The future of offshore aquaculture will depend upon several factors, including feasibility of locations, technological advancements, economic potential, and compatibility with existing uses.

---

<sup>3</sup> Utilities must also utilize all cost-effective electricity efficiency measures to comply with the Renewable Energy Portfolio Standard (RCW 19.285).

<sup>4</sup> Ocean thermal energy conversion is also a marine renewable energy resource, but is not addressed within the MSP.

<sup>5</sup> Terrestrial wind has been the predominant renewable resource acquired so far (Washington State Department of Commerce, 2014a).

### 2.10.3 Dredging and Dredge Disposal

In progress

### 2.10.4 Marine Product Extraction

A potential new use of Washington's Pacific coast is the extraction of marine organisms for commercial industries<sup>6</sup> such as cosmetic, pharmaceutical, and biomedical research.

Marine product extraction is the practice of harvesting marine plants and animals to develop non-food related goods. Examples of products derived from marine organisms around the world include anti-viral, anti-cancer, and anti-tumor agents used in medical treatments, an anti-inflammatory agent used in a cosmetic skin cream, chemicals used in biomedical and cell biology research, and fatty amino acids in nutritional supplements (Arrieta, Arnaud-Haond, & Duarte, 2010; Baerga-Ortiz, 2009; Bruckner, 2002; Pomponi, 1999).

### 2.10.5 Mining

A potential new use of Washington's Pacific coast is mining within marine waters for sand and gravel as well as gas hydrates. This chapter provides context for sand/gravel and gas hydrate mining operations, environmental impacts, use conflicts, and future trends in Washington.

## 2.11 Climate Change

To be written

## 3. Spatial Analyses

*This section will provide a summary on the methods and key outputs of the spatial analyses.*

### 3.1. Ecologically Important Areas\*

### 3.2. Use Analysis

## 4. Marine Spatial Plan and Management Framework.\*

*This section provides background on the regulatory framework, as well as the recommended policies and spatial designations. It also includes an adaptive management strategy to ensure the plan adapts to future changes, new information, etc.*

---

<sup>6</sup> Marine product extraction, as discussed here, does not include any extraction or harvest performed by the tribes.

- 4.1. Existing statutes, regulations and policies
- 4.2. Existing state and local authorities, including management plans and procedures, that govern plan implementation\*(SMPs, port plans, etc.).
- 4.3. Recommended designations and policies
  - 4.3.1. Maps of different designations/areas (e.g. multi-use, preferred new use areas, avoid, and conserve areas) and descriptions
  - 4.3.2. General policies
    - 4.3.2.1. *Recommendations on phasing and scaling*
    - 4.3.2.2. *Recommendations on data and analysis needs for projects*
    - 4.3.2.3. *Other recommendations*
  - 4.3.3. New use – policies specific to new use
  - 4.3.4. Recommendations for Federal Waters\*
- 4.4. Substantially inconsistent existing management plans and recommendations on aligning plans (if needed).\*
- 4.5. Framework for coordinating state agency and local government review of proposed renewable energy development uses\*
- 4.6. Adaptive Management Strategy\*
- 4.7. Ecosystem indicators and recommendations\*

## 5. Environmental Assessment/SEPA Requirements

(this may be a separate document)

## 6. Appendices

June 2016

**NOAA's Office for Coastal Management (OCM)  
Summary Information for Washington's Marine Spatial Planning Process**

*This document is intended to provide Washington with general information on what NOAA/OCM would and would not be able to approve as part of a final state plan on siting and managing offshore renewable energy and other potential ocean uses in Washington's state waters. This information is consistent with what NOAA/OCM has provided to other state programs, and represents requirements NOAA/OCM must adhere to under the Coastal Zone Management Act (CZMA) and Federal Consistency Regulations when reviewing plans and enforceable policies to be approved as part of a state's federally-approved coastal management program under the CZMA. In many cases, NOAA/OCM will not be able to make a final determination until the state provides specific maps, policies, standards, conditions, etc., but intend for this information to assist the state in its deliberations and efforts to develop its final Marine Spatial Plan.*

- OCM, generally, cannot approve exclusion areas that discriminate against a particular coastal use, user, or activity. Some areas may exclude certain uses, but only after the state demonstrates with substantial evidence and documentation an important environmental, economic or cultural reason, and that the activity excluded is allowed elsewhere.
- State policies must only apply to state waters and not to federal waters or federal agencies and should be based on effects to coastal uses or resources and not on a particular type of activity. This ensures that the policy is applicable to any type of activity that has coastal effects and will not discriminate against a particular user group, agency, or a particular type of activity. (OCM Program Change Guidance, Section 2.D)
  - For example, a state was concerned with possible impacts from offshore oil and gas development on specific fishing areas and on discharges that might follow ocean currents and eddies into the state's estuarine areas. The state proposed oil and gas specific energy policies. OCM did not approve the policies because they imposed requirements on one user group, when other types of activities might have the same coastal impacts. The state re-wrote the policies to be based on coastal impacts and information needs to assess such impacts. Now the policies are applicable to all energy projects and other activities having similar effects.
- If Washington still wants to define a geographically limited exclusion area for a particular use, the state must also:
  - Have a clear rationale, based on coastal effects; and
  - Clearly identify areas that can support offshore renewable energy development in state waters and where such development would be encouraged.
  - An example of this can be found in Oregon's Part Five of the Territorial Sea Plan where the state used clearly defined map designations to describe a few geographically limited areas that were not compatible with renewable energy (see "Renewable Energy Exclusion Area" and "Proprietary Use and Management Area") due to existing marine reserves, dredge disposal sites, cable corridors or navigation channels. Then the state also described several other areas where renewable energy would be allowed and specifically a few "Renewable Energy Facility Suitability Study Areas" where renewable energy was anticipated to have the lowest potential for adverse effects and would be encouraged.

- Another example can be found in Rhode Island's OceanSAMP, which defines Areas of Particular Concern (APCs) which represent areas of high conservation value, high cultural and historic value or high human use value. APCs presumptively exclude development unless an applicant can demonstrate that there are no practicable alternatives that are less damaging outside the APC and that the project will not result in significant alteration to the resources in the APC. At the same time, Rhode Island defines a Renewable Energy Zone in state waters as the area most suitable for and preferred for offshore development. Rhode Island's plan also allows development in other areas as long as it would not result in significant adverse impacts.
- Coastal effects can be defined and justified by existing protection areas (e.g. marine reserves), or areas where mapped data layers show multiple layers of spatially coinciding areas of high importance.
- Since geographically-broad exclusion areas can be challenging to justify based on coastal effects, the state may also want to consider establishing specific conditions that need to be met in certain areas of state waters (e.g. high value fishing areas) or areas where spatial analysis has demonstrated a higher potential for use or resource conflicts.
  - An example can be found in Oregon's Part Five of their Territorial Sea Plan Section B.4.g(2) where the state defines Fisheries Use Protection Standards and how they apply in different map designations. In the "Resources and Uses Conservation Areas", renewable energy is presumptively excluded from areas of important to fisheries, and an applicant must demonstrate the propose project meets all applicable standards for protecting fisheries use from adverse effects. These standards are then defined in B.4.g(2)(b) and include considerations such as minimizing displacement, minimizing compaction of fishing effort, minimizing economic impact and mitigating possible hazards to navigation.
- Enforceable Policies in the Rhode Island Ocean SAMP, the Massachusetts Ocean Plan, and Oregon's Territorial Sea Plan, Part Five have been approved by OCM and may serve as references for ideas, structure, and content.
- Washington needs to work closely with OCM in developing enforceable policies and any exclusion areas well before state adoption of the Marine Spatial Plan.

# POTENTIAL MSP POLICY RECOMMENDATIONS

## With Suggested Revisions

June 1, 2016

**Recommendations from the Washington Coastal Marine Advisory Council (WCMAC) are intended to support and reinforce statutory requirements, including but not limited to RCW 43.143.010, RCW 43.143.030, and RCW 43.372.040 (4) (a-h):**

### **RCW 43.143.010**

- (1) The purpose of this chapter is to articulate policies and establish guidelines for the exercise of state and local management authority over Washington's coastal waters, seabed, and shorelines.
- (2) There shall be no leasing of Washington's tidal or submerged lands extending from mean high tide seaward three miles along the Washington coast from Cape Flattery south to Cape Disappointment, nor in Grays Harbor, Willapa Bay, and the Columbia river downstream from the Longview bridge, for purposes of oil or gas exploration, development, or production.
- (3) When conflicts arise among uses and activities, priority shall be given to resource uses and activities that will not adversely impact renewable resources over uses which are likely to have an adverse impact on renewable resources.
- (4) It is the policy of the state of Washington to actively encourage the conservation of liquid fossil fuels, and to explore available methods of encouraging such conservation.
- (5) It is not currently the intent of the legislature to include recreational uses or currently existing commercial uses involving fishing or other renewable marine or ocean resources within the uses and activities which must meet the planning and review criteria set forth in RCW 43.143.030. It is not the intent of the legislature, however, to permanently exclude these uses from the requirements of RCW 43.143.030. If information becomes available which indicates that such uses should reasonably be covered by the requirements of RCW 43.143.030, the permitting government or agency may require compliance with those requirements, and appeals of that decision shall be handled through the established appeals procedure for that permit or approval.
- (6) The state shall participate in federal ocean and marine resource decisions to the fullest extent possible to ensure that the decisions are consistent with the state's policy concerning the use of those resources.

**RCW 43.143.030**

- (1) When the state of Washington and local governments develop plans for the management, conservation, use, or development of natural resources in Washington's coastal waters, the policies in RCW 43.143.010 shall guide the decision-making process.
- (2) Uses or activities that require federal, state, or local government permits or other approvals and that will adversely impact renewable resources, marine life, fishing, aquaculture, recreation, navigation, air or water quality, or other existing ocean or coastal uses, may be permitted only if the criteria below are met or exceeded:
  - (a) There is a demonstrated significant local, state, or national need for the proposed use or activity;
  - (b) There is no reasonable alternative to meet the public need for the proposed use or activity;
  - (c) There will be no likely long-term significant adverse impacts to coastal or marine resources or uses;
  - (d) All reasonable steps are taken to avoid and minimize adverse environmental impacts, with special protection provided for the marine life and resources of the Columbia river, Willapa Bay and Grays Harbor estuaries, and Olympic national park;
  - (e) All reasonable steps are taken to avoid and minimize adverse social and economic impacts, including impacts on aquaculture, recreation, tourism, navigation, air quality, and recreational, commercial, and tribal fishing;
  - (f) Compensation is provided to mitigate adverse impacts to coastal resources or uses;
  - (g) Plans and sufficient performance bonding are provided to ensure that the site will be rehabilitated after the use or activity is completed; and
  - (h) The use or activity complies with all applicable local, state, and federal laws and regulations.

**RCW 43.372.040 (4) (a-h):**

- (4) The marine management plan must be developed and implemented in a manner that:
  - (a) Recognizes and respects existing uses and tribal treaty rights;
  - (b) Promotes protection and restoration of ecosystem processes to a level that will enable long-term sustainable production of ecosystem goods and services;
  - (c) Addresses potential impacts of climate change and sea level rise upon current and projected marine waters uses and shoreline and coastal impacts;
  - (d) Fosters and encourages sustainable uses that provide economic opportunity without significant adverse environmental impacts;
  - (e) Preserves and enhances public access;
  - (f) Protects and encourages working waterfronts and supports the infrastructure necessary to sustain marine industry, commercial shipping, shellfish aquaculture, and other water-dependent uses;
  - (g) Fosters public participation in decision making and significant involvement of communities adjacent to the state's marine waters; and
  - (h) Integrates existing management plans and authorities and makes recommendations for aligning plans to the extent practicable.

Dale would like to add the following statutes/regulations to this section:

Commented [s1]: Dale Beasley

**RCW 42.30.010 (Open Public Meetings Act)**

**Legislative declaration.**

The legislature finds and declares that all public commissions, boards, councils, committees, subcommittees, departments, divisions, offices, and all other public agencies of this state and subdivisions thereof exist to aid in the conduct of the people's business. It is the intent of this chapter that their actions be taken openly and that their deliberations be conducted openly.

The people of this state do not yield their sovereignty to the agencies which serve them. The people, in delegating authority, do not give their public servants the right to decide what is good for the people to know and what is not good for them to know. The people insist on remaining informed so that they may retain control over the instruments they have created.

**WAC 173-26-360 (the regulations that implements the Ocean Resources Management Act)**

(4) Relationship to existing management programs. These guidelines augment existing requirements of the Shoreline Management Act, chapter 90.58 RCW, and those chapters in Title 173 of the Washington Administrative Code that implement the act. They are not intended to modify current resource allocation procedures or regulations administered by other agencies, such as the Washington department of fisheries management of commercial, recreational, and tribal fisheries. They are not intended to regulate recreational uses or currently existing commercial uses involving fishing or other renewable marine or ocean resources. Every effort will be made to take into account tribal interests and programs in the guidelines and master program amendment processes. After inclusion in the state coastal zone management program, these guidelines and resultant master programs will be used for federal consistency purposes in evaluating federal permits and activities in Washington's coastal waters. Participation in the development of these guidelines and subsequent amendments to master programs will not preclude state and local government from opposing the introduction of new uses, such as oil and gas development.

**RCW 43.143.060**

**Washington coastal marine advisory council—Duties.**

(1) The duties of the Washington coastal marine advisory council established in RCW 43.143.050 are to:

(a) Serve as a forum for communication concerning coastal waters issues, including issues related to: Resource management; shellfish aquaculture; marine and coastal hazards; ocean energy; open ocean aquaculture; coastal waters research; education; and other coastal marine-related issues.

(b) Serve as a point of contact for, and collaborate with, the federal government, regional entities, and other state governments regarding coastal waters issues.

(c) Provide a forum to discuss coastal waters resource policy, planning, and management issues; provide either recommendations or modifications, or both, of principles, and, when appropriate, mediate disagreements.

(d) Serve as an interagency resource to respond to issues facing coastal communities and coastal waters resources in a collaborative manner.

(e) Identify and pursue public and private funding opportunities for the programs and activities of the council and for relevant programs and activities of member entities.

- (f) Provide recommendations to the governor, the legislature, and state and local agencies on specific coastal waters resource management issues, including:
- (i) Annual recommendations regarding coastal marine spatial planning expenditures and projects, including uses of the marine resources stewardship trust account created in RCW 43.372.070;
  - (ii) Principles and standards required for emerging new coastal uses;
  - (iii) Data gaps and opportunities for scientific research addressing coastal waters resource management issues;
  - (iv) Implementation of Washington's ocean action plan 2006;
  - (v) Development and implementation of coast-wide goals and strategies, including marine spatial planning; and
  - (vi) A coastal perspective regarding cross-boundary coastal issues.
- (2) In making recommendations under this section, the Washington coastal marine advisory council shall consider:
- (a) The principles and policies articulated in Washington's ocean action plan; and
  - (b) The protection and preservation of existing sustainable uses for current and future generations, including economic stakeholders reliant on marine waters to stabilize the vitality of the coastal economy.

## 1. Issues Related to All New Uses

### 1.1. Economic Recommendations

#### Problem Statement

New uses (including significant expansion of existing uses) may have acute and cumulative impacts on the local economy, both positive and negative. There is concern that some new uses could have short-term economic gains followed by long-term economic loss due to displacement of current uses by short-term projects (such as pilot projects or abandoned or failed projects). Additionally, a new use could result in national or global economic gain, but a significant economic loss at the local level. Local stakeholders and affected parties would like a clear understanding of the potential economic impacts of new uses, and a clear understanding of the interactions with existing uses, prior to the use being permitted.

#### Draft Recommendations

- 1.1.1. Prior to permitting new uses or expansions of existing uses which may cause impacts to either existing uses or to the local economy, an economic assessment should be completed. The purpose of this assessment is to provide permitting agencies, the proponent, and stakeholders with information on economic benefits and impacts for consideration in conjunction with established review and permitting processes. When appropriate, the economic assessment should build on the baseline information of

Commented [s2]: Randy Lewis

available economic and social studies (including but not limited to the Cascade Economics Assessment).

The assessment ~~should be prepared by an independent third party and~~ should include:

a) Process

- Early stakeholder notice, including a detailed description of the project proposal.
- A designated time period for review and comment that provides time for stakeholder input at key stages throughout the project assessment.
- A clear timeframe for response to comments.
- ~~Expert Independent third party expert~~ review of the assessment and the stakeholder comments. The project proponent will be given an opportunity to review and respond to the assessment, stakeholder comments, and the independent review.

b) Content

- An assessment of the short-term and long-term economic costs and benefits to the affected community, including social costs and benefits. The assessment should specifically address the social costs to vulnerable ocean users, and the potential impacts on taxpayers (and, if appropriate, ratepayers). The determination of costs and benefits should not be completed without input from local stakeholders and affected parties.
- As appropriate, an assessment of the costs and benefits to the larger economy (state, national, global).
- An assessment of various scenarios which include the full project footprint, and scenarios where the new use fails and is abandoned or decommissioned.
- A discussion of how the project complies with all legal statutory requirements, including but not limited to RCW 43.143.030 (e): *All reasonable steps are taken to avoid and minimize adverse social and economic impacts, including impacts on aquaculture, recreation, tourism, navigation, air quality, and recreational, commercial, and tribal fishing;*

**Commented [s3]:** Larry Thevik would like a footnote added listing other available economic studies. I will need a list of which studies to include.

**Commented [s4]:** Randy Lewis

**Commented [s5]:** Katie Krueger

## 1.2. Infrastructure and Technology Recommendations

### Problem Statement

New ocean<sup>1</sup> infrastructure presents many concerns to coastal communities, ranging from loss of views and aesthetics to safety concerns.

New infrastructure may pose an increased risk to the navigational safety of all vessel types and sizes. Impacts may be both direct impacts (~~such as risk of including but not limited to~~ collision, damage to or loss of fishing gear, and reduction or elimination of existing fishing operations and maritime

**Commented [s6]:** Dale Beasley

<sup>1</sup> The terms "ocean" and "offshore" throughout this document include estuaries

commerce) and indirect impacts (such as impacts from changes in ocean conditions or traffic patterns). New uses that disturb the seafloor could harm or bury cultural or historic resources, habitat for marine species, and fishing grounds. New uses could also create hazardous ocean conditions that endanger existing uses and infrastructure.

Some types of fishing gear are mobile, especially crab pots placed in Washington's nearshore. New infrastructure in these areas presents an increased risk for entangling fishing gear. Gear entanglement results in increased costs for fishing and can cause unintended mortality or harm to marine life.

Although some fishing gear is classified as "fixed" benthic gear it is common knowledge that some "fixed" benthic gear, especially crab pots, often move in normal storm events during fall, winter, and early spring off of the Washington coast. Most but not all of this movement normally occurs within State waters. Any newly placed fixed structures in the ocean waters off the Washington coast will cause increased gear entanglement scenarios which will lead to increased gear loss, derelict gear, negative impacts on fishing opportunities and economies, and unintended mortality or harm to marine life.

Harsh coastal conditions on the Washington Coast, including storms and tsunamis, may harm or destroy infrastructure. If a structure becomes obsolete, is destroyed, or is abandoned, there are concerns about the ongoing impacts of leaving unmaintained structures in place, the impacts of the removal process, associated debris, and footprint scars.

## Draft Recommendations

### 1.2.1. Navigational Safety

WCMAC recommends that a vessel traffic risk assessment or a risk-based modelling analysis be presented or prepared prior to permitting to evaluate navigational safety. WCMAC recommends that permitting agencies deny permits that have an adverse impact on navigational safety.

WCMAC recommends that, in order to improve safety and prevent major oil spills, ESCORT TUGS should be required in known hazard areas such as the Columbia River.

### 1.2.2. Dredge Disposal and Wave Amplification

WCMAC recommends implementation of recommendations established by the updated Mouth of the Columbia River Regional Sediment Management Plan and local Shoreline Master Programs that address navigation safety and dredge disposal. WCMAC recommends that dredge disposal should be sited in areas where the disposal will provide beneficial use to the greatest extent possible.

Commented [s7]: Larry Thevik

Commented [s8]: Dale Beasley

### 1.2.3. Historic and Cultural Resources

WCMAC recommends that, for new uses that will impact the ocean floor, a high-resolution seafloor archeological assessment be conducted prior to permitting, and that the project be sited and mitigated to avoid and preserve historic and cultural resources.

### 1.2.4. Coastal Erosion and Sea-Level Rise

WCMAC recommends that state agencies continue to monitor erosion and sea-level rise on the Washington coast. The effects of projected coastal erosion, future sea-level rise, and other climate change impacts should be evaluated to determine the long-term suitability of a proposed new use prior to permitting.

WCMAC recommends that Washington develop a new concept of "Coastal Sediment Rights" which would require full federal remedy to coastal erosion as mitigation for a truncated sediment supply to the coast from the taming of the Columbia River that has had its supply nearly terminated and reduced by over a magnitude of sand delivery to the coast. Coastal processes have severe anthropogenic interference that needs to be addressed.

Commented [s9]: Dale Beasley

### 1.2.5. Aesthetics

WCMAC recommends that the environmental review process require conceptual site drawings of visual impacts and assess the effect new infrastructure will have on views, aesthetics, and public access.

### 1.2.6. Structure Survivability

WCMAC recommends that a survivability assessment be required for all new ocean structures. Permit conditions should include requirements that comply with RCW 43.143.030(2)(g): *Plans and sufficient performance bonding are provided to ensure that the site will be rehabilitated after the use or activity is completed.*

### 1.2.7. Entangled Fishing Gear

WCMAC recommends that permit conditions for new uses require a plan for monitoring for entangled fishing gear or other debris, including a plan to mitigate impacts. Mitigation measures should include compensation for, or recovery and return of identifiable fishing gear.

Commented [s10]: Dale Beasley:

1.2.7 needs additional modification. Some gear in a flower garden may not be readily identifiable but still needs to be replaced – gear can be buried irretrievably in a wound up gob that is not recoverable and surface identification is missing. This gear loss is also associated with lost income that must also be mitigated until the gear can be replaced which could take in excess of a year or more due to availability of the supplies to make up a complete crab pot. The WCMAC MUST realize the severity of this problem and could eliminate the next generation of crab fishermen if not adequately addressed. 1.2.7 does not address the worst case scenario that could have happened even this year in 2016.

### 1.2.8. New Structures

WCMAC recommends that, at a minimum, proposals for any new structures (including the creation of artificial reefs) consider the information in the Marine Spatial Plan, follow the MSP recommendations, and comply with the criteria described in RCW 43.143.030(2).

## 1.3. Ecological Recommendations

## Problem Statement

New uses raise ecological concerns, including impacts to species and habitats; changes to migration routes and physical processes; degradation of water quality; impacts to the food web; and introduction of invasive species. In addition, offshore uses are often supported by on-shore infrastructure, and it is important to understand and assess the positive and negative impacts of changes to infrastructure on local coastal communities.

## Draft Recommendations

1.3.1. WCMAC recommends that, prior to permitting new uses or expansions of existing uses, an environmental assessment should be completed. Environmental assessments required under SEPA or NEPA should thoroughly address:

- Degradation of sensitive and important habitat for representative important species, including, but not limited to, ESA listed and commercially, recreationally and ecologically valuable species.
- Potential for direct injury or harm to species, including ESA listed and commercially valuable species (e.g. strikes, entanglement, etc.), or indirect injury related to exposure to noise, light, vibration, electromagnetic fields or other related stressors associated with the new use.
- Alteration or impairment of existing animal migration routes.
- Degradation of water quality (chemicals, petroleum products, nutrients, oxygen, temperature, acidification, etc.).
- Changes in physical processes, including, but not limited to, currents and waves, sediment processes, coastal erosion and accretion, electromagnetic fields, acoustics and wave amplification.
- Unintended impacts, including, but not limited to, impacts to the food chain, changes to physical processes, introduction of disease or genetic pollution, and access to existing resources.
- Inadvertent introduction of invasive species, organisms, etc.
- Comparison of alternatives and best-available technologies, if appropriate.
- Evaluation of impacts and demands on existing infrastructure, both on and offshore.

If environmental review is not required by SEPA or NEPA, WCMAC recommends that state and local agencies ensure that these concerns are addressed by applicants for new uses.

1.3.2. WCMAC recommends that all environmental assessments include a process for stakeholder input, including scoping, review of draft assessments, and a period for public comment. Agencies should establish adequate time for notice and public comment based on the complexity of the project.

1.3.3. WCMAC recommends applicants be held liable for damages and provide mitigation of adverse impacts to coastal resources ~~or and~~ uses, consistent with existing law.

Commented [s11]: Dale Beasley

- 1.3.4. For projects that pose a risk for invasive species introduction, WCMAC recommends applicants be required to prepare a prevention, monitoring and control plan.

## 2. Additional Issues Related to Specific New Uses

### 2.1. OFFSHORE AQUACULTURE ISSUES

#### Problem Statement

Offshore aquaculture presents unique concerns. The infrastructure and activities from offshore aquaculture could harm other species, particularly predators such as pinnipeds, cetaceans, and sharks. The infrastructure could also alter habitat and food sources for marine species. Offshore aquaculture may introduce new species, genetic mixing, and diseases into the environment, potentially harming existing populations and ecosystems. Fin-fish aquaculture could have economic, ecological and spatial impacts on existing fishing, and there is currently no feasible recovery method for escaped fin-fish from net-pen aquaculture.

#### Draft Recommendations

- 2.1.1. WCMAC recommends that applicants for offshore aquaculture prepare prevention, monitoring and response plans that ~~address prevent~~ escapement, disease, and nutrient pollution.
- 2.1.2. WCMAC recommends that applicants for offshore aquaculture avoid and minimize impacts to pinnipeds, cetaceans, sharks and other species through facility design, siting and operation.
- 2.1.3. WCMAC recommends that agencies deny permits for offshore aquaculture facilities with species that pose a significant risk of introducing disease, impairing fish health, or potentially introducing genetic pollution into the area, in accordance with WAC 276.76.100: *A permit may be denied based on the determination by the director of significant genetic, ecological or fish health risks of the proposed fish rearing program on naturally occurring fish and wildlife, their habitat or other existing fish rearing programs.*
- 2.1.4. WCMAC recommends that pesticide controls should undergo rigorous safety analysis before their use is allowed.

Commented [s12]: Dale Beasley

2.1.5. WCMAC recommends that applicants of offshore aquaculture avoid and minimize impacts to existing uses to protect and preserve uses for current and future generations, including cumulative impacts from all new uses.

Commented [s13]: Dale Beasley

### 3. Additional Issues Related to Protecting and Preserving Existing Sustainable Uses

#### Problem Statement

New uses could irrevocably change coastal communities. While some new uses may bring positive changes, there are concerns that new uses could also harm communities in ways that are difficult to repair. There is a concern that harmful changes are likely to occur without adequate stakeholder involvement and input during all aspects of the decision-making process for new development.

The Washington coast is the shortest coast line of the the three Pacific Coast states, and has unique limitations on usage, including Olympic National Park, the Olympic Coast National Marine S-a marine sanctuary, areas of tribal sovereignty and off-shore treaty rights, restrictions by the US military, and severe weather. Ocean space is limited and already hosts multiple uses. Additional spatial displacement along the Washington coast could place an undue burden on existing uses, including fishing. New uses could preempt existing fishing space, resulting in smaller fishing areas. Smaller fishing areas may lead to overcrowded and dangerous fishing activities as well as reduced catch and negative economic impacts.

Commented [s14]: Larry Thevik: Add a footnote of each state's "crow flies" coast line length in nautical miles

Commented [s15]: Katie Krueger

Commented [s16]: Larry Thevik: Provide a footnote reference to textual and spatial description of each issue in the body of the plan.

Commented [s17]: Larry Thevik

There is concern that new uses could degrade or alter existing sustainable uses in the marine waters, including fisheries and aquaculture, in a variety of ways (impairment of estuary functions, degradation of water quality, impacts to fish and wildlife habitat, etc.). This could result in reduced harvest or reduced profitability for existing uses. New uses could also degrade recreational opportunities, public access, and aesthetics.

#### Draft Recommendations

3.1.1. WCMAC recommends public and stakeholder involvement in all aspects of project development and review, including:

- working collaboratively with stakeholders, including but not limited to fishing, aquaculture, maritime commerce, conservation, tourism and recreation interests;
- providing timely and effective notice; and
- initiating both formal and informal pre-application discussions between stakeholders and applicants.

3.1.2. WCMAC recommends a project review process that includes existing uses, appropriate agencies, and project proponents. The process should involve established fishing advisory groups, and should identify potential adverse impacts on commercial and recreational

fisheries and opportunities to avoid, reduce, or mitigate impacts. Fishing advisory boards comprised of representatives of the affected fisheries could also be created for specific projects or sites.

3.1.3. WCMAC recommends that project proponents use WCMAC as a forum for early notification and discussion of potential proposals, including impacts to habitat, impacts on existing uses, project location and maximum size, etc.

3.1.4. WCMAC recommends that through the permitting and review process, applicants prepare site specific impact assessments addressing impacts to current uses, including, but not limited to, fishing, recreation, and aquaculture. The assessment should also describe how the project will comply with local Shoreline Master Programs.

Commented [s18]: Dale Beasley

## 4. Adaptive Management and Data Gathering

### Problem Statement

As conditions change or as new information is gathered, it is important to update baseline information, apply adaptive management, and update the MSP.

4.1.1. WCMAC recommends that state agencies identify a systematic process to update existing datasets, gather new data to keep baseline information current, and fill data gaps.

4.1.2. WCMAC recommends that, based on new information or changing conditions, state agencies identify areas of the MSP's recommendations where changes may be needed, and recommend changes to the MSP or to existing implementation activities.

### Other Issues

1. WCMAC discussed at the April meeting that it may want to develop a recommendation to the Governor or Legislature to address concerns about non-native finfish in offshore aquaculture, but it will not go in the MSP recommendations because 1) aquaculture is a preferred use under the Shoreline Management Act, and 2) WAC 220.76.100 regarding Marine Finfish aquaculture states that a permit may be denied if a new permit negatively effects fishing.

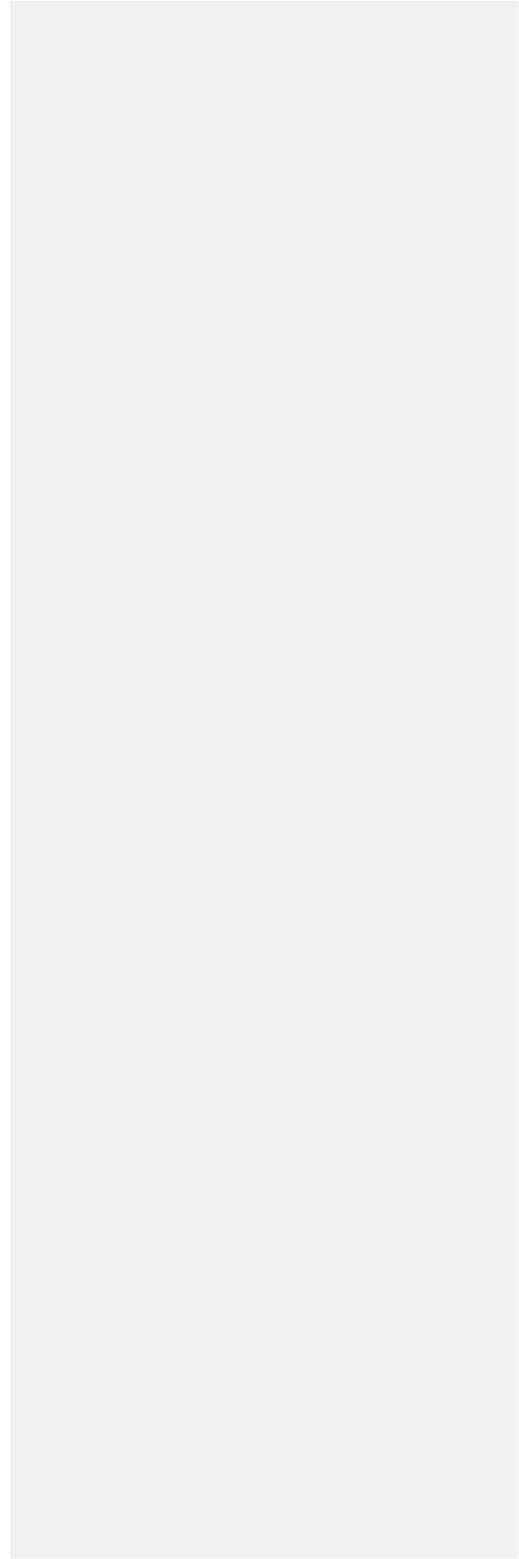
Dale comment:

This is an arbitrary decision to remove a WCMAC recommendation that is a legitimate concern that non-native finfish pose a RISK to native fish and should not be removed. CCF objects.

2. Dale comment:

WAC 220-76-120 is inadequate to address escaped finfish which once escaped have never been recovered in any instance anywhere in the world in marine waters. Escapee prevention is the only solution. WCMAC needs to make stronger recommendations for WAC's and RCW's in several areas of offshore aquaculture that must be implemented prior to permitting offshore aquaculture, if at all. Some pesticides are potentially detrimental to existing commercially important species and should be specifically banned – specifically cypermethrin

DRAFT



<b>MSP Mapping Application Active Data (6/15/2016)</b>	<b>Data owner</b>	<b>Notes</b>
<b>Energy Suitability</b>	Green = Updated Data	
Tidal Energy Devices	PNNL and Parametrix	
Wave Energy: Deepwater Energy Devices	PNNL and Parametrix	
Wave Energy: Mid-depth Energy Devices	PNNL and Parametrix	
Wave Energy: Nearshore, M3 Energy Devices	PNNL and Parametrix	
Wave Energy: Deepwater Energy Devices	PNNL and Parametrix	
Wave Energy: Mid-depth Energy Devices	PNNL and Parametrix	
Wave Energy: Nearshore, M3 Energy Devices	PNNL and Parametrix	
Wind Energy: Turbines Mounted on Jacket/Tri Founds	PNNL and Parametrix	
Viewsheds	Olympic Natural Resources Center	
<b>Human Uses: Empirical Evidence</b>		
Aquaculture Districts	Wa Dept. of Fish and Wildlife	
Commercial Albacore Fishing	Wa Dept. of Fish and Wildlife	
Commercial Dungeness Fishery	Wa Dept. of Fish and Wildlife	
Commercial Groundfish Fishery	Wa Dept. of Fish and Wildlife	
Commercial Pacific Whiting (Hake) Fishery	Wa Dept. of Fish and Wildlife	
Commercial Pink Shrimp Fishery	Wa Dept. of Fish and Wildlife	
Commercial Salmon Fishery	Wa Dept. of Fish and Wildlife	
Commercial Sardine Fishery	Wa Dept. of Fish and Wildlife	
Commercial Shellfish Growing Areas	Wa Department of Health	
Commercial Waterways (Deep Draft)	Bureau of Transportation Statistics	
Crabber and Towboat Lanes	Washington Sea Grant	
Northwest Training Range Complex	NOAA Nautical Charts	
Ocean Disposal Sites	Dredged Material Management Program	
Public Access	Wa Department of Ecology	
Recreational Albacore Fishery	Wa Dept. of Fish and Wildlife	
Recreational Bottomfish and Lingcod Fisheries	Wa Dept. of Fish and Wildlife	
Recreational Halibut Fishery	Wa Dept. of Fish and Wildlife	
Recreational Salmon Fishery	Wa Dept. of Fish and Wildlife	
Recreational Shellfish Beaches	Wa Department of Health	
Seafood Processors	Wa Department of Ecology	
Shipping Density	US Coast Guard/ NOAA National Marine Sanctuary	
Wrecks & Obstructions	NOAA Office of Coast Survey	
<b>Infrastructure</b>		
Beacons	NOAA Office of Coast Survey	
Buoys	NOAA Office of Coast Survey	
Marinas	WA Department of Ecology	
Outfalls	WA Department of Ecology/ WA Dept. Natural Resources	
Ports: Fishing Ports, Port Facilities	Commerce, Army Corps	
Submarine Cables	NOAA Office of Coast Survey	

<b>MSP Mapping Application Active Data (6/15/2016)</b>	<b>Data owner</b>	<b>Notes</b>
<b>Marine Boundaries</b>	Green = Updated Data	
3 Nautical Mile Limit	Wa Dept. of Natural Resources	
Coastal National Wildlife Refuges	US DFW	
County Boundaries	Wa Department of Ecology	
Exclusive Economic Zone	NOAA National Ocean Service	
MSP Study Area	Wa Dept. of Natural Resources	
Natural Area Preserves (NAP)	Wa Dept. of Natural Resources	
Natural Resources Conservation Areas	Wa Dept. of Natural Resources	
Olympic Coast National Marine Sanctuary	National Marine Sanctuaries Program	
Olympic National Park	Wa Dept. of Natural Resources	
Oyster Reserves	Wa Dept. of Fish and Wildlife	
Oyster Tracts	Wa Dept. of Natural Resources	
Seashore Conservation Area (Parks)	Wa Parks Commission	
Shoreline (Ownership Boundaries)	Wa Dept. of Natural Resources	
State Owned Aquatic Lands	Wa Dept. of Natural Resources	
WA Cities and Populations	Office of Financial Management	
<b>Marine Life and Habitat</b>		
Benthic Habitat	The Nature Conservancy	
Chinook Critical Habitat	NOAA	
Chinook Essential Fish Habitat	NOAA	
Chum Critical Habitat	NOAA	
Coho Essential Fish Habitat	NOAA	
Dunegrass	Wa Dept. of Natural Resources	
Eelgrass	Wa Dept. of Natural Resources	
Eulachon Critical Habitat	NOAA	
Forage Fish Surveys	Wa Dept. of Fish and Wildlife	
Green Sturgeon Critical Habitat	NOAA	
Groundfish Essential Fish Habitat	NOAA	
Kelp	Wa Dept. of Natural Resources	
Marine Mammal Haulout Locations	Wa Dept. of Fish and Wildlife	
Northern Sea Otter Occurrences	Wa Dept. of Fish and Wildlife	
Northern Sea Otter Summer Concentration Area	Wa Dept. of Fish and Wildlife	
Rocky Reefs	The Nature Conservancy	
Salt Marsh	Wa Dept. of Natural Resources	
Seagrass	Wa Dept. of Natural Resources	
Shoreline Biology & Habitat	Wa Dept. of Natural Resources	
Sockeye Critical Habitat	NOAA	
Steelhead Critical Habitat	NOAA	

Summer Whale Density	Duke University/NOAA SwFSC	
Washington State Seabird Catalog	Wa Dept. of Fish and Wildlife	
<b>MSP Mapping Application Active Data (6/15/2016)</b>	<b>Data owner</b>	<b>Notes</b>
<b>NOAA/BOEM: Participatory Mapping</b>	Green = Updated Data	
Extractive/Fishing Uses	NOAA and Bureau of Ocean and Energy Management	
Industrial Uses	NOAA and Bureau of Ocean and Energy Management	
Non-Extractive Uses	NOAA and Bureau of Ocean and Energy Management	
<b>Physical Oceanography</b>		
Bathymetry (25m contours)	Oregon State University/TNC	
Water Quality Monitoring	Wa Department of Health	
<b>Surfrider Foundation: Recreational Participatory Mapping</b>	Surfrider Foundation/Point 97	
Total Uses for All Recreational Activities		
Diving Activities		
Shore-Based Activities		
Surface Water Activities		
Wildlife Viewing and Sightseeing Activities		
Green = Updated Data		

## Spatial Analysis: Recap of Recent Workshops June 14, 2016

### Summary

The state recently held two workshops (May 26 and June 13, 2016) for WCMAC members and others to assist with the next steps on spatial analysis to inform the state's marine spatial planning process.

The purposes of these workshops were:

- To familiarize interested parties with MARXAN tool and potential scenarios
- To gather further input on MARXAN scenarios to:
  - 1) Assist state in preparing the series of maps required by statute, and
  - 2) To assist WCMAC in preparing spatial recommendations for the Marine Spatial Plan.

At the workshops, state staff presented draft scenarios and revised outputs using Marxan and received feedback from participants on data and the model parameters. Scenarios presented included:

- A. **Subsector Scenario** that included data on: fishing, aquaculture, recreation, shipping/transportation, ecologically important areas, and archaeological/historic resources. Intensity of use data was used, where available.
- B. **Sensitive Areas** that included data on: threatened and endangered species, marine mammals, seabird colonies, important habitats, and archaeological/historic resources.
- C. **Important Crab Areas** that included data on: commercial crab fishing and soft-bottom habitat within Special Management Areas and out to a depth of 150 fathoms.
- D. **Combined Scenario** that incorporated all of the above and crabber-tug/tow lanes.

Marxan results were illustrated against energy suitability data for: nearshore wave energy, mid-depth wind, and floating wind technologies and using both clumped and dispersed results. Two types of outputs were illustrated:

1. Meeting an **energy goal** using coarse estimates for energy production per hexagon (specific to technology type). The energy goal was based on anticipated future energy needs, state energy plans and policies, and designed to avoid high use areas within a scenario. This energy goal was based on estimates of potential future development in the 200-500 MW range and using various levels of energy suitability.
2. Using a new **cost-threshold** analysis to find the minimum potential renewable energy footprint that could be achieved without exceeding that cost threshold.

### Background:

The Marine Spatial Planning law requires a plan to include a series of maps that identify: "appropriate locations with high potential for renewable energy production with minimal potential for conflicts with other existing uses or sensitive environments" RCW 43.372.040(6)(c)

WCMAC has played an important role in advising on the criteria for the process and recommended actions for the outputs of the Use Analysis throughout the past year, including maps of ecologically important areas and maps of human activities.

The Use Analysis, as outlined by the state, involves the following main activities:

- Assessing and compiling data on existing uses and ecological information in two ways:
  - Intensity of uses – how frequently an area is used

## **Spatial Analysis: Recap of Recent Workshops**

### **June 14, 2016**

- Number of uses – how many uses occur in an area, regardless of how often
- Using spatial analysis tools to compare existing use data to renewable energy data
- Developing spatial recommendations

#### **What is Marxan?**

Marxan is a software optimization tool that enables spatial analysis of multiple sets of spatial data (GIS or mapped) using different scenarios to produce different options that meet multiple planning objectives. In the case of marine spatial planning, the tool can:

- Include data on human uses, ecological information (e.g. species/habitat) and potential new uses (e.g. renewable energy).
- Identify spatial overlap between existing uses and resources and potential new uses.
- Illustrate areas that avoid and minimize socio-economic and environmental costs, while still achieving various potential targets for new uses such as renewable energy.
- Incorporate stakeholder interests using different scenarios.
- Marxan does not provide a single answer or solution. Different scenarios reflecting different weightings of use data and different energy type will result in different results.

Marxan was originally developed in and used by Australia for marine conservation planning efforts and has since been used in a variety of coastal and land planning applications around the world. Marxan can be a useful tool for WCMAC to illustrate various scenarios and to support WCMAC's subsequent consideration of and development of spatial recommendations.

#### **Discussion/Next Steps:**

Participants discussed many topics at the two workshops, including:

- Questions and comments about data included in the scenarios and data quality.
- Challenges of imperfect data and of analyzing impacts without a specific proposal.
- Challenges of interpreting maps and describing map outputs.
- Challenges of comparing impacts to multiple uses versus impacts to a single use, recognizing that a large impact to a single use may be more significant than small impacts to a variety of uses.
- Benefit of using the data we have and using an objective tool like Marxan.
- The need for more focus on developing narrative recommendations.
- That more specific analyses of potential impacts can and will be done when a specific project is proposed.

The group discussed further fleshing out concepts for potential spatial recommendations, including:

- Identifying areas that are particularly valuable and vulnerable, and developing appropriate recommendations for these areas.
- Developing recommendations for ongoing data collection and updates as appropriate, and developing recommendations requiring applicants to gather and analyze other data.
- Developing recommendations regarding the scale of projects and potential cumulative impacts from multiple projects.

June 15, 2016

**Washington Coastal Marine Advisory Council  
Draft Work Plan**

The WCMAC work plan is a living document. It will be continually updated and used as a guide for planning WCMAC meetings. WCMAC members are encouraged to identify agenda requests as early as possible.

<b>Meeting</b>	<b>Information</b>	<b>Advice/Action</b>
June 15, 2016	<ul style="list-style-type: none"><li>• Recap of Spatial Analysis workshops</li><li>• Policy and spatial recommendations (continued)</li><li>• Update on draft MSP</li><li>• Discuss work plan topics/next steps (2017 meeting dates)</li></ul>	<ul style="list-style-type: none"><li>• Finalize WCMAC policy recommendations</li><li>• Discuss WCMAC spatial recommendations</li><li>• Meeting dates 2017</li></ul>
September 28, 2016	<ul style="list-style-type: none"><li>• Spatial recommendations (continued)</li><li>• Update on draft MSP</li><li>• MSP outreach update</li></ul>	<ul style="list-style-type: none"><li>• Finalize WCMAC spatial recommendations</li><li>• Input on MSP outreach</li></ul>
<i>TBD: Nov 9 or Dec 7, 2016</i>	<ul style="list-style-type: none"><li>• Spatial recommendations (continued, if needed)</li><li>• Update on draft MSP</li><li>• Discuss 2017 work plan</li></ul>	<ul style="list-style-type: none"><li>• Finalize WCMAC spatial recommendations (if needed)</li></ul>
<i>February 15, 2017</i>	<ul style="list-style-type: none"><li>• Update on draft MSP</li></ul>	<ul style="list-style-type: none"><li>• TBD</li></ul>
<i>May 10, 2017</i>	<ul style="list-style-type: none"><li>• TBD</li></ul>	<ul style="list-style-type: none"><li>• TBD</li></ul>

*Italics represent potential meeting dates for discussion.*

Other information needs to fit in:

- Background on state vs. federal jurisdiction.
- Lessons-learned from other planning processes.

Other topics, issues, or recommendations may be addressed through the process set up by the Council and as time and resources allow.

## 2.5 Aquaculture

---

Aquaculture is a major use within the large coastal estuaries of the MSP Study Area. The shellfish aquaculture industry provides income and jobs to the region and the state, promotes environmental monitoring in the estuaries, and is a key part of the cultural history and identity in Pacific and Grays Harbor Counties. As a state, Washington ranks first in aquaculture shellfish sales in the nation, with Pacific and Grays Harbor counties producing a substantial portion (about 29%) of the state's mollusk sales in 2012. The industry has a long history within the region and has adapted to several challenges to sustain a thriving industry. Current challenges such as invasive and nuisance species management, regulatory complexities, and climate change will continue to influence the future of aquaculture.

This chapter summarizes the history and current use of shellfish aquaculture in the MSP Study Area. Economic impacts, related infrastructure, and future trends of the industry are also presented here to outline the context of aquaculture and its role in the Washington coastal region.

### Summary of History and Current Use

---

Marine aquaculture is one of the oldest industries in the state of Washington and includes a variety of shellfish species, marine plants, and net-pen-raised salmon. Washington is currently a major player in shellfish aquaculture production in the United States. The U.S. Census of Aquaculture from 2005 ranks Washington first in value of sales of farmed mollusks (over \$63.7 million), with Washington-grown shellfish accounting for 31% of the value of U.S. farmed shellfish production (Industrial Economics Inc., 2014).

Aquaculture in the MSP Study Area is exclusively shellfish and occurs primarily in Willapa Bay (Pacific County), and to a lesser extent in Grays Harbor (Grays Harbor County). All but one of the shellfish farms are family-owned businesses, ranging from small "mom and pop" operations to larger, vertically-integrated farms with many thousands of acres. The communities of South Bend and Nahcotta on Willapa Bay are the primary centers for aquaculture activity (Industrial Economics Inc., 2014).

Native Olympia oysters (*Ostrea lurida*) originally dominated Willapa Bay and Grays Harbor. Heavy exploitation by the region's early Euro-American settlers resulted in the commercial extinction of Olympia oysters by the early 1900's, which led to the development of oyster farms. Pacific oyster (*Crassostrea gigas*) spat was transplanted from Japan starting in 1928. Imports continued until the mid-1970's when Pacific oyster larvae began to be successfully reared in local hatcheries. A thriving oyster industry has existed in the region ever since. Pacific oysters have naturalized in Grays Harbor and Willapa Bay, yet hatchery production has been necessary to ensure stable production and supply (Industrial Economics Inc., 2014). Beginning in the mid-2000's, hatcheries in the Pacific Northwest began to experience production failures. An increase in the acidity of coastal waters due to climate change is identified as the likely cause and hatcheries have had to adapt their practices to address the increased acidity in local coastal waters (Washington State Blue Ribbon Panel on Ocean Acidification, 2012).

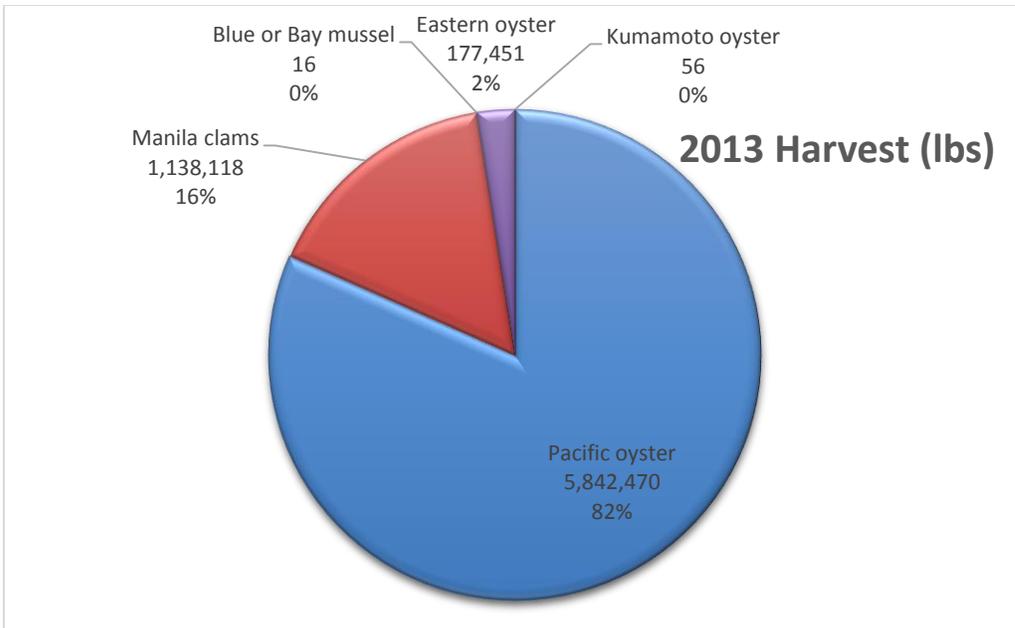
Invasive and noxious species have also shaped estuary management and the shellfish industry. Most notably was the extensive infestation of the non-native cordgrass species *Spartina alterniflora* and *S. densiflora*. *S. alterniflora* was unintentionally introduced to Willapa Bay during the late 1800's. By 2003, it had spread to over 8,500 solid acres within Willapa Bay. *S. alterniflora* has been present in Grays Harbor since the early 1990's and *S. densiflora* was discovered in Grays Harbor in 2001. *Spartina* is an aggressive plant that disrupts the ecosystem of the estuaries by outcompeting native vegetation and converting mudflats into *Spartina* meadows. This impacts shellfish beds, as well as migratory bird habitats (Washington State Department of Agriculture, 2015).

44 An extensive effort lead by the Washington State Department of Agriculture (WSDA) in partnership  
45 with WDNR, WDFW, ECY, local governments, tribes, USFWS, NMFS, and private landowners has resulted  
46 in the extremely successful reduction and control of *Spartina*. Control methods include herbicide  
47 applications and manual removal. In Pacific County (Willapa Bay) only 0.9 solid acres of *S. alterniflora*  
48 were reported in 2014, a 99.9% reduction since the peak in 2003. Dedicated resources, surveys, and  
49 removal treatments are ongoing to maintain the control program and prevent a resurgence of *Spartina*  
50 along the coast (Washington State Department of Agriculture, 2015).

51 Burrowing shrimp (*Neotrypaea californiensis* and *Upogebia pugettensis*) have also been a nuisance  
52 species to the aquaculture industry in Willapa Bay and Grays Harbor. These shrimp are native to  
53 Washington, but populations have grown drastically starting in the 1940's and 1950's. Burrowing shrimp  
54 destabilize the sediment and the beds become too soft to support oysters and aquaculture equipment;  
55 this has a dramatic economic influence on the aquaculture industry. The pesticide carbaryl was used to  
56 control burrowing shrimp since the 1960's, yet has recently been phased out of use. The industry is  
57 pursuing the use of an alternative pesticide, imidacloprid, to replace carbaryl to control the expansive  
58 populations of burrowing shrimp. However, environmental concerns by the public and customers have  
59 stalled the use of this alternative pesticide. Managing these species will continue to be a major  
60 challenge for the industry into the future (Taylor, Baker, Waters, Wegge, & Wellman, 2015; Washington  
61 State Department of Ecology, 2014).

62 The aquaculture industry is currently enjoying strong demand for its products. Main products  
63 include oysters and manila clams. According to WDFW 2013 data, Pacific oysters account for about 82%  
64 of shellfish farmed and harvested in Pacific and Grays Harbor counties. Manila clams make up about  
65 16% of harvest. Small amounts of eastern oysters, Kumamoto oysters, and blue and bay mussels are  
66 also produced (Figure A). By value, Pacific oysters accounted for approximately 83% of the relative value  
67 for shellfish in Pacific and Grays Harbor counties, with Manila clams accounting for about 11% (Figure B)  
68 (Industrial Economics Inc., 2014).

69 Pacific County produces more shellfish than Grays Harbor County. Harvest and value have varied  
70 over time (Table 1), and data suggest that there have been a general decrease in Pacific oysters and a  
71 general increase in Manila clams over the past 10 years (Industrial Economics Inc., 2014). Due to  
72 challenges in accurate and comprehensive reporting within the industry, WDFW recognizes that these  
73 numbers may under represent actual harvest. While WDFW data may not reflect true production values,  
74 they are currently the best available data to illustrate aquaculture production status and history  
75 (Industrial Economics Inc., 2014; Taylor et al., 2015).

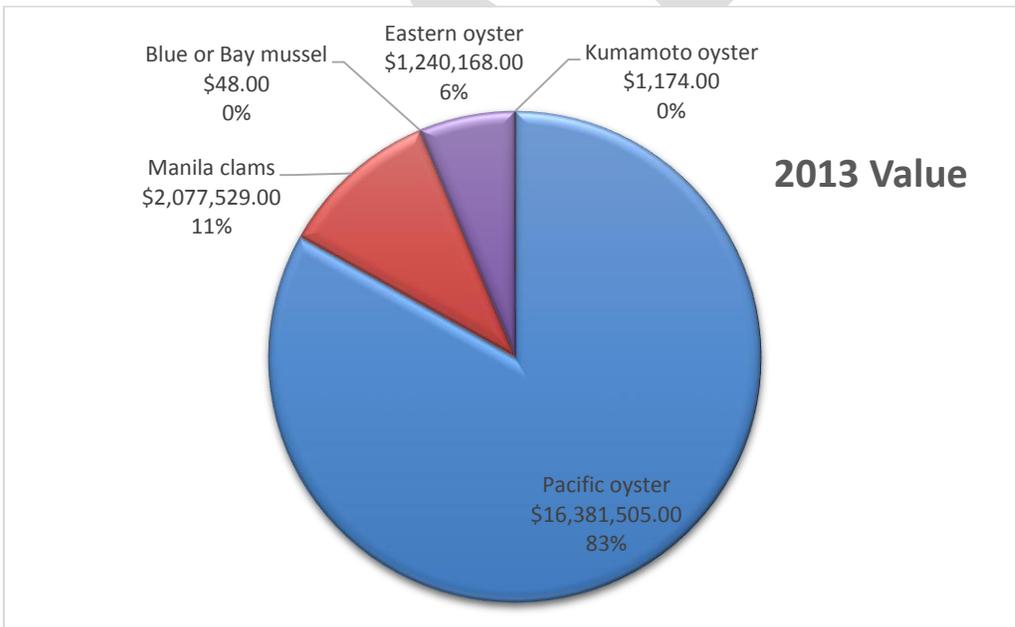


76

77

78

Figure A. Relative harvest (round lbs) of farmed shellfish products in Pacific and Grays Harbor Counties, 2013. Source: Industrial Economics (2014).



79

80

81

Figure B. Relative value (dollars) of farmed shellfish products in Pacific and Grays Harbor Counties, 2013. Source: Industrial Economics (2014).

82

83

Table 1. High and low values for harvest (round lbs) and value (2014 \$) of aquaculture Pacific oyster and Manila clams in Grays Harbor and Pacific Counties, 2004-2013. Source: Industrial Economics (2014).

Species	Gray Harbor County		Pacific County		Total	
	Harvest (lbs)	Value	Harvest (lbs)	Value	Harvest (lbs)	Value
Pacific oyster						
Manila clams						

<b>Pacific oyster</b>	1,030,586-1,804,434	\$3,519,614-\$6,134,273	4,276,566-6,803,533	\$11,194,059-\$16,707,209	5,842,470-8,274,431	\$16,381,505-\$21,494,323
<b>Manila clams</b>	0-9,034	\$0-\$24,983	704,446-1,187,787	\$1,419,160-\$2,638,361	704,529-1,196,821	\$1,419,160-\$2,638,361

84 Willapa Bay and Grays Harbor make a considerable contribution to state-wide and national  
85 aquaculture production. According to the USDA, Pacific County ranked 3<sup>rd</sup> among all Washington  
86 counties and 15<sup>th</sup> among all U.S. counties in aquaculture sales with over \$22.3 million in total sales in  
87 2012. Grays Harbor ranked 7<sup>th</sup> statewide, and 43<sup>rd</sup> nationally, with \$7.8 million in aquaculture sales. For  
88 mollusk production specifically, Pacific County and Grays Harbor County ranked 2<sup>nd</sup> and 4<sup>th</sup>, respectively,  
89 statewide in 2012. Pacific County produced about 23% of state farmed mollusk sales, and Grays Harbor  
90 County produced about 6% of statewide sales (Industrial Economics Inc., 2014).

91 Participation in the industry is significant, however reporting challenges make deriving consistent,  
92 representative numbers difficult. The Willapa Grays Harbor Oyster Growers Association (WGHOGA)  
93 reports that in 2014, 28 growers were members in Willapa Bay and 7 growers were members in Grays  
94 Harbor. The number of farms can fluctuate on a regular basis, and are not always consistent with WDFW  
95 estimates (reported 20 farms in Willapa Bay and 6 farms in Grays Harbor in 2012) due to small  
96 operations or frequent changes that may not be reflected in WDFW reported numbers (Taylor et al.,  
97 2015). Another way to measure participation is through tideland leases. All reported shellfish farms  
98 operate on privately owned tidelands or on tidelands that are owned by the state and leased through  
99 the Washington Department of Natural Resources (WDNR) to growers. WDNR reports that in 2015,  
100 approximately 50 leases were held for shellfish farming in Willapa Bay and Grays Harbor (WDNR  
101 personal communication, December 18, 2015). The Department of Health (DOH) also tracks the number  
102 of harvester and dealer licenses for commercial shellfish, as well as the number of certified harvest sites  
103 for the shellfish industry.

104 Shellfish aquaculture is an extensive spatial use of privately and publically owned tidelands in  
105 Willapa Bay and Grays Harbor. Commercially farmed acreage for aquaculture is estimated between  
106 2,288 to 3,278 acres in Gray Harbor and 14,681 to 17,288 acres in Willapa Bay. This represents  
107 approximately 66% to 80% of the total acreage for shellfish aquaculture in the state<sup>1</sup>. There is significant  
108 uncertainty about the actual numbers of acres in aquaculture production because acreage is  
109 continuously rotated and some portions of tracts may go unused from year to year. Growers report that  
110 they typically farm between two-thirds and one-half of the acreage they own or lease (Taylor et al.,  
111 2015). In addition to privately owned and WDNR leased lands, WDFW manages about 10,000 acres of  
112 intertidal and subtidal land as oyster reserves in Willapa Bay, and about 1,000 acres of these reserves  
113 are currently used for oyster production where licensed individuals may harvest naturally occurring  
114 oysters (WDFW personal communication May 23, 2016). Spatial use of the estuaries by the shellfish  
115 aquaculture industry is represented in Figure 1.

116 Oyster production can be accomplished using natural (aka wild set) or artificial cultivation. In a  
117 natural set, naturally recruited oysters settle onto tidelands covered with oyster shells. Artificial  
118 cultivation requires the purchase or growth of oyster larvae, which are placed in upland tanks of  
119 warmed water that have been filled with bags of oyster shells onto which the larvae settle. After five to  
120 ten days, the shells with the settled larvae (aka "spat") are removed and placed into a nursery area.  
121 They are then moved to a "grow-out ground" within the estuary, then transported again to a "fattening

<sup>1</sup> Estimates ranges are based on WDFW data compared with grower survey data.

122 bed” where they mature and grow until they reach harvest size(Industrial Economics Inc., 2014). Oysters  
 123 are primarily cultured using bottom culture methods, and some oysters are cultured using off-bottom  
 124 techniques such as longlines, flip bags, and racks and bags. The vast majority (approximately 95%) of  
 125 oysters cultured in Willapa Bay and Grays Harbor use bottom culture. 100% of Manila clam crops rely in  
 126 bottom culture techniques (B. Sheldon, personal communication, May 26, 2016).

127 Oysters are processed either by shucking or sold in-shell. Oysters for shucking are sent to shucking  
 128 houses, where the meat is removed and packaged for sale. Shucked meat can also be used for smoked  
 129 oysters. Oysters sold in-shell are generally purchased for cooking (e.g. on the grill) or to be eaten raw on  
 130 the half shell (aka “shellstock”). Generally, larger oysters are sent to Asia, medium and small oysters stay  
 131 in the U.S., and extra small oysters are sent to local oyster bars on the West coast. Demand for in-shell  
 132 oysters is increasing, and some farms are expanding their in-shell production (Industrial Economics Inc.,  
 133 2014). Clams are typically cleaned and bagged by the pound and sold to wholesalers or retail outlets.  
 134 Some companies are vertically integrated; they farm, process, and distribute their product as well as  
 135 provide a retail market. Other farms rely on separate processing facilities and distributors to move their  
 136 product (Taylor et al., 2015).

137 The aquaculture sector makes significant contributions to social, cultural, and environmental  
 138 systems. Ecologically, oyster beds are important biogenic habitat. They form complex structures that  
 139 provide refuge and hard substrate for marine plants and animals, enhancing biodiversity. Shellfish in the  
 140 estuaries provide important nursery habitat for commercially and recreationally important species, such  
 141 as fish, crab, and others. Research also suggests that shellfish provide environmental services, such as  
 142 water quality improvement through nitrogen removal (Skewgar & Pearson, 2011; Taylor et al., 2015).

143 Shellfish aquaculture can also bring water quality impairments to the attention of local  
 144 communities. Because of stringent U.S. health standards for water in which shellfish fisheries and  
 145 aquaculture operate that are set by the National Shellfish Sanitation Program, these coastal areas often  
 146 have amplified monitoring of environmental conditions. Harvest area closures due to water quality  
 147 impairments can result in economic hardships for the industry (Taylor et al., 2015). The industry has  
 148 assisted state and local government agencies, tribes, and private citizens in the planning and  
 149 implementation of improvements to sewage treatment systems or programs to fix local septic systems,  
 150 and other water quality pollution reduction programs. The aquaculture industry is often a protective  
 151 steward of water quality in and along the coastal estuaries.

152 The aquaculture industry is managed through a complex interaction of multiple agencies, each with  
 153 its own mandate, jurisdiction, and standards related to aquaculture. Table 2 provides a summary of the  
 154 primary agencies involved with shellfish aquaculture and their general role.

155 **Table 2. Primary regulatory agencies for Washington shellfish aquaculture and their roles.**

Agency	Role
<b>Washington Department of Ecology</b>	Ensures Coastal Zone Management Act consistency  Ensures Shoreline Management Act consistency through review and approval of certain Shoreline Permits  Issues 401 Water Quality Certifications for new and expanded aquaculture operations

	Issues NPDES permits for herbicide and pesticide applications
<b>Washington Department of Natural Resources</b>	Leases state-owned aquatic lands and authorizes use of those lands for aquaculture operations
<b>Washington Department of Fish and Wildlife</b>	Manages oyster reserves, processes aquatic farm registrations, and authorizes in-state and out-of-state shellfish importation and transfer
<b>Washington Department of Health</b>	State Shellfish Authority, ensure compliance with the National Shellfish Sanitation Program  Sets growing area classifications and boundaries; monitors water quality for toxins, pathogens, and viruses; closes areas that are unsafe for harvest; licenses and inspects commercial shellfish harvest and operations; certifies harvest sites; and responds to shellfish related reports and outbreaks
<b>United States Army Corps of Engineers</b>	Requires a Section 404 permit for the discharge of material into waters of the United States  Requires a Section 10 permit for work in navigable waters of the United States
<b>Washington Department of Agriculture</b>	Safeguards the public from consuming unsafe, adulterated, or misbranded food through processing plant licenses and product identification requirements.  Oversees the control of noxious and invasive species
<b>Local Governments</b>	Issues aquaculture use permits under local Shoreline Master Programs to protect natural resources for future generations, provide for public access, and plan for water-dependent uses

156

157 **Economic Impact of Aquaculture**

158 The coastal shellfish aquaculture industry provides a significant contribution to the local and  
159 statewide economy. However, comprehensive economic impact estimates are particularly challenging to  
160 generate for this industry due to discrepancies between state collected data and other reports from the  
161 industry. Taylor et al. (2015) analyzed data from the state, supplemented with surveys from the shellfish  
162 harvesting and processing industry, to estimate the economic contributions of the industry for the MSP.  
163 Economic contributions include direct expenditures by the industry, as well as indirect and induced  
164 effects generated by those industry expenditures, including the total number of jobs and total labor

165 income. Expenditures, total employment, and total labor income generated by the shellfish aquaculture  
166 industry in Pacific and Grays Harbor Counties are presented in Table 3.

167 Expenditures made by the shellfish industry include payments for goods and services such as payroll  
168 and benefits, seed oysters, ice, packaging, and taxes. A survey of processors and distributors indicate  
169 that about 71% of expenditures made by survey participants are made locally in Washington’s coastal  
170 counties, with 94% of expenditures made within Washington State. About 847 jobs and \$50 million in  
171 labor income are generated by the aquaculture industry (growing and processing) in the Washington  
172 coastal region. An additional 383 jobs and \$23.2 million in total labor income are generated in  
173 Washington State outside of the coastal region by the coastal aquaculture sector’s activities (Table 3)  
174 (Taylor et al., 2015).

175 **Table 3. Estimated regional expenditures by the Pacific coast shellfish aquaculture industry and total economic**  
176 **contribution (employment and labor income) to the Washington coast region and statewide. Source: Taylor et al. (2015).**

	Expenditures	Total Employment	Total Labor Income
Washington coast region	\$65.2 million	847	\$50 million
Statewide	\$78 million	1,230	\$73.2 million

177 Included in the total economic contribution to the state economy from shellfish aquaculture are  
178 revenue to the state from aquaculture land leases, license, and permit fees paid by shellfish farmers,  
179 and sales for access to the state-owned Willapa Bay Oyster Reserves for commercial harvest<sup>2</sup> (Taylor et  
180 al., 2015). WDNR leased lands generated about \$327,230 in revenue in 2010, and oyster sales from the  
181 Oyster Reserves have averaged about \$173,000 per year with clam sales averaging about \$15,000 per  
182 year (Industrial Economics Inc., 2014).

183 Industry representatives, state managers, and economists understand well the limitations of the  
184 above aquaculture economic contribution estimates. The Washington State Shellfish Initiative is looking  
185 to address this issue by designing a system to improve data collection and sharing of information on the  
186 economics of shellfish (Office of the Governor, 2016).

## 187 [Related Infrastructure](#)

---

### 188 [Hatcheries](#)

---

189 Shellfish hatcheries are vital to the aquaculture industry. Four companies provide hatchery larvae to  
190 farms in Willapa Bay and Grays Harbor: Whiskey Creek Shellfish Hatchery of Netarts, Oregon, Taylor  
191 Shellfish of Shelton, Washington, Coast Seafoods Company of Bellevue, Washington (now owned by  
192 Pacific Seafood), and the Nisbet Oyster Company of Bay Center, Washington. Some other companies are  
193 able to produce some larvae for their own operations, but it is often not enough to fulfill their entire  
194 seed need. Most hatchery production occurs in the Pacific Northwest, however the Nisbet Oyster  
195 Company has an operation in Hilo, Hawaii, Coast Seafoods has a clam larvae operation in Kona, Hawaii,  
196 and Taylor Shellfish has nurseries in California and Hawaii. Some operations in Hawaii were in response

---

<sup>2</sup> 60% of the proceeds from the sales of oysters on the reserves goes to research activities in Willapa Bay (WDFW, personal communication, May 31, 2016).

197 to the large scale oyster larvae failures in the mid 2000's and the concern of ocean acidification  
198 (Industrial Economics Inc., 2014; Taylor et al., 2015).

## 199 *Processors*

---

200 Processing facilities are also vital to the sale of shellfish aquaculture product. Processing can consist  
201 of simply cleaning the shell to prepare for selling live<sup>3</sup>, or the product can be processed in-shell (non-  
202 living) or be shucked and packed. The DOH has different licensing requirements for different categories  
203 of shellfish processors (aka "dealers"). Processors can be licensed to perform various processing and  
204 selling activities (e.g. shellstock shippers vs. shucker-packers, etc.<sup>4</sup>). Several processing companies that  
205 are licensed to shuck shellfish operate in Pacific County, including Coast Seafoods, Nisbet Oyster  
206 Company, Wiegardt Brothers, Ekone Oyster Company, Bay Center Mariculture, Chetlo Harbor Shellfish,  
207 Palix Oyster Company, and South Bend Products. Another large company, Taylor Shellfish, ships its  
208 product out of the Study Area to a facility in Shelton for processing. Processing in Grays Harbor is more  
209 limited, with Brady's Oysters and Lytle Seafood being the only processors of oysters in the area  
210 (Industrial Economics Inc., 2014; L. Johnson (DOH), personal communication, December 22, 2015).

211 Processors also ship their product in- and out-of-state, as well as overseas. Many processing  
212 companies transport the product themselves or rely on another company or consolidated shipper  
213 (Taylor et al., 2015; L. Johnson (DOH), personal communication, December 22, 2015).

## 214 *Water access*

---

215 As an estuary use, water access is required for the farming of shellfish. Willapa Bay has marinas that  
216 are primarily used by oyster growers, such as Bay Center Marina and Nahcotta, to transport and store  
217 boats, along with other aquaculture water access related activities. Some farms and processors have  
218 their own private docks and water access for operations in Willapa Bay and Grays Harbor.

## 219 *Future Trends*

---

220 Shellfish growers and processors face many current challenges and future uncertainties within the  
221 industry. Primary among future uncertainties are invasive and native nuisance species control,  
222 regulatory and policy changes, climate change, workforce availability, and changes to estuary uses.  
223 Experimentation with geoduck culture and the development of the Manila clam market are  
224 opportunities for aquaculture expansion.

## 225 *Invasive and native nuisance species control*

---

226 Invasive and native noxious and nuisance species are perceived by aquaculture stakeholder  
227 representatives as the greatest threat to the industry (Industrial Economics Inc., 2014). While the 99.9%  
228 reduction of *Spartina* in Willapa Bay is a substantial success story (Washington State Department of  
229 Agriculture, 2015), other invasive and nuisance species pose current and future risks to aquaculture  
230 growing conditions in Willapa Bay and Grays Harbor. Current species include (but are not limited to) the  
231 noxious weed<sup>5</sup> Japanese eelgrass (*Zostera japonica*), burrowing shrimp (*Neotrypaea californiensis* and

---

<sup>3</sup> DOH uses the term "shellstock" to describe oysters that are washed and kept live.

<sup>4</sup> For descriptions of the various dealer license categories, please see Industrial Economics (2014).

<sup>5</sup> A "noxious" weed in Washington is the traditional, legal term for any invasive, non-native plant that threatens agricultural crops, local ecosystems or fish and wildlife habitat. For more information on noxious weeds in Washington, including Japanese eelgrass, go to <http://www.nwcb.wa.gov/default.asp>

232 *Upogebia pugettensis*), and two species of non-native oyster drills (*Ceratostoma inornatum* and  
233 *Urosalpinx cinerea*) (Industrial Economics Inc., 2014; Taylor et al., 2015).

234 The impacts on aquaculture production by nuisance species can be quite significant, with one expert  
235 suggesting declines as much as 10%-20% in shellfish production per year in areas of high burrowing  
236 shrimp populations. Controlling burrowing shrimp can be quite challenging and costly to the industry,  
237 and currently requires the use of pesticides to be effective. Similarly, Japanese eelgrass also requires the  
238 use of herbicides for control. The application of known effective chemicals for these species is  
239 environmentally controversial and requires permits from the Washington Department of Ecology. In  
240 addition, new species may be introduced in the future or environmental changes to the estuaries could  
241 result in a species interaction shift that can have unforeseen impacts to aquaculture. Present day and  
242 potential future invasive and nuisance species will continue to be a threat and create significant  
243 operational, regulatory, and economic challenges for the aquaculture industry (Industrial Economics  
244 Inc., 2014; Taylor et al., 2015).

### 245 *Regulatory burden and uncertainty*

---

246 Regulatory requirements are perceived by many industry representatives as complicated,  
247 burdensome, costly, time consuming, and not conducive to a growing aquaculture industry. Main  
248 concerns voiced include: (1) resources required to comply and keep up with permit application, renewal,  
249 and reporting requirements, etc.; (2) as a result of new permit requirements, the industry is vulnerable  
250 to additional challenges from conservation organizations which can result in expensive legal  
251 proceedings; and (3) environmental requirements with which shellfish farms must comply are  
252 burdensome. The complicated nature of aquaculture industry regulations is a current challenge, and will  
253 continue to pose challenges to the future of the industry, particularly if new, more restrictive regulations  
254 are put into place (Industrial Economics Inc., 2014; Taylor et al., 2015). The Shellfish Interagency  
255 Permitting Team, part of the Washington Shellfish Initiative, has recently released recommendations to  
256 address permitting challenges in the aquaculture industry and will continue to work to improve the  
257 permitting process (Lund & Hoberecht, 2016).

### 258 *Climate Change*

---

259 A changing climate could lead to alterations of environmental conditions within the estuaries, and  
260 ultimately the growing conditions for the aquaculture industry. Among the key concerns related to  
261 climate change are the consequences of ocean acidification, sea level rise, and water temperature.

262 Ocean acidification is one of the primary environmental concerns for the shellfish aquaculture  
263 industry in the MSP Study Area as well as elsewhere in Washington. As ocean acidity increases, calcium  
264 carbonate upon which young oysters rely to grow their shells becomes less available. This leads to  
265 thinner shells, slower growth rates, and higher mortality rates. Because oysters and other shellfish are  
266 most vulnerable when they are young, scientists believe that ocean acidification is likely the cause of  
267 failure of the natural set in recent years, as well as large scale hatchery failures using local seawater. The  
268 state of Washington has recognized the severity of this issue and potential risks to the economy and  
269 culture of the aquaculture industry, and the Governor's office has taken a number of steps to promote  
270 research and actions to address this issue, including a Washington State Blue Ribbon Panel on Ocean  
271 Acidification (Washington State Blue Ribbon Panel on Ocean Acidification, 2012).

272 Hatcheries and oyster production companies have incurred considerable costs to address the  
273 consequences of ocean acidification, and are investing for the future in anticipation of further increases  
274 in ocean acidity. The Blue Ribbon Panel estimated that ocean acidification has already cost the oyster  
275 industry over \$110 million. One company has opened a hatchery in Hawaii to avoid the acidic waters

276 entering the Pacific Northwest, which has increased the cost of producing and providing oyster spat.  
277 Many companies may not have the means to relocate hatcheries if they own one or may not be able to  
278 absorb the costs of purchased spat (Industrial Economics Inc., 2014; Taylor et al., 2015).

279 The failure of natural oyster sets (either from ocean acidification or other conditions) creates  
280 challenges and increased costs for the oyster industry. One company has seen a five to six time increase  
281 in seeding process costs. The failure of a natural set in the Willapa Harbor State Oyster Reserve, which  
282 depends completely on the occurrence of natural larvae sets, will diminish oyster supply. This in turn will  
283 decrease income provided by the reserve as well as reduce the quality of oyster habitat and the  
284 associated ecosystem services within Willapa Bay (Industrial Economics Inc., 2014; Taylor et al., 2015).

285 Sea level rise may also impact the shellfish industry. Most shellfish culture occurs on the intertidal  
286 substrate, and the intertidal zone will shift landward or be reduced as a result of sea level rise. This may  
287 decrease access to aquaculture beds, decrease available harvest time at low tides, and likely shift  
288 optimal growing areas. Changes in property boundaries and harvest areas will create logistical and  
289 management challenges for the oyster industry (Taylor et al., 2015).

290 As water temperatures rise with climate change, the shellfish industry could be impacted in a  
291 number of ways. First, increased temperatures may reduce shellfish growth, reproduction, distribution,  
292 and health. Second, rising water temperatures may increase the occurrence of Harmful Algal Blooms  
293 (HABs) and bacteria, which can produce natural toxins that cause human illness or death when they are  
294 concentrated within filter feeding shellfish. *Vibrio parahaemolyticus* is a naturally-occurring bacterium  
295 common in Washington in the warm summer months. *V. parahaemolyticus* causes illnesses each year,  
296 mostly impacting consumers of raw oysters. The Washington Department of Health (DOH) is responsible  
297 for monitoring HABs and *V. parahaemolyticus* in shellfish growing areas. The DOH is concerned that  
298 HABs and *V. parahaemolyticus* will increase in frequency, duration, and severity with rising water  
299 temperatures. Rising water temperatures may also result in new, more dangerous varieties of toxins and  
300 other pathogens. The DOH tracks reports of shellfish-related illnesses and monitors for emerging toxins  
301 and pathogens in close collaboration with research partners at the National Oceanographic and  
302 Atmospheric Administration, the Food and Drug Administration, and academia. The emergence of new  
303 toxins and pathogens would result in a significant negative economic impact to the industry (Industrial  
304 Economics Inc., 2014; Taylor et al., 2015; L. Johnson, personal communication, December 22, 2015).

### 305 *Potential changes to estuary uses*

---

306 Changes in the intensity and frequency of current co-uses of the estuaries may influence the  
307 shellfish aquaculture industry on the coast. Projected increases in crude oil transportation by ship and  
308 by rail is of particular concern (cross reference marine stressors oil section). Concerns center on the risk  
309 of an oil spill, and the potential severe impact it could have to the industry through contamination of  
310 shellfish beds. Another concern for Grays Harbor growers is the planned federal navigation channel  
311 deepening (cross reference dredging chapter). Past navigational dredging is believed to contribute to  
312 loss of oyster beds now buried by sand, decreased production from wave action, and changes in  
313 substrate size (Industrial Economics Inc., 2014). These changes to marine traffic and increases in oil  
314 transportation place additional uncertainty for the future of the aquaculture industry.

315 Potential new uses addressed within the Marine Spatial Plan also cause some concern among  
316 industry representatives. Aquaculture is highly dependent upon environmental conditions such as water  
317 flow and water quality. Some representatives are concerned about what effect a Marine Renewable  
318 Energy project within or near the estuaries may have on water flow (Industrial Economics Inc., 2014).  
319 Another potential concern is the possibility of net pen aquaculture within the estuaries. Finfish  
320 aquaculture can be associated with reduced water quality in shallow and poorly flushed sites (cross

321 reference Offshore Aquaculture). There is currently no net pen aquaculture (finfish) within the estuaries.  
322 If net pens were to be developed within Grays Harbor or Willapa Bay, growers may be concerned about  
323 potential water quality changes and the consequences for the shellfish industry. Currently, there is no  
324 known active interest in net pen aquaculture in Willapa Bay or Grays Harbor and it is unlikely this activity  
325 would be sited here in the future.

326 In summary, even while facing several existing challenges and future uncertainties, the aquaculture  
327 industry is currently enjoying strong demand for its products. Experts believe the industry can continue  
328 to grow and thrive if: the industry is able to innovate and adjust to changing climatic conditions and  
329 other challenges, such as invasive and nuisance species; policy makers can address concerns of uses  
330 such as crude oil transportation; and the regulatory structure allows for a reasonable and flexible  
331 opportunity to address these challenges. Furthermore, experts have identified areas of potential  
332 expansion into the culture of geoduck clams and further develop production and markets for Manila  
333 clams (Industrial Economics Inc., 2014). Aquaculture is important economically and socially to the coast  
334 and the state of Washington, and will continue to play a role in future policies and decisions for coastal  
335 and marine uses.

## 336 References

---

337 WDNR, personal communication, December 18, 2015.

338 L. Johnson (DOH), personal communication, December 22, 2015.

339 WDFW personal communication May 23, 2016

340 Brian Sheldon, personal communication, May 26, 2016.

341 Industrial Economics Inc. (2014). *Marine sector analysis report: Aquaculture* (Sector Analysis Report;  
342 Washington Department of Natural Resources Contract No. SC 14-327). Prepared for the  
343 Washington Coastal Marine Advisory Council. Retrieved from [http://msp.wa.gov/wp-](http://msp.wa.gov/wp-content/uploads/2014/03/AquacultureSectorAnalysis.pdf)  
344 [content/uploads/2014/03/AquacultureSectorAnalysis.pdf](http://msp.wa.gov/wp-content/uploads/2014/03/AquacultureSectorAnalysis.pdf) [Source type 11].

345 Lund, P. J., & Hoberecht, L. H. (2016). *Shellfish Interagency Permitting Team Phase I Report*. Shellfish  
346 Interagency Team. Retrieved from <http://www.ecy.wa.gov/programs/sea/aquaculture/sip.html>  
347 [Source type 11].

348 Office of the Governor. (2016, January). Washington Shellfish Initiative Phase II Work Plan. Washington  
349 Governor's Legislative and Policy Office. Retrieved from  
350 [http://www.governor.wa.gov/issues/issues/energy-environment/gov-inslee%E2%80%99s-](http://www.governor.wa.gov/issues/issues/energy-environment/gov-inslee%E2%80%99s-shellfish-initiative)  
351 [shellfish-initiative](http://www.governor.wa.gov/issues/issues/energy-environment/gov-inslee%E2%80%99s-shellfish-initiative)

352 Skewgar, E., & Pearson, S. F. (Eds.). (2011). *State of the Washington coast: Ecology, management, and*  
353 *research priorities*. Washington Department of Fish and Wildlife.

354 Taylor, M., Baker, J. R., Waters, E., Wegge, T. C., & Wellman, K. (2015). *Economic analysis to support*  
355 *marine spatial planning in Washington*. Prepared for the Washington Coastal Marine Advisory  
356 Council. Retrieved from [http://www.msp.wa.gov/wp-](http://www.msp.wa.gov/wp-content/uploads/2014/02/WMSP_2015_small.pdf)  
357 [content/uploads/2014/02/WMSP\\_2015\\_small.pdf](http://www.msp.wa.gov/wp-content/uploads/2014/02/WMSP_2015_small.pdf) [Source type 11].

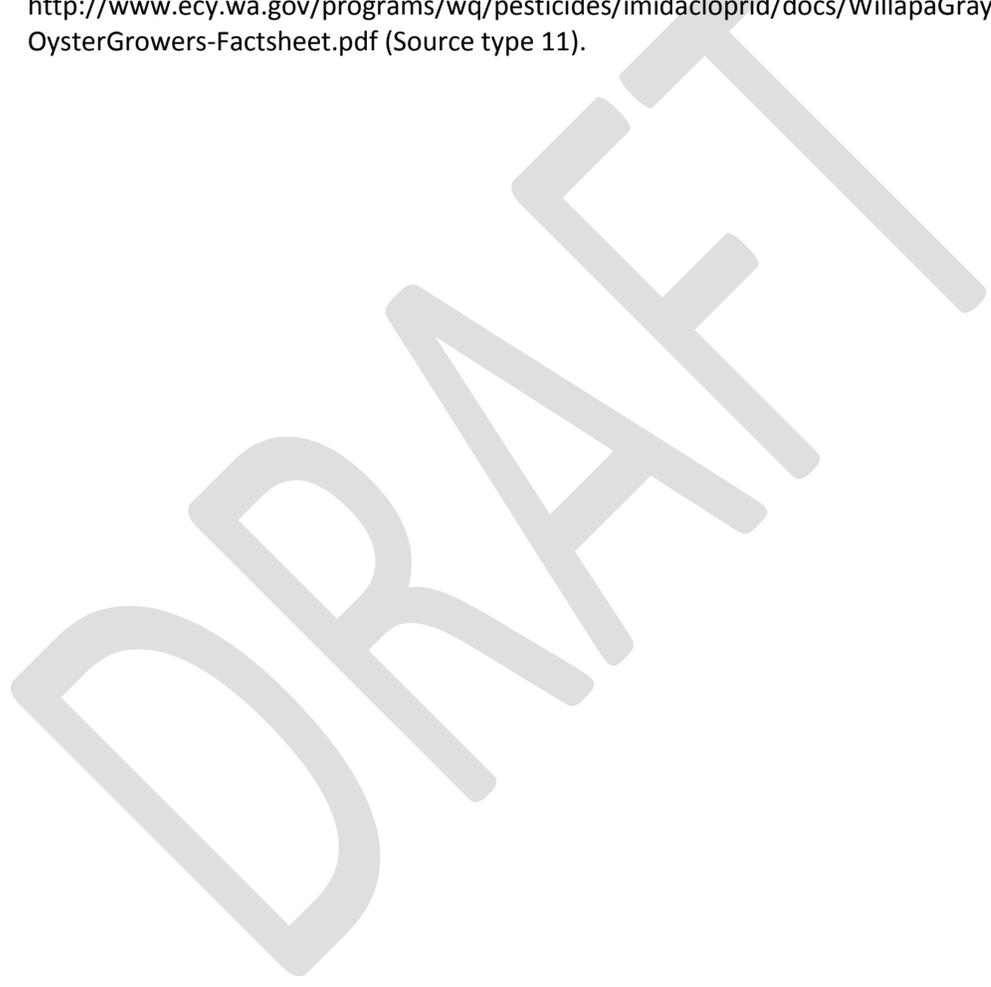
358 Washington State Blue Ribbon Panel on Ocean Acidification. (2012). *Ocean acidification: From*  
359 *knowledge to action, Washington State's strategic response*. (H. Adelman & L. W. Binder, Eds.).

360 Washington Department of Ecology. Retrieved from  
361 <https://fortress.wa.gov/ecy/publications/documents/1201015.pdf> [Source type 11].

362 Washington State Department of Agriculture. (2015). *Spartina eradication program 2014 progress*  
363 *report*. Olympia, WA: Washington State Department of Agriculture. Retrieved from  
364 <http://agr.wa.gov/PlantsInsects/Weeds/Spartina/docs/SpartinaReport2014.pdf> [Source type  
365 11].

366 Washington State Department of Ecology. (2014, October 24). Fact sheet for Willapa Grays Harbor  
367 Oyster Growers Association National Pollutant Discharge Elimination System (NPDES) permit no.  
368 WA0039781. Washington Department of Ecology. Retrieved from  
369 [http://www.ecy.wa.gov/programs/wq/pesticides/imidacloprid/docs/WillapaGraysHarbor-](http://www.ecy.wa.gov/programs/wq/pesticides/imidacloprid/docs/WillapaGraysHarbor-OysterGrowers-Factsheet.pdf)  
370 [OysterGrowers-Factsheet.pdf](http://www.ecy.wa.gov/programs/wq/pesticides/imidacloprid/docs/WillapaGraysHarbor-OysterGrowers-Factsheet.pdf) (Source type 11).

371  
372  
373  
374  
375  
376  
377  
378  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
390  
391  
392  
393



395 **2.3 Aquaculture**

396 DRAFT Figure 1: High Value Areas for Aquaculture

