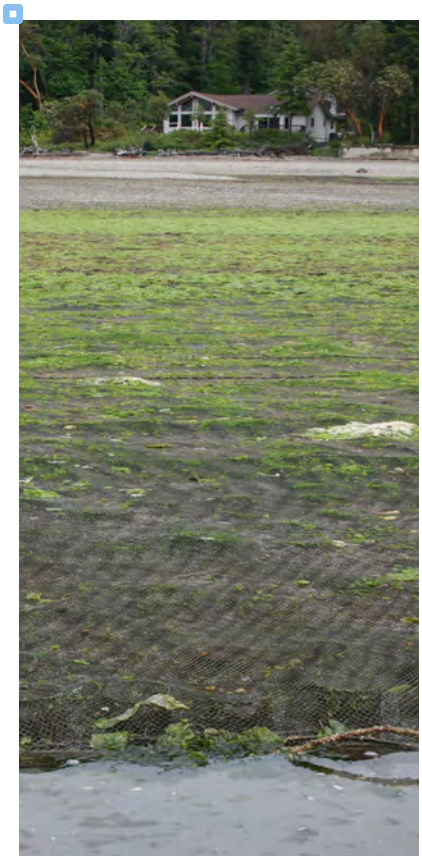
Geoduck Aquaculture in South Puget Sound
Understanding the Social and Policy Dimensions

University of Washington Environmental Management Certificate Program Keystone Project, March 2015



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Executive Summary

Geoduck aquaculture, the commercial farming of geoducks, is an expanding industry in Washington State. Research addressing the social and policy dimensions of aquaculture is required as the situation surrounding aquaculture involves a wide variety of stakeholders with varying positions and concerns, as well as a complex permitting process for the approval of commercial operations. Understanding the social and policy dimensions of aquaculture will allow concerned stakeholders, policy-makers, citizens, and the legislature to continue to have a voice in the future of industry and the environment on Washington shorelines.

As a Keystone Project conducted by graduate students in the Environmental Management Certificate Program at the University of Washington, this project attempts to provide an improved understanding of the values, beliefs, and viewpoints of the stakeholders involved, as well as how these human dimensions affect the permitting and appeals process. The project goals are:

Conduct a partial situation assessment with stakeholder interviews to identify the common themes and opinions regarding geoduck aquaculture in the South Puget Sound.

Analyze the policy process through Hearings Board hearings relevant to geoduck aquaculture and identify common themes and issues.

***Situation Assessment* -** Our partial situation assessment involved conducting twenty-three interviews with heavily involved stakeholders to determine the interests and perspectives of the stakeholders in geoduck aquaculture. Our interviewees were selected using non-random "snowball" sampling and were interviewed through the prior approval of the University of Washington Institutional Review Board. Our confidential interviews revealed that many respondents expressed values and attractions of the south Puget Sound concerning its pristine and natural beauty, its recreational uses, its commercial uses, and their related "sense of place." Although opinions diverged regarding a 'working waterfront' vs. an unaltered shoreline, common concerns expressed during interviews included aesthetic impacts, ecological impacts, recreational access, economic impacts, and the status of current research.

During the interview process, respondents were asked to assess the current barriers to addressing their concerns. A lack of information, specifically regarding the previously mentioned concerns, was a common sentiment among stakeholders. Some stakeholders believed the shellfish industry was being "vilified" while others believed that the shellfish industry is influencing research on the impacts of aquaculture. Overall, our research indicates a disagreement over the facts about the effects of geoduck aquaculture.

Permitting Process Analysis **-** Our Hearings Board research involved analyzing eleven hearings board decisions. The results of our analysis indicated that petitioners involved in hearings board decisions used a wide variety of arguments to attempt to deny commercial growing and harvesting permits to shellfish companies. These arguments focused on the aesthetic and ecological impacts of geoduck aquaculture as well as on recreational access. In nearly all decisions, petitioners requesting the reversal or modification of a permit failed to meet a burden of proof required to demonstrate the harmful effects of commercial aquaculture operations. The only exception was a decision concerning the impact of aquaculture on existing eelgrass. In this decision, a Cumulative Impact Assessment was required before the permit could be issued. Best management practices were also addressed, and in all of the decisions, the procedures outlined in the Pacific Coast Shellfish Growers Association's Environmental Code of Practice were found to be sufficient, with site-specific management practices applied as needed.

Recommendations - Based on the results of our analysis through our situation assessment, as well as our policy analysis of the permitting process, we recommend the following:

Do not attempt collaborative dialogue or conflict resolution strategies at this time. Petitioners have not been successful in using hearings boards to prevent new aquaculture permits, so industry representatives may not have an incentive to participate in a collaborative process. In addition, stakeholders' disagreement on the core ecological and economic assumptions surrounding geoduck aquaculture makes collaborative approaches unlikely to succeed.

Continue conducting research on geoduck aquaculture regarding the ecological and social dimensions of the issue.

Maintain the current best management practices commonly applied to geoduck aquaculture to minimize their impact on the surrounding environment.

Improve the communication of research results to all stakeholders.

Background

Geoducks are large marine clams native to Washington State that are harvested recreationally as well as commercially. The first geoduck fishery opened in 1970, with commercial aquaculture in Puget Sound beginning in 1996.[1] Shellfish aquaculture, the farming of shellfish, is an established industry throughout Washington waters. Washington State is unique in that the majority of its shorelines were privatized with the intention of cultivating shellfish on those lands.[2] The privatized shorelines also have a common resource aspect in that they must be strictly managed under the shoreline use provisions in Washington's 1972 Shoreline Management Act (SMA).[3] The SMA allows for multiple uses of shorelines by businesses or resident landowners, including "single family residences, ports, shoreline recreational uses, water dependent industrial and commercial developments and other developments that provide public access opportunities. To the maximum extent possible, the shorelines should be reserved for 'water-oriented' uses, including 'water-dependent', 'water-related' and 'water-enjoyment' uses.[4] Under this definition, aquaculture is categorized as a water dependent use and is thus a preferred use of Washington Shorelines under the SMA. In this way, shorelines of Washington serve as working waterfronts, recreational areas, and places of residence.

Geoduck aquaculture in Washington State operates in a variety of shoreline areas, and harvests are generally profitable, with prices as high as $25 per pound at the dock, or $125 dollars per pound when exported to other countries such as China.[1] This has created an aquaculture industry in Washington that produces about $22 million dollars annually. Geoduck aquaculture involves planting juvenile geoducks in subtidal and intertidal zones. In Washington, geoduck aquaculture is practiced in Puget Sound, a large estuarine

[1] "Aquaculture Leasing on State Lands." Washington State Department of Natural Resources. n.d. Web. 14 Dec.
[2] "Puget Sound Shorelines." Washington Department of Ecology. n.d. Web. 14 Dec. 2014.
[3] "Chapter 90.48 RCW Water Pollution Control." 2013. Web. 3 March 2015.
[4] "Shoreline Management Act." Washington State Legislature. 1971. Web. 22 Nov. 2014

complex of waterways and basins that constitutes the southern portion of the Salish Sea. Commercial geoduck farms range in size from about half an acre to as large as five acres.[5] Aquaculture projects can take place on state, tribal, or private lands. In some cases shellfish farmers own the tidelands they cultivate, and in other cases lease areas from private landowners or from the state. During the early portion of the 5-7 year culture cycle, shellfish farmers protect young geoduck ("seed") by placing them within short sections of PVC tube that have been set upright into the sediment. These tubes are then covered with netting, and together this structure prevents predation from animals such as snails, crabs, fish and birds. Once geoduck have reached market size, harvest is conducted by injecting a high-volume of low-pressure water to loosen the sediment around the geoduck so that a worker may extract it without damaging it. Subtidal operations are conducted in areas that are almost always submerged. In these situations, shellfish farmers use scuba divers to conduct harvests. Intertidal farms operate in tidelands where the area periodically exposed at low tide and under water at high tide. In general, intertidal operations are less expensive and more easily managed than subtidal operations and are therefore preferred in most situations.[6]

Because of the history and complexity of geoduck aquaculture in Washington State, a variety of stakeholders are involved. Geoduck farmers as well as landowners who lease to shellfish growers are directly involved, as are non-leasing landowners and non-profit groups. Several county, state, and federal organizations are also involved in both research and in the permitting process. The Washington Department of Ecology, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, the Army Corps of Engineers, Washington Governor's Office, Washington State legislature, tribal governments, Washington Department of Health, Washington Sea Grant, NOAA, and the various universities conducting research on aquaculture are all stakeholders in this issue.

[5] Washington Sea Grant. "Final Report: Geoduck Aquaculture Research Program." *Report to Washington State Legislature.* Nov. 2013.

[6] Cooper, Diane. Expert Testimony. Shoreline Hearings Board. S06-039.

Past Research

Ecological Research:

Many of the issues surrounding geoduck aquaculture involve ecological concerns, and reviewing research over the past decade provides important context to the situation. The literature reviewed includes Environmental Impact Statements (EIS) regarding several aquaculture projects as well as research conducted by consulting firms, Washington Sea Grant, multiple universities, and other sources. A few key findings are listed below:

Effects on sediment communities - Geoduck harvests have minimal effects on soft bottom sediment communities. Water and sediment quality remain unaffected and soft sediment biota may recover more quickly from geoduck harvesting practices than from many other types of human (e.g., trawling) and natural (e.g., severe storms) disturbances.[7]

Effects on genetic patterns and diseases in wild geoduck communities - Commercial geoduck harvests have an effect on the rates of toxin-related disease that is no greater than the average background effect found in nature. No significant effect on wild geoduck genetics was found as a result of geoduck aquaculture.[7]

Effects on habitat - Geoduck aquaculture does not produce significant impacts on the life cycle of forage fish. PVC tubes and nets have been observed temporarily enhancing local algae productivity. Aquaculture may exclude some species and life history stages while enhancing others. Juvenile salmon may find more cover and prey due to the PVC tubing. It is unlikely that aquaculture will have any impact on forage fish or salmonids. The recovery rates for benthic invertebrates following farming activities ranges from 56 days in sandy sediment to 12 months in denser sediment.[8]

Effects of Foreign Objects - Netting and other gear used in geoduck aquaculture poses a strangulation hazard for animals; however, proper farm management reduces the possibility of animals becoming entangled in the netting or ingesting gear. Heavy metals, chlorine, and other chemicals do not leech from the PVC tubing at any significant rate nor do these materials breakdown to produce microplastic particles.[9]

Effects on Species Abundance and Diversity - Several indicator species were observed at geoduck aquaculture sites. These indicator species are used for biomonitoring and can help assess ecological impacts such as changes to water quality, habitat quality, and toxins. Some

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[7] Fisher, Jeffrey. "A Supplemental Analysis of the Environmental Concerns Associated with Intertidal Geoduck Clam Aquaculture: Effects on Wild Geoduck Genetics, Potential for Toxin Resuspension, and Effects on Soft-Sediment Associated Communities." *ENVIRON International Corporation publication*. 23 Oct. 2008.

[8] Houghton, Jonathan. "Longbranch Shellfish Report for Thurston County." *Pentech Environmental Publication.* 15 Feb. 2011. Web. 21 Dec. 2014.

[9] Schenck, Rita. "Report on the Potential Environmental Impacts of the Proposed Longbranch Geoduck Culturing Facility." *Institute for Environmental Research and Education.* Web. 15 Feb. 2011.

species became more abundant with aquaculture while others decreased, but only temporarily, and most effects were in the same magnitude as seasonal variation. Taxa showed no consistent response to geoduck aquaculture. Transient fish and macroinvertebrates did have different populations in natural areas relative to where farms had used equipment such as tubes and nets, although the total abundance of macroinvertebrates more than doubled in farmed areas. No behavioral differences such as feeding habits in other species such as salmon smolts were observed between any of the sites.[10]

Previous research indicates that the ecological effects of geoduck aquaculture are temporary, with a site used for aquaculture returning to its natural state in three to twelve months after aquaculture had ceased.[7] Current research also indicates that ecological disruption caused by geoduck aquaculture is consistent with the normal variation found in nature, or that the impacts from aquaculture are similar in effect to impacts from normal patterns of weather and ocean currents.[10]

Social Research:

There exist few studies on the social and human aspects of geoduck aquaculture. Much of the research focuses on quantitative ecological impacts of aquaculture, or on the divided opinions regarding the uses of limited natural resources. The issues surrounding geoduck aquaculture in Puget Sound can be categorized as a resource conflict. Resource conflict involves the usage of natural resources in a variety of ways, some of which may be mutually exclusive.[11] In the case of geoduck aquaculture, the finite natural resource is tidal land. Different stakeholder groups value different uses of a finite resource, and as a result disagree over how the resource should be allocated. A summary of social and qualitative research dealing with natural resource conflicts is listed below:

Sense of Place - There is a connection between an individual's sense of place and sense of identity and the values of the environment they perceive. Sense of place is the feeling that the resource is a defining part of one's home and community. Social group identity also influences political behavior and values. A study conducted by Antony Cheng states that, "natural resource politics are a contest over place meanings as well as a competition among interest groups over scarce resources."[12]

Collaborative Processes - Collaboration and information sharing can provide a framework for natural resource conflict solutions. "Information collection improves the understanding of all

[10]Washington Sea Grant. "Final Report: Geoduck Aquaculture Research Program." *Report to Washington State Legislature.* Nov. 2013.

[11]Daniels, S.E. and G.B. Walker. "Working through environmental conflict: The Collaborative Learning Approach." Westport CT: Praeger Publishers. 2001.

[12]Cheng, Antony. "'Place' as an Integrating Concept in Natural Resource Politics: Propositions for a Social Science Research Agenda." *Society & Natural Resources: An International Journal.* 16.2 (2003) P. 87-104.

parties and engages the attention of those at the periphery of the issues. It also requires the engagement of all parties in providing, often contradictory, information."[13]

Stakeholder Involvement - Stakeholder methodologies can be instrumental in assessing conflicts over natural resources. Understanding the stakeholders involved in the issue so that new frameworks and models can be created to incorporate stakeholder concerns is of the utmost importance when resolving resource conflicts.[14]

Perspectives and Attitudes of Geoduck Aquaculture - The Pacific Shellfish Institute conducted a general survey on stakeholder perceptions of shellfish aquaculture in Puget Sound. This study found that while stakeholders perceived economic and cultural values associated shellfish aquaculture, they were also concerned with land use conflicts, property rights, and the ecological impacts of aquaculture.[15] A second study regarding geoduck aquaculture specifically described the social perspectives of stakeholders and identified contentious topics, such as the economic benefits of geoduck aquaculture and the contribution of geoducks to improved water quality. Although interviewees were divided on many issues regarding geoduck aquaculture specifically, stakeholders saw aquaculture in general as being a valuable industry to Washington State. There was also strong consensus that Washington's shorelines have ecological importance.[16]

In the case of geoduck aquaculture, some stakeholders believe that best use of shorelines is to produce sustainable food for a growing human population as a working shoreline. Others believe that a working shoreline conflicts with both their recreational and residential use of tidelands. Common issues in aquaculture policies that were explored include ecological, recreational, and aesthetic concerns, as well as competing values of property rights and working waterfronts. A greater understanding of the resource conflicts of geoduck aquaculture and the stakeholders involved is necessary to evaluate these issues.

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[13]Tyler, Stephen. "Policy Implications of Natural Resource Conflict Management." *International Development Research Center.* 1 Feb. 2006. Web. 3 Dec. 2014.

[14]Grimble, Robin & Wellard, Kate. "Stakeholder methodologies in natural resource management: a review of principles, contexts, experiences and opportunities." *Agricultural Systems.* 55.2 (1997) p. 173-193.

[15] Northern Economics, Inc. Perceptions and Values of Shellfish Stakeholders. Prepared for Washington Sea Grant and Pacific Shellfish Institute. June 2009.

[16]Rudell, Paul. "Human Perceptions and Attitudes Regarding Geoduck Aquaculture in Puget Sound, Washington: A Q Methodology Approach." *Thesis, University of Washington*. 2012.

Purpose

The purpose of our qualitative research is to investigate the social and policy dimensions of geoduck aquaculture in South Puget Sound (Mason, Pierce, and Thurston Counties). We will provide a partial situation assessment to determine the values, beliefs, and viewpoints of the stakeholders involved with geoduck aquaculture as well as an analysis of the permitting process of commercial operation permits. Our partial situation assessment examines the characteristics and properties of a conflict, but did not ask respondents about their willingness to participate in a collaborative process.

The objectives of our research were as follows:

Use stakeholder interviews to identify common themes and opinions regarding geoduck aquaculture - An analysis of stakeholder interviews determined shared values and beliefs that may point to possible options for resolution. Stakeholder interviews provide an assessment of the policies surrounding geoduck aquaculture and identify the key values and concerns held by those involved with or affected by geoduck aquaculture.

Analyze land use hearings relevant to geoduck aquaculture and identify common themes and issues - By analyzing hearings board decisions we identified common contentions and their resolution. These documents provide a legal and policy-based assessment regarding the issues of geoduck aquaculture that government agencies and other stakeholders are most concerned with.

Situation Assessment: Stakeholder Interviews

Overview and Background

Our team has conducted a situation assessment in order to scope the interests and perspectives of the stakeholders involved in geoduck aquaculture. A situation assessment is a technique used to help identify stakeholders, map their interests, and support a collaborative and solution-focused dialogue about the nature and extent of an issue.[17] A properly conducted situation assessment can assist policy-makers and assessors to explore stakeholders' incentives and willingness to negotiate in good faith. These assessments also create an opportunity for education and relationship building between different stakeholder groups.[18]

Due to several limitations including time constraints and the specific nature of our research project, our team has conducted only a partial situation assessment. Our team has conducted and analyzed qualitative interviews, but our interview questions did not directly ask stakeholders about their willingness to participate in a collaborative dialogue process, nor have

[17] Susskind, Lawrence E., McKearnen, Sarah, & Thomas-Lamar, Jennifer. *The Consensus Building Handbook.* SAGE Publications, 1999.
[18] *Ibid.*

we established dispute resolution or mediation strategies, or engaged stakeholders beyond contact during the interview process.

Interview Process

Our team conducted in-person and phone interviews with twenty-three (23) individuals who are affected by shellfish aquaculture in Puget Sound. Interviewees included individuals with a history of involvement in the issue such as landowners or residents, representatives of federal, state, and local (city and county) governments, various nongovernmental and environmental organization representatives, and commercial growers and farmers. Our qualitative study used purposeful or criterion-based sampling in order to determine the appropriate stakeholders[19] and gain an in-depth understanding of the situation. We interviewed stakeholders with differing perspectives regarding aquaculture in order to represent a balanced range of interests and values.

Stakeholders contacted: 37
No reply: 10
Refusals: 4
Interviews complete: 23
Academics/researchers: 1
Agency/state employees: 7
Landowners w/ geoduck: 2
Landowners w/out geoduck: 5
Shellfish industry reps: 4
Tribal reps: 1
NGOs: 3
Total interviews completed: 23

The UW Institutional Review Board reviewed the study's interview questions and granted approval for human subject interviewing. The questions were open-ended and designed to elicit responses unaffected by assessor's biases and offer interviewees an opportunity to voice their opinions in a non-judgmental and confidential manner. Our interviewees were ensured of confidentiality prior to beginning the interview.

Interviewees were invited by our research team to participate via email and phone and given information and background on the study prior to interviewing (see Appendix 1 for interview request letter). The interviews were conducted via telephone and in-person from November 2014 to January 2015. We conducted our interviews in a short time period in order to minimize cost and delay. Our team used interview questions to guide the interviews, but allowed conversations to take their course during the interview according to best practices in semi-structured interview methodology.[19] Occasionally, our interviewers requested clarification when necessary with follow-up questions in order to provide more detail about particular topics and interests. Interviews were transcribed by an online transcription service, paid for by the grant funding provided for this research project.

Our interview questions focused on eliciting open-ended responses to several questions regarding aquaculture, and its relation to stakeholder's values and perceptions of Puget Sound shorelines and their use. We asked respondents the questions presented in Figure 1.

[19] Rubin, Herbert J. & Rubin, Irene S. *Qualitative Interviewing: The Art of Hearing Data.* SAGE Publications, 3rd Ed. 2011.

Figure 1

INTERVIEW GUIDE

1. Can you tell me a little bit about yourself and what you see as the primary benefits, attractions, and values of South Puget Sound shorelines?

2. Do you think these have changed over time? If so, can you describe some examples?

3. Can you tell me about your interest in and any involvement with geoduck aquaculture in South Puget Sound?

4. What issues relating to the situation are important to you and why?

5. How would you rank the key issues you have identified in order of priority? Why?

6. Are there barriers to addressing these key issues? If so, how might they be overcome?

7. Who else – either specific people or organizations—are interested in geoduck aquaculture?

8. What are the interests and concerns of these people and organizations, as you see them?

9. Are there other things you would like to mention about this issue?

10. Do you have any questions for me?

11. Would you be willing to participate in a survey regarding observed effects on shoreline wildlife? Is it ok that someone from WA Sea Grant contacts you at a later date?

Interview Analysis

In order to analyze the perspective and opinions of the stakeholders we interviewed, we created a coding matrix that identified the most common responses we encountered during the interviews. To ensure that our coding was conducted via best practices in qualitative research methods, we conducted an inter-coder reliability test. An inter-coder reliability test requires each assessor to conduct an independent assessment of an interview or document, and then compares agreement between the coders. By then coding for agreed upon qualities or attributes expressed by interviewees, researchers can conduct a document or content analysis

more efficiently and accurately together, rather than working independently.[20] Our team used our revised coding matrix to code the remaining interviews and then synthesize results from these interviews for further analysis. Our research team has not linked specific information, quotations, or opinions with particular interviewees in order to provide complete confidentiality for interview participants.

Limitations

As noted, our research is limited in scope and breadth because of several limitations we experienced.

Small sample size - We had a small *n,* or sample size in our interviews. Our research examines a localized conflict that is specific to a certain context and predicated on a small group of stakeholders' opinions that we received over the course of the interviews. Increasing the number of respondents or reaching out to those involved in shellfish aquaculture in other capacities in Washington State may have enabled the study to gain greater generalizability. Broad-reaching conclusions, including any quantitative analysis, requires additional time and resources, and is beyond the scope of our research.[21]

Flexibility - Our interview questions were previously drafted and approved by the University of Washington Institutional Review Board (IRB). Although we conducted semi-structured interviews, our team was unable to alter the interview questions in any way or make them more specific to our final research objectives. To do so would jeopardize the approval of the IRB.

Selection bias - Our interview team emailed respondents asking for their voluntary participation in the study. Therefore, participants self-selected by agreeing to be interviewed. Fortunately, due to the breadth and scope of our interviewees' values and beliefs, selection bias is unlikely to hamper our analysis and results.

Short Data Collection - Our study conducted interviews over the course of two months. Several stakeholders have been involved with geoduck aquaculture for many years, and various inter-disciplinary research studies have been published, suggesting the field of research in aquaculture is very dynamic and subject to change. Had our study been conducted over years rather than months, we may have been able to make broader conclusions.

[20] Armstrong, David et al. "The Place of Inter-rater Reliability in Qualitative Research: An Empirical Study." *Sociology.* August 1997 v31 n3 p. 597.

[21] Hackshaw, A. "Small Studies: Strengths and Limitations." *European Respiratory Journal.* 2008, vol. 32 p. 1141-1143.

Primary Benefits and Attractions of Puget Sound

Respondents identified key social and ecological values during the course of the interviews. The shorelines and waterways of Puget Sound hold a variety of aesthetic, cultural, and social values for nearly all of our study respondents. Most respondents expressed sentiments that Puget Sound has a natural and pristine beauty that they value. Additionally, respondents valued Puget Sound shorelines for their access to recreation, for their availability to be used for commercial purposes, and for their 'sense of place'. To some, geoduck aquaculture represents a threat to these shorelines, and to others, an opportunity for a working waterfront. Specific issues concerning aquaculture mentioned by interview respondents included:

Aesthetic Issues

Visual Impacts - Many respondents emphasized that Puget Sound has a beauty and pristine quality that should be preserved regardless of use of the shorelines. Several landowners who reside or own property in direct proximity to geoduck farming sites expressed disapproval of some aspects of the harvesting and farming process that impact their quality of life. Some issues mentioned include finding trash or plastics on public and private beaches, having to look at rows of PVC tubes used for growing juvenile geoducks, netting over the PVC tubes, and brightly-colored plastic containers used for shellfish collection or trash. Other respondents felt that a minority of landowners had undue representation in this situation and that the aesethetic impacts of aquaculture are minimal.

> *"[A landowner's] perspective is largely one of a view. They've got waterfront or property that has a water view and they don't like the view of a working waterfront…there is value to [a natural environment] but if you're looking at a relatively small scale shellfish operation, I think... it's not as negative an impact visually as their efforts would lead you to believe."*
>
> *Government Representative*

Light and Noise Impacts - Some beachfront property landowners mentioned that vehicle and pump use during farming operations disrupted the "stillness" and "quietness" of owning beachfront property. The noise from using generators or pumps also prompted some interviewees to claim an impact on the aesthetic values of the shoreline.

Ecological Issues

Marine Debris - Some respondents expressed concerns regarding the effects of marine debris, specifically microplastics, netting, and PVC tubes used in aquaculture having a negative impact on tidal species living in and near geoduck farms.

Water quality - The impact on the water quality near shellfish farms was a concern for some, while others expressed the possibility that water quality was improved by geoducks either by their intake of the water and subsequent filtration process, or by their presence necessitating the reduction of non-point pollution in order to harvest.

Aquaculture's effects on eelgrass and other species - Several respondents mentioned concerns regarding aquaculture's effect on eelgrass, a protected species in Puget Sound. As noted previously, aquaculture operations are not permitted near eelgrass habitat zones, due to the protected status of eelgrass habitats. Other respondents mentioned concerns regarding the effects on the ecosystem by geoduck aquaculture such as sediment disruption from the planting and harvesting process (including use of the water-jets to dislodge mature geoducks from the sand), potential pesticide use during farming operations (to decrease predation), and other ecological issues.

Accuracy and reliability of ecological research - Many respondents questioned the accuracy and reliability of ecological research already completed. Limited work has been done by state agencies and a few studies have been contracted by private consulting firms. To date, the most extensive research has been conducted under the auspices of Washington Sea Grant's Geoduck Aquaculture Research Program (GARP). Washington Sea Grant sponsored the research at the direction of the Washington State legislature, and most scientists involved are employed by the University of Washington. Some respondents expressed sentiments that the research was not peer-reviewed extensively, that the research was biased due to its funding stream, that it was not replicable due to the specific locations and short time periods in which it was conducted, and other concerns. Conversely, other respondents felt that the research was very reliable and had been conducted according to best practices in scientific research, and therefore should be evidence that aquaculture does not have a negative ecological impact.

Land stewardship - A minority of interview respondents expressed sentiments that it was the responsibility of landowners to act as stewards of the shorelines of Washington but that this role additionally fell to them because of lack of stewardship of other stakeholders involved in aquaculture. Stewardship, in this context, indicated removing marine debris from the shorelines, helping or protecting the flora and fauna near aquaculture farms, and other actions involved with tending to the environment.

Recreational Issues

Pedestrian access to beach - Some respondents expressed fears that geoduck operations would restrict access to previously public beaches by making them the private property of commercial entities instead of the citizens of Washington State. Other respondents believed that shellfish growers should be entitled to the same property rights that shoreline residents enjoy.

> *"Our best sandy public will be privatized basically to industry… because they won't let you on them."*
>
> *Landowner*

Boater recreational access, navigable waters, and right of way - A few interviewees remarked that geoduck aquaculture resulted in hazards to recreational users of the shoreline such as boaters or windsurfers, primarily due to the dangers of becoming entangled in nets or other foreign objects in the water related to farming operations.

Land use Issues

Commercial vs. residential development - Several respondents mentioned concerns regarding the re-zoning of residential land for commercial purposes, or the impacts of having residential land adjacent to commercial operations. Other respondents mentioned that residential property owners have built shoreline modifications, such as bulkheads and docks, which have an effect on the shorelines just as much, or more than, commercial geoduck operations.

> *"So [aquaculture operations] [are] moving in industrial operations into residential neighborhoods which you wouldn't allow if you were doing residential zoning. You wouldn't let industrial companies move into our residential neighborhood and just say, "Live with it. You'll like it."*
>
> *Landowner*

Property value decline - Some interviewees felt that property values would decline as result of aquaculture activities. Some interviewees expressed that because of aquaculture, residential land was being compromised by having industry so close to private property. Other respondents felt that landowners were overstating aquaculture's effect on homeowners' property values, and that aquaculture may increase the value of property because of the potential commercial activities that could take place on them.

Comparison between Farming and Aquaculture - Some respondents felt that shellfish aquaculture was operating in Washington similarly to traditional horticulture.

> *"If you go to an area where we're farming…we've eliminated, we've obliterated the natural environment in order to produce farm goods. So…how are those vegetables grown? Even if they're organic, the farm field they came from you just obliterated all of the natural habitat there in order to raise those vegetables and we make that trade off in society because we have to produce food for human beings. It's a necessity; in the shellfish industry here's an example of being able to produce food, a very valuable food, in the natural environment with relatively little disturbance to everything else that lives there. So what's the problem?"*
>
> *Shellfish Grower*

Politics and Stakeholder Perceptions

Political Support/Opposition -

- Some respondents expressed sentiments that geoduck aquaculture is over-supported politically, and that the shellfish industry is over-involved in the rule-making process and with the state legislature. Because of this, some respondents feel that opposition to aquaculture is impossible and that aquaculture operation will continue to expand in the south Puget Sound.

> *"At the start of the industry… [state agencies] were brought into the picture [because] there was little to no oversight of the aquaculture industry…The standard practices, and the behavior of the growers probably left something to be desired…"*
>
> *Government representative.*

- Other respondents maintained that commercial aquaculture supporters or owners experience political difficulty because of the permitting process, and that they have been vilified by some media sources. Other respondents mentioned that aquaculture farming is a difficult business, and that the current regulatory environment is not conducive to growth or ease of industry operations.

> *"There is too much regulatory blockage in place for small new farms. It's going to become an industry of large companies. In fact, there's a consolidation going on right now, that's a result. A large result of it is from the regulations they're putting in place. It's making it more difficult for small farmers to farm."*
>
> *Shellfish Grower*

State Agencies and Science - Some stakeholders hold sentiments that state agencies are biased in their support of aquaculture. Others expressed concern that some resource agencies are supporting certain conclusions about the ecological effects of aquaculture based on a political agenda or funding stream and that research that reaches differing conclusions faces opposition. In contrast, some respondents pointed to how Washington State's law and administrative code supports aquaculture and it is the responsibility of agency representatives to support those provisions.

Economic/Financial Perceptions

Geoduck aquaculture represents a growing industry for Puget Sound region. It exports significant amounts of shellfish abroad and provides several economic and financial values.[1] For many respondents, uncertainty exists regarding the costs and benefits of shellfish aquaculture for Washington. Stakeholders expressed issues including:

Jobs - Uncertainty around job creation was an expressed sentiment among respondents, including that geoduck aquaculture increases the amount of jobs in specific regions such as Thurston and Mason counties, that aquaculture provides poor-quality jobs, and that the quantity of jobs is unclear because of lack of documentation provided by shellfish companies on their labor force. Some respondents felt that geoduck aquaculture jobs were beneficial for the state, and identified a theme of a working waterfront, remarking that Washington State has had an active shellfish aquaculture dating back to the early 1900's.

Exports - Some interviewees expressed that they felt that the shellfish industry is a very lucrative industry, but because the majority of its profits arises from exporting geoducks as a delicacy overseas, the shellfish companies do not support Washington State by putting their money back into the state's economy. These respondents expressed a desire to see more transparency regarding whether shellfish companies are a financial benefit for the state.

> *"Show us the employment numbers. Show us how many people are actually working like jobs, and you will not get one single piece of paper because they don't want to show you that it's really a small number compared to the big scheme, again, the value of Puget Sound."*
>
> *NGO representative.*

Barriers to Addressing Issues

In our interviews, respondents were asked to identify barriers to addressing the issues surrounding geoduck aquaculture. While respondents were unable to rank those barriers they mentioned, they were able to identify several barriers to resolution, some of which are listed below.

> *"The first barrier is suspicion. Lack of information. Aquaculture obviously happens underwater so nobody, if it was wheat or potatoes or cattle you can see where it is. First of all, it's underwater and people don't really understand; is it really here or not? The other part of the mystery is the carrying capacity question…there's a public mystery, there's a science mystery, and the uncertainty about what the industry is doing. Just a lot of lack of information."*
>
> *Government representative*

Lack of information - Several interviewees emphasized a lack of information regarding the situation. Some felt that industry representatives were intentionally withholding financial, operational, or ecological information from the public. Additionally, if information was known, it was seldom shared outside of the industry with the public or other stakeholders interested in the issue.

Representation - Some respondents felt that non-industry stakeholders were not given enough representation in the rule-making process regarding the prioritization of shellfish aquaculture in Washington State.

Disagreement on the Facts - Due to disbelief regarding the facts presented in previous research, stakeholders do not agree on the accuracy or legitimacy of ecological studies.

Vilification of Industry - Some industry respondents feel that the shellfish industry's presence has been marginalized and vilified. They expressed sentiments that, unlike traditional farming in Washington State, shellfish farming experiences unwarranted resistance even when operating in full compliance with the law.

Focus on Uncertainty over Realized Risk - Several respondents focused on the uncertainties of aquaculture: whether it caused harmful ecological impacts, whether it helped or hindered Washington's economy, whether it affected recreational users and property owners of shorelines, and others. By dwelling on the uncertainties, stakeholders can skew risk assessments by perceiving the situation as more impactful than the consequences of that situation or action would indicate.

Situation Assessment: Permitting Process

A significant policy issue concerning geoduck aquaculture has to do with the permitting process. In 2011, an interagency team formed to improve the coordination for permitting and licensing shellfish aquaculture, the Shellfish Interagency Permit (SIP) Team.[22] Despite improvements, acquiring a permit for a commercial geoduck aquaculture project remains time intensive, intricate, and often costly. Time spent permitting each project depends on site-specific conditions, but its length is substantial, in large part due to multiple comment periods and multiple approvals needed from almost all of the ten different organizations involved with the permitting process (see Figure 2). The full shellfish interagency permitting diagram is in Appendix 2, and complete instructions can be found on the Washington State Department of Ecology website.[21]

Figure 2

Agencies involved -

- *Local government (Counties)*
- *Tribal governments*
- *Department of Health*
- *Department of Natural Resources*
- *Department of Fish and Wildlife*
- *Department of Ecology*
- *US Army Corps of Engineers*
- *NOAA Marine Fisheries Service*
- *US Fish and Wildlife*
- *Department of Archaeology and Historic Preservation*

If a permit approval is appealed, it can substantially increase in length of time and cost. These characteristics discourage some potential shellfish growers from entering the market or expanding their operation. During appeals the Hearings Board discusses stakeholder concerns that were not sufficiently addressed by the permitting process. These decisions cover important

[22] For more information please visit: http://www.ecy.wa.gov/programs/sea/aquaculture/sip.html

conclusions surrounding geoduck aquaculture. In order to summarize the issues in the permitting process we analyzed the appeals occurring in Washington's Land Use Hearings Office concerning geoduck aquaculture.

Land Use Hearings Boards

Washington State Environmental and Land Use Hearings Boards are quasi-judicial forums for stakeholders to contest the decisions made by local governments and state agencies.[23] According to attorneys involved with the process, these proceeding are intensive in terms of time and capital. However, Hearings Board decisions help to define statewide guidelines for permitting, enforcement, and land management policy, increasing predictability for all parties involved.

Washington Environmental and Land Use Hearings Office Boards:

- Growth Management Hearings Board (GMHB)
    - Appeals involving the Growth Management Act (GMA), Shoreline Management Act (SMA), and the State Environmental Policy Act (SEPA).
    - Two presiding board members.
- Pollution Control Hearings Board (PCHB)
    - Appeals related to decisions and administrative orders made by the Washington State Department of Ecology and other state agencies.
    - Three board members appointed by the governor and confirmed by the Washington Senate.
- Shorelines Hearings Board (SHB)
    - Issues related to geoduck aquaculture most often heard by this board.
    - Hears appeals related to permits issued by local government including shoreline substantial development (SSDP), conditional use (CUP), and variance permits.
    - Three board members appointed by the governor and confirmed by the Washington Senate and three additional members in various governmental positions.

Approach

To identify hearings board decisions relevant to geoduck aquaculture we used three sources: a state agency representative involved with geoduck aquaculture, a private law firm, and online searches of the hearings board database. Hearings boards often dealt with multiple permit appeals or "cases" in each decision. The majority of decisions dealt directly with geoduck aquaculture alone, while decisions that applied more generally to shellfish aquaculture were chosen because of their impact on geoduck aquaculture practices or permitting. This list of decisions is not comprehensive, but the decisions show an accurate and fair representation of the debates taking place in Washington State Administrative Hearings Boards. Hearings boards

[23] For more information please visit: http://www.eluho.wa.gov/Home/Index

will often group appeal cases into one decision when they deal with the same situation. Of the decisions examined, seven were from the SHB and dealt with thirteen individual cases, one decision was from the PCHB, and three decisions were from the GMHB.

To analyze these decisions we examined the "findings of fact, conclusions of law and order," a summary document issued by the Board after a decision. This document does not comprehensively address all the issues raised by petitioners. Some issues raised by the petitioners may be settled outside of the hearings office and some are dismissed. The "findings of fact, conclusions of law and order" does not include the details explaining why or how some issues are dismissed or settled.

After a preliminary examination of the decisions we organized a simple matrix outlining issues that were identified in the decisions and how they were resolved. Using two of the decisions, three team members performed a test of inter-rater coding reliability and observed a negligible amount of variation between the coding of each team member. The same team members used the matrix of characteristics to analyze all of the decisions. In addition, each member took notes of key observations and board conclusions. Below, we will first review common appeals issues and then discuss significant issues observed in the permitting process.

Appeals issues

A number of issues were appealed to the hearings board. Petitioners were either shellfish producers seeking less strict permit conditions, or concerned citizens seeking more restrictions on aquaculture operations. Out of the eleven decisions, petitioners in six of the cases were shellfish producers and five were from citizen groups. Five decisions addressed cases from Pierce county, three were from Thurston county, two from Mason county, and one from Snohomish county. The earliest decision we analyzed was from 2010 and the most recent decision will be heard later this year in 2015. All these issues, except for the issue of eelgrass mentioned below, were present in more than one case. Eelgrass was included in the issue summary because it was a critical factor in the Board's permit denial. The context involving each issue varied between decisions, but they are generalized in Figure 3 for summary purposes.

Figure 3

Issue	Specific concern	Resolution
Ecological	Nets – interfere with species' movement and cause entanglement.	Failed to meet burden of proof
	Harvesting – Water jets used to loosen sediment, alter sediment properties, and create plumes that may threaten fish spawning	Failed to meet burden of proof; address concerns with ECOP*; spawning fish identification class for workers
	Cumulative Impact Assessment (CIA) – must be performed for project site	Failed to meet burden of proof in all but one situation; apply six questions for CIA necessity.
	Marine Debris - PVC and netting harm species by entanglement and ingestion.	Failed to meet burden of proof, follow ECOP
	Eelgrass - Geoduck aquaculture damages eelgrass	Present in one case, poor eelgrass protection may necessitate a CIA or permit denial
Recreational	Restricted access – Nets, PVC tubes, and the presence of aquaculture workers restrict neighboring residents' travel and access through tideland	Addressed with site specific management, follow ECOP, right of way setback
	Navigation - Nets, PVC tubes, and other non-organic objects used by aquaculture pose navigational hazards to boats and other recreational activities	Addressed with site specific management, follow ECOP, remove specific foreign objects
Aesthetic	Noise – Sounds made by people, engines, and boats, especially during the night, disturb homeowners and their pets	Addressed with site specific management; follow ECOP; warn neighbors of upcoming aquaculture activities
	Light – Lights from nighttime aquaculture disturbs homeowners and their pets.	Site specific management; follow ECOP; no flood lights
	Netting and Tubes – foreign objects on tideland damage landowners' views	Addressed with site specific management; follow ECOP
Restrictions on Aquaculture	Harvest Times – Restrictions on harvest times impair businesses' ability to operate during winter	No restrictions on harvest times for intertidal projects
	SMP updates (GMHB) – updating or amending an SMP in a manner that decreases ecological function of shorelines conflicts with the SMA.	Must be consistent with SMA's "no net loss" principle

* Pacific Shellfish Growers Environmental Code of Practice (ECOP)[24]

[24] For more information please see: http://pcsga.org/

Summary and Discussion

Viewing these decisions in sum, several observations help to highlight themes and conclusions from the Board decisions that were analyzed.

Specificity of science - Based on the Board's decisions, we conclude that the SHB values site-specific knowledge of proposed projects and expert testimony from scientists with qualifications specific to the subject for which they are testifying.

- Each site is unique, possessing different environmental characteristics.
- The most qualified scientists usually testify in favor of the county's permitting determination. This may be because the scientist's research was used in the original permit formulation.

> *"Local government should consider local ecological conditions and provide limits and conditions to assure appropriate compatible types of aquaculture for the local conditions as necessary to assure no net loss of ecological functions."*
>
> *WAC 173-26-241(3)(b)*

Burden of Proof - Petitioners have the burden to prove that permit conditions are inconsistent with the Shoreline Management Act (SMA) or the local government's Shoreline Master Plan (SMP).

- To completely reverse a permit the petitioner must prove a significant problem with the project. Objections related to issues that did not risk irreversible damage such as noise, light, or navigation were resolved by altering the conditions of the permit. Almost all of the ecological issues brought by citizen groups failed to meet the petitioner's burden of proof to reverse the county's permit. The Board often addressed ecological concerns though additional permit conditions, normally involving the PCSGA's ECOP. The protection of eelgrass was the only ecological concern where the petitioning citizen group met their burden and reversed the permit issuance.

> *"[Aquaculture] is of statewide interest. Properly managed, it can result in long-term over short-term benefit and can protect the resources and ecology of the shoreline. Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, is a*

Many appeal arguments - Petitioners use a wide variety of reasons to contest the county's permitting decisions.

- The Board only considers some arguments, because some issues are settled between parties or the Board dismisses the issue. The reasons for dismissal or conditions for settlement were not always specified in the "findings of fact and conclusion of law and order."

Express support for aquaculture - Washington State considers aquaculture as a beneficial and water dependent use of shorelines.[25]

- The Board is required to support Washington state law and the Board uses law to guide their decisions.
- Because the Washington State Administrative Code explicitly considers aquaculture as a beneficial use, there is a high threshold for petitioners to meet their burden of proof.

Cumulative Impact Assessment (CIA) - Citizen groups petitioning Hearings Boards argue that a CIA must be completed before a permit approval.

- CIAs are needed for conditional use permits (CUP) and variance permits, while CIAs are discretionary for SSDP.[26]
- The Board considers six factors to determine if a CIA is necessary.
  1. Is the shoreline of statewide significance (SSWS)?
  2. Is there potential harm to habitat, loss of community use, or a significant degradation of views and aesthetic values?
  3. Is the project the "first of its kind" in the area?
  4. Is there an indication of additional applications for similar activity in the area?
  5. Does the local SMP require a CIA to be performed before issuing a SSDP?
  6. Is the proposed type of use a favored use?

> *"Aquaculture should not be permitted in areas where it would result in a net loss of ecological functions, adversely impact eelgrass and macroalgae, or significantly conflict with navigation and other water-dependent uses. Aquacultural facilities should be designed and located so as not to spread disease to native aquatic life, establish new nonnative species which cause significant ecological impacts, or significantly impact the aesthetic qualities of the shoreline."*
>
> *WAC 173-26-241(3)(b)*

In three of the four decisions that involved request for CIAs the Board ruled that a CIA was not necessary. In the case where the Board ruled that a CIA should be performed, the presence of eelgrass was a significant factor.

[25] "Shorelines Uses WAC 173-26-241." Washington State Legislature. 2013. Web. 1 Dec. 2014.
[26] Wolfman, Sonia A. "Washington Sea Grant Shellfish & the Environment Research Symposium: Case Law Office." Assistant Attorney General, Saint Martin's University, Olympia, WA, December 8th, 2014

Shoreline Master Plan Updates/Amendments - SMP updates often revise how aquaculture is prioritized in the local government's shoreline management and permitting.

- Shellfish companies contested changes to an SMP that were perceived to restrict aquaculture, while citizen groups contested changes that promoted aquaculture. SMP updates and amendments can thus be used as a tool to restrict or expand aquaculture.
- SMP updates must follow procedure and objectives outlined in Washington's SMA.
- Hearings Boards look to SMPs for guidance on many issues.

Best Management Practices (BMPs) - Our analysis found that the Boards regularly recommended three important BMPs.

- *Harvest times* - The 2008 *Marnin, et al. v. Mason County & Ecology* decision concludes that harvest time limits significantly restrict the operations of a geoduck aquaculture operation, and thus cannot be imposed.
- *Spawning fish* - Monitoring by informed workers during spawning times provides sufficient protection for spawning grounds. If fish eggs or other evidence of spawning is present, farmers are required to forego harvests until a spawning report is concluded.
- *Shellfish Growers Environmental Code of Practice (ECOP)* - Local government and Boards look to the ECOP for best management practices for growers. The ECOP is an industry guide developed by Pacific Coast Shellfish Growers Association (PCSGA), a trade organization that works on behalf of shellfish growers and addresses environmental protection, shellfish safety, regulations, technology and marketing.[27] The board has repeatedly ordered growers to follow the ECOP and in *Coalition to Protect Puget Sound Habitat, et al. v. Thurston County and Taylor Shellfish* the Board clarified that growers should pick the stricter of the standard when permitting conditions and the ECOP have different requirements.

[27] For more information please see: http://pcsga.org/

Recommendations

We indicate below several recommendations that could be adopted to move forward with the situation. Recommendations include:

Do not attempt collaborative dialogue or conflict resolution strategies at this time - Our research indicates that a collaborative process addressing geoduck aquaculture in south Puget Sound will likely be unproductive, because neither geoduck farmers nor landowners have a clear incentive to participate in such a process. Stakeholder interviews revealed fundamental disagreements concerning the core ecological and economic research findings related to geoduck aquaculture. Without agreement on basic facts, it is difficult to move forward with conversations about management. Additionally, based on analysis of Hearings Board decisions, geoduck farmers are successfully protecting industry viability through the cases, and those challenging the permits are not prevailing in their arguments.

Continue with aquaculture research - With Washington's explicit support for an industry operating in areas that have significant ecological and social value, the state should continue investing in and promoting aquaculture research. Specifically:

- Continue to assess the ecological and economic benefits and costs of aquaculture in order to responsibly grow the industry.
- Conduct more research into the *social dimensions* of aquaculture in Puget Sound in order to improve the relationships of parties involved in the permitting process. Specifically, we recommend that future qualitative studies use a broader sample of shoreline communities in order to create a balanced picture of all community members.
- Because the available ecological research indicates little to no impact related to current geoduck farming techniques, and hearings boards believe that BMPs sufficiently address some social issues, it is difficult to require the industry to invest in less aesthetically impactful growing methods. During our research, we observed some stakeholders interpreting aesthetic impacts as ecological harm. Therefore, if the state wants a viable geoduck industry, they may need to direct future funding towards decreasing the aesthetic impacts of geoduck aquaculture.

Maintain current best management practices. Additional BMPs applied to the industry as a whole are not recommended. The PCSGA's ECOP provides sufficient guidance for current practices. Considering the rigor and complexity of the permitting process and past decisions of Hearings Boards, we recommend continued use of site-specific regulations as needed. We believe that site-specific BMPs, rather than statewide BMPs, will better address the concerns of landowners while minimizing their impact on shellfish growers.

Improve Communication - Improve the communication methods of current and future ecological, economic, and social research by presenting it in a variety of concise and digestible formats, including digitally, through the media, and through 'town-hall' meetings. Communicating scientific information to a broad audience in a format that can be understood by the majority of intended recipients is a challenge that all scientific analysis faces and should strive to improve.

Acknowledgements

Our team would like to thank our faculty advisor, Clare Ryan, Director of the Program on the Environment and Professor of Environmental and Natural Resource Policy at the School of Environmental and Forest Sciences.

In addition, we would like to thank:

Our clients: Perry Lund from the Washington State Department of Ecology and Laura Hoberecht, NOAA.

Washington Sea Grant for funding for interview transcriptions through *rev.com* and providing transportation funding to attend shellfish conferences.

Anna Gjørtz Bovbjerg, an exchange student from Aarlborg University, Denmark, for her assistance and expertise in the fall quarter, 2014.

Plauche & Carr LLP, who helped identify relevant hearings board decisions.

P. Sean McDonald, for his time, guidance and images.

All of those who agreed to interview with our team, or provided correspondence via email or assistance on other areas of research; without whom this study would not be possible.

Appendices

Appendix 1: Interview request email

Dear [participant],

I am an undergraduate/graduate student at the University of Washington currently enrolled in the Program on the Environment's Environmental Management Certificate Program. As part of our final degree project, my team and I are conducting a case study of geoduck aquaculture in South Puget Sound. We are seeking to understand the issues surrounding geoduck aquaculture management in Puget Sound, by identifying the key players, interests and concerns, and analyzing relevant policy issues.

I am interested in hearing about your thoughts on geoduck aquaculture in the South Puget and your view of the major players, issues, conflicts, and successes of the industry.

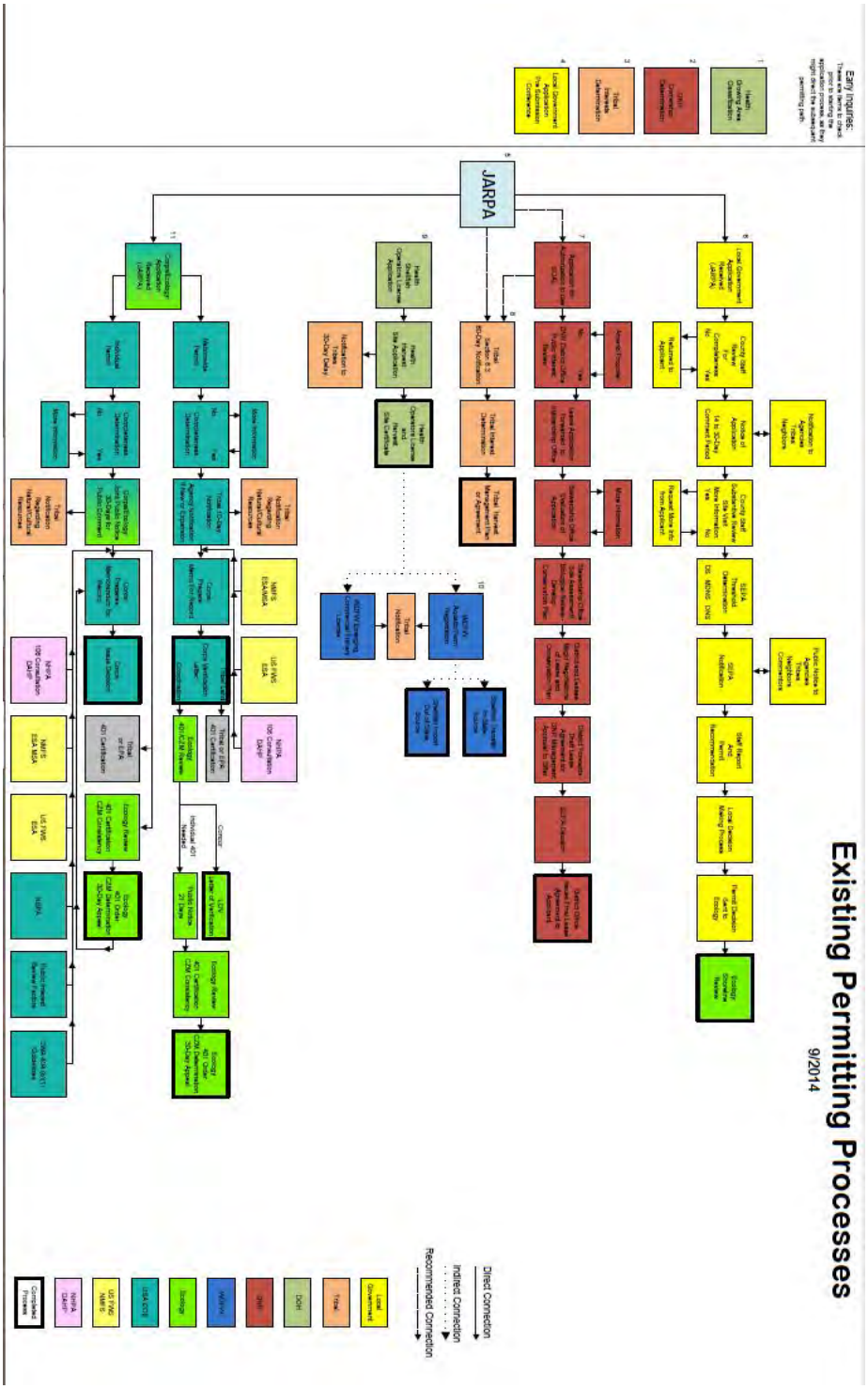
Please let me know if you are willing to talk to me about this important issue. Interviews will remain confidential and will be used for academic purposes. I would like to conduct an interview in-person or via phone as soon as possible. If you are available to conduct an interview please let me know some dates and times that would work.

I welcome any further questions or comments and can be reached at [email] and [phone] during [best time to reach you].

Thank you for your time and consideration.

Sincerely,
[Researcher's name]

Appendix 2: Permitting Flowchart



Ecology, Shellfish Interagency Permit (SIP) Team: Process and Product. (http://www.ecy.wa.gov/programs/sea/aquaculture/sip.html)

Appendix 3: Expanded Decision Analysis Matrix

Case Name	Case Number(s)	Year	Summary	Conclusions
Shoreline Hearings Board				
Farms Garrison v. Pierce Cnty., Darrell and Majia deTienne, and Chelsea Farms	S13-016c, S13-016, S13-018, S13-019	2014	Appeal SSDP for a geoduck farm. This farm was the first of it's kind in the area, was located on a shoreline of statewide significance, was in close proximity to eelgrass, and was an area used to windsurf. The SSDP was reversed	- Areas of statewide significance, especially when they contain eelgrass, are difficult to get permitted - Buffers must be large enough to protect eel grass, considering off-site eelgrass as well (petitioners cited 2ft vertical distance as adequate) - Monitoring is not sufficient justification for less stringent permitting conditions protect eelgrass, but may be acceptable for forage fish - 600ft buffer from any bald eagle nest - Appealed to superior court, decision pending
Taylor Shellfish Company, Inc. v. Thurston Cnty., et al.	S12-012	2013	Appeal of a denial to issue a SSDP after an intensive environmental review process. The board agreed that the county should have issued the SSDP, but added additional monitoring conditions. All parties appealed to superior court.	- Superior court concluded that the board had erroneously applied monitoring conditions
Coalition to Protect Puget Sound Habitat, et al. v. Thurston Cnty and Taylor Shellfish	S13-006c	2013	Appealed SSDP citing need for cumulative impact assessment. The SSDP was affirmed.	- ECOP is mandatory, not optional - If orders are different from the permitting agency and the ECOP, the grower should use the more stringent of the requirements - Upheld a condition requiring review of operation after first harvest or 7 years, whichever comes first.

Coalition to Protect Puget Sound Habitat, et al. v. Pierce Cnty., et al.	S11-019	2012	Appealed DNS and SSDP citing environmental impacts. The SSDP and DNS was affirmed	- Site-specific knowledge is critical to meeting burden of proof. - Plastics have no significant effect on fish. Not found in stomachs. - No harvesting during spawning
Taylor Resources/Taylor Shellfish Farms v. Pierce Cnty.	S08-010, S08-017	2009	Appeal of Pierce County's permit approval to cultivate commercial intertidal geoduck after the existing permit had expired.	- Shoreline permits cannot expire through the passage of time
Taylor Shellfish Farms v. Pierce Cnty.	S06-039, S07-003, S07-005	2009	Appealed conditions set by Pierce County SSDPs for Taylor geoduck aquaculture operations. The conditions were modified in favor of the petitioner.	- Reaffirmed the Marnin decision, no restriction on harvest time for intertidal geoduck aquaculture - ECOP addresses noise and light concerns, but should apply to all activities, not just harvest - Notification of neighbors for all activities and flexibility to change dates and times - Counties need to address safety of recreational activities related to geoduck aquaculture
Marnin, et al. v. Mason Cnty. & Ecology	S07-021	2008	Appealed conditions set by permit, and Mason County's requirement to have a SSDP and CUP. Conditions were modified and the permit was issued.	- Shoreline SSDP are necessary for aquaculture that impairs water navigation - Marnin operation is not required to have a CUP because he is only harvesting, sorting, and packing - Cannot work longer than 8hrs per day - Restrictions on work activities based on time of day or date are not consistent with SMA or county SMP - Noise must be minimized and may not exceed residential noise limits - Floodlights are prohibited and worker should take care to minimize light disruptions. - Cannot deny a permit based on aesthetic grounds. Fencing and bags are allowed, but must be changed to darker colors.

Pollution Control Board Hearings				
Case Inlet Shoreline Ass'n v. Ecology and Taylor Shellfish Farms	P12-033c	2012	Appeal a water quality certification for a geoduck operation in Case Inlet.	Settlement reached to allow farm development if the farmer completed: sand dollar relocation, PVC pipe labeling, site inspections for debris, and limit planting above +2.5 of the mean low water mark.
Growth Management Hearings Board				
Bainbridge Alliance for Puget Sound, et al. v. City of Bainbridge Island and Ecology	14-3-0011	2015	Citizen group appealed Bainbridge Island's SMP update, based on procedural grounds, provisions related to aquaculture.	Pending decision, hearing scheduled for May 26, 2015. Settlement may be reached before then.
Pacific Coast Shellfish Growers Ass'n. v. Snohomish Cnty. and Ecology	12-3-0009	2014	Shellfish company appealed the adoption of Snohomish County's Comprehensive SMP Update.	Settlement including limited amendments to Snohomish counties SMP.
Seattle Shellfish, et al. v. Pierce Cnty., et al.	9-3-0010	2010	Shellfish company appealed, on procedural grounds, a limited amendment to Pierce County's SMP related to limiting the expansion of aquaculture.	Split decision. SMP limited amendment stands. Justification: Since SMP limited future aquaculture, there is "no net loss."