

Washington Shellfish Aquaculture: Assessment of the Current Regulatory Frameworks

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## **Abstract**

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The Washington shellfish aquaculture regulatory framework is a complex instrument with numerous permits and high agency involvement. Shellfish business owners, industry officials and policy-makers look to simplify the overall process by reducing paperwork and permit redundancies. In the past, the Washington aquaculture sector held a close relationship with the Washington Department of Agriculture, and policy-makers are again assessing a closer future relationship, aiding in regulatory efficiency. The purpose of this study is to locate sources of inefficiency within the shellfish aquaculture regulatory framework and supply new ideas for future policy-making based on an aquaculture regulatory framework proposed by Takoukam and Erikstein (2013). There are four main objectives to this study. The first is to identify barriers within the regulatory framework from the federal scale to the county level restricting the Washington shellfish industry. Through scientific and governmental literature reviews, and information from conference attendance, these barriers are identified. The second objective is to showcase current programs addressing regulatory barriers in aquaculture. Current programs are the Shellfish Interagency Permitting Team, the Pacific Aquaculture Caucus, and the Pacific Coast Shellfish Growers Association. The third objective is to compare the regulatory framework for aquaculture based on the Washington agriculture framework. I used the Washington agriculture program as a

template to assess how aquaculture can meet the regulatory goals set forth by Takoukam and Erikstein (2013). The Florida Aquaculture program, which is a combined Aquaculture-Agriculture regulatory department, is used to illustrate a closer relationship between the two divisions. The final objective is to assess the future of Washington aquaculture based on information provided through the first three objectives.

Preliminary recommendations for the Washington regulatory framework are to shift regulatory work to county level officials, limit the number of government agencies involved, reduce review periods, and increase regulatory transparency on county and state levels.

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# List of Acronyms

ACOE.....	Army Corps of Engineers
ACP.....	Aquaculture Certification Program
CAA.....	Clean Air Act
CP.....	Conditional Permit
CSGS.....	Commercial Shellfish Growers Settlement
CWA.....	Clean Water Act
DOC.....	Department of Commerce
ECOP.....	Environmental Codes of Practice
EP.....	Environmental Protection
EPA.....	Environmental Protection Act
FAO.....	Food and Agriculture Organization
FDACS.....	Florida Department of Agriculture and Consumer Services
FDEP.....	Florida Department of Environmental Protection
HPA.....	Hydraulic Project Approval
IP.....	Individual Permit
MOU.....	Memorandum of Understanding
NOAA.....	National Oceanic and Atmospheric Administration
NPDES.....	National Pollutant Discharge Elimination System
NSI.....	National Shellfish Initiative
NWP.....	Nationwide Permit
JARPA.....	Joint Aquatic Resource Permit Application
PAC.....	Pacific Aquaculture Caucus
PCN.....	Preconstruction Notification
PCSGA.....	Pacific Coast Shellfish Growers Association

PSI .....Pacific Shellfish Institute  
PSP .....Puget Sound Partnership  
SDP .....Substantial Development Permit  
SIP.....Shellfish Interagency Permitting Team  
SMA .....Shoreline Management Act  
SMP .....Shoreline Management Plan  
USDA.....United States Department of Agriculture  
WDA .....Washington Department of Agriculture  
WDFW .....Washington Department of Fish and Wildlife  
WDNR .....Washington Department of Natural Resources  
WDOH .....Washington Department of Health  
WSI .....Washington Shellfish Initiative

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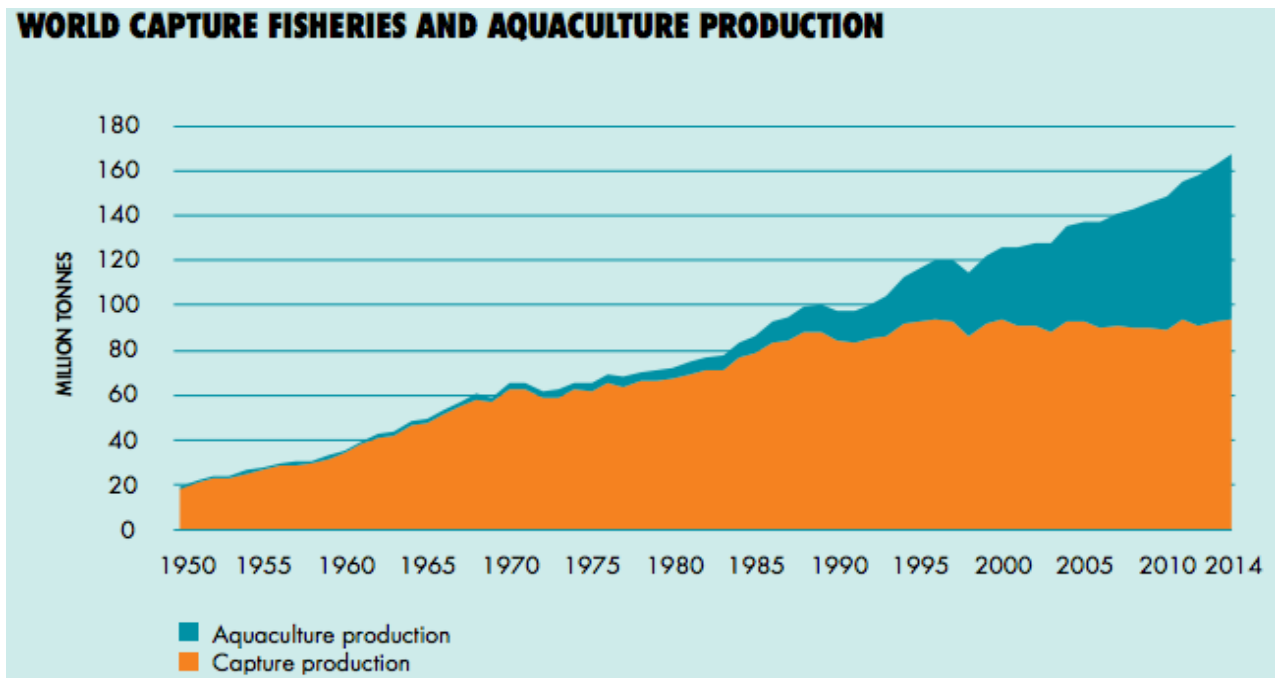
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# I Introduction

Aquaculture is becoming increasingly important as world wild fisheries fail to meet consumer demand. In the early 1970s, FAO determined 90% of worldwide wild caught fisheries were sustainable; by 2013 the number dropped to a little over 60% (FAO 2016, Cressey 2016). Partially due to these unsustainable fishing habits, for the past 20 years, world fisheries held stagnant in catch size, while worldwide aquaculture production grew (Figure 1). For aquaculture, a 2016 FAO study found that China, as of 2013, was responsible for 60% of all aquaculture production, with India, Bangladesh, and Egypt following. United States production was markedly low, mainly due to restrictive regulations (FAO 2016; NOAA n.d.).



**Figure 1:** Fisheries overall catch production between wild-caught and aquaculture (FAO 2016)

In 2016, the United States accumulated over \$11 billion dollars in federal trade debt due to importation of seafood, with a substantial majority (around 91%) of all imported seafood coming from Asia (Bernadette 2013; Kearney 2014; NOAA n.d.). This trade deficit demonstrates a growing U.S. seafood palate, with limited local seafood producers from which to purchase to meet demand. With wild fishery production leveling off, U.S. aquaculture offers potential to close the gap between wild-capture fisheries and consumer demand, while lessening the federal debt.

Shellfish farming occurs in every coastal state in the U.S., with Washington State as the lead producer (FAO n.d.). In contrast to wild fishing or finfish farming, shellfish aquaculture is more universally seen as a sustainable enterprise (Shumway et al. 2003). One acre of oyster farming can extract the nitrogenous waste expelled by 40-50 nearby shoreline homeowners, and shellfish grow-out requires little to no chemical additives (Shumway et al. 2003). Of existing shellfish species, Washington State produces oysters, clams, and mussels for consumer purchase. Oysters currently hold the highest domestic consumer popularity among cultured shellfish (Northern Economics 2013). There are five main species of oyster grown in Washington: Olympia (*Ostrea lurida*), Pacific (*Crassostrea gigas*), European Flat (*Ostrea edulis*), Kumamoto (*Crassostrea sikamea*), and Virginica (*Crassostrea virginica*). Washington farmers use a wide array of tactics for the nursery and grow-out of shellfish, including but not limited to suspended culture (bags, nets, cages), on-bottom grow-out, and indoor circulatory systems. Overall, Washington State shellfish farming represents 12% of the total employment for U.S. aquaculture, generating over \$185 million in state income for 2015 (FAO n.d.; WSI 2016).

Aiming to increase U.S. aquaculture, current federal and state level strategies are promoting aquaculture as a priority sector. The goal is to expand aquaculture around the U.S. and offshore. Current federally funded research seeks to expand U.S. aquaculture, among which are sustainability projects, breeding for resiliency projects and 'domestication' of new species' to encourage adaptability of aquaculture species to changing climates (Teletchea 2015; Sae-Lim 2016). For example, the National Sea Grant College Program is providing science-based information to rural farmers and government stakeholders and encouraging sustainable aquaculture operations. In 2016 National Sea Grant was awarded \$3.4 million through federal funding to support 11 university-led aquaculture projects in the United States, ranging from comparative management analyses, to biotoxin and virus bivalve resiliency studies (Carney 2016). Washington is a leader in shellfish studies, and the University of Washington received two of the eleven federal grants. In 2011, Washington established the Washington Shellfish Initiative (WSI), expanding upon innovative ideas to solidify shellfish as a state treasure.

### ***State and National Initiatives***

The 2011 NOAA National Shellfish Initiative (NSI) established under the Obama Administration, aims to increase shellfish production nationwide through “marine planning and permitting, environmental research, restoration and [enhanced] farming techniques”, as well as “coordinated and innovative financing” (NOAA 2011). Among the goals of the NSI are increased shellfish production, opening new opportunities for

jobs and business, and meeting demand for seafood while creating cleaner near shore waters in America.

Washington became the first state to implement a statewide shellfish initiative (Ecology 2011; WSI 2016). Created by then-Governor Christine Gregoire, the 2011 Washington Shellfish Initiative (WSI) aims to build strong partnerships among state and federal government, tribes, and the shellfish aquaculture industry (Ecology 2011). One goal of the partnership is to promote environmental benefits by encouraging new shellfish farms through an improved harvest permitting system (Ward 2014). Following Gregoire, Governor Inslee instituted Phase II of the WSI, Winter 2016 with seven main goals:

1. Ensure clean water
2. Embrace strategies to address impacts of ocean acidification
3. Advance shellfish research topics
4. Improve permitting process to maintain and increase sustainable aquaculture
5. Restore native shellfish
6. Enhance recreational shellfish harvest
7. Educate the next generation about shellfish

Apart from the WSI, the Puget Sound Partnership (PSP) works closely with the Washington governor's office, tribes, universities, and other government entities promoting safe and healthy Puget Sound ecosystems (PSP 2015). Created by the PSP, the Puget Sound Vital Signs framework provides indicators to determine the overarching health of the Puget Sound region (PSP 2015). The vital signs focus on five main elements: healthy human population, quality of life, species and food web, protection and restoration of habitat, water quantity, and water quality.

The shellfish bed vital sign targets reducing public shellfish beds closed due to pollution through monitoring pollution sources impacting water quality. As of 2015, 19 percent of Washington coastline (approximately 36,000 acres) was closed for harvesting as a result of pollution problems (PSP 2015). The PSP, with the Washington Department of Health (WDOH), is working to revitalize 10,800 acres of prohibited coastline for shellfish harvest (Dumbauld et al. 2009; PSP 2015). The WDOH samples more than 1,200 marine water stations between 6 to 12 times a year and classifies each acreage as “approved”, “restricted”, or “prohibited” for harvest (PSP 2015). Improving water quality for future shellfish aquaculture endeavors could contribute to increases in state revenue (Northern Economics 2009). In addition to direct revenue provided by shellfish sales, over 2,700 direct and indirect jobs are associated with aquaculture in Washington State (Northern Economics 2013; PSI 2014).

### ***Environmental Management***

Along with economic contributions, shellfish aquaculture can address negative environmental effects such as increased hypoxic zones by lessening phytoplankton abundances and water turbidity (Dumbauld et al. 2009; Washington Sea Grant 2015, Reum 2015). Shellfish aquaculture is also shown to increase abundance for transient and macroinvertebrate species while supporting cover for predatory species with little effect to nearby ecosystems. However, there is potential to displace certain regularly found intertidal species (VanBlaricom et al. 2015; McDonald et al. 2015; Reum et al. 2015).

Studies conducted in Oregon and Washington found shellfish aquaculture does not produce significant large-scale ecological damage (Shumway et al. 2003, Dumbauld 2009, McDonald et al. 2015). For example, the extent of ecological perturbation on resident infauna caused by geoduck clam aquaculture is limited to being equal to or little more than natural perturbations during the harvesting phase (VanBlaricom et al. 2015). Material processes such as ejection of undigested pseudofeces by oysters, or construction of physical structures like suspended nets or PVC pipes can cause mild disturbances in the waterway. However, most moderate ecosystem disturbances occur from application of mechanical harvesting equipment (Dumbauld 2009). Because of the generally limited disturbances caused by shellfish aquaculture, environmental management can be approached at the larger ecosystem level, rather than focus at the individual species level (Dumbauld 2009; Ward 2014).

### ***Comparing Tools and Frameworks***

Florida aquaculture policy makers continue to evaluate the costs and benefits of streamlining aquaculture policies and frameworks (Schiavinato 2007; FDACS 2015). From increased regulatory pressure, the Florida Aquaculture division moved from the Florida Department of Environmental Protection (FDEP) to the Florida Department of Agriculture and Consumer Services (FDACS) in 1999 to increase regulatory efficiency and facilitate a better working relationship with shellfish growers (Schiavinato 2007). This shift helped streamline the shellfish farming permitting system, simplifying the regulatory process for future shellfish farmers. Using the Florida system as an example for an agriculture-aquaculture working relationship, the Washington regulatory

framework could benefit in efficiency and an improved working relationship between growers and the government.

Takoukam and Erikstein (2013) discuss the need for a worldwide secure aquaculture regulatory framework in their FAO report *Aquaculture Regulatory Frameworks: Trends and Initiatives in National Legislation*. The report states that a secure regulatory framework is “the context of laws, rules, by-laws and other requirements that steer a specific question, target area or situation”. Like the Florida aquaculture department in FDACS, the authors support the integration of agriculture with aquaculture, and found a dual program increases overall efficiency through one overhead division and allows for aquaculture to be recognized as a significant agricultural commodity through “legal and institutional instruments”. The authors also propose creating an integrated aquaculture state office and an aquaculture state manager whose job is assessing and connecting the policies for the state.

### ***Research Questions and Goal***

The goal of this thesis is to identify current inefficiencies in the Washington Shellfish Regulatory System through comparison to an alternative framework, namely Washington agricultural regulatory framework. I also use the Florida State Agriculture-Aquaculture program as a case study to demonstrate successful elements of a combined regulatory framework. With these findings, I seek to supply new ideas for policy-makers to enhance the current program.

My primary research questions are as follows:

- What major barriers are presented by the current commercial aquaculture regulatory system for Washington State?
- How can alternative frameworks, such as the Washington agriculture framework, provide guidelines to address these barriers through a combined regulatory process?

### Method for Evaluation

I assessed the current shellfish aquaculture regulatory system based on county, state, and federal-level frameworks in Washington. I then compared these frameworks to the Washington agriculture framework. I began with an historical narrative to demonstrate the importance of shellfish aquaculture in Washington starting with original tribal use and described the effects of westward expansion on native shellfish, which led to the evolution of regulations between state and tribal governments. I then identified barriers within the current shellfish aquaculture regulatory system specifically permitting redundancies, permitting time scale, public perceptions, and county level regulations and their effects upon the permitting system. For the purpose of this thesis, a barrier is defined as “something that restricts the ability for new or existing shellfish growers to efficiently develop and grow their tideland farms and economic productivity” (Cardinal, 2012; Gunderson et al. 1995). I then listed current programs in place addressing regulatory barriers. Using this information, I determined practices that aid in increasing efficiency within existing Washington Shellfish aquaculture framework. Finally, I compared regulatory systems of Washington aquaculture and agriculture and provide

an example of a regulatory system that combines the two farming divisions under one sector (Florida). Throughout my thesis, regulatory recommendations by Takoukam and Erikstein (2013) were applied to the Washington regulatory framework, along with current literature and conference notes. My goal through this research was to supply new knowledge aiding future actions and helping increase efficiency within the shellfish permitting and regulatory system.

## **II Historical Narrative**

Here I describe the history of Washington State shellfish aquaculture. Understanding the long history of shellfish use and aquaculture in Washington creates a strong foundation for future movement. Acknowledging past actions, treaties, and acts aids in informative policy-making and regulatory efficiency as it pinpoints important stakeholders within the program. Throughout this section the relationship between tribes, commercial growers and government officials are summarized to provide a better understanding of the basis for the shellfish aquaculture regulatory program.

### ***Historical Use***

Even before westward expansion of European settlers and the commercialization of oysters, Washington tribes extensively utilized native shellfish stocks (S'Klallam 2016). In the Quinault language, there is a saying “*ta’aWshixa’iits’os*” meaning “clam hungry” (NIFC 2016). Clams, oysters, shrimp and crab comprised a high proportion of tribal diets and were cooked either by steaming or curing for later use (S'Klallam 2016). Large piles of oyster and clam shells (middens) can be found around former homes. The placement of large shell middens provides evidence that shellfish were largely consumed during ceremonies, especially name and funeral honorings (S'Klallam Tribe 2016). However, with the arrival of settlers to Washington, tribal traditions were affected as tribes were forced to cede land to newcomers.

Washington is home to 29 federally recognized tribes and 7 non-federally recognized tribes, each with a deep cultural heritage. Coastal tribes, with access to shellfish

grounds, consist of 23 of the 29 federally recognized tribes (WIGA 2017). In Washington, tribal coastal culture emanates from Puget Sound and the bounty, which it has provided, including an ingrained respect for salmon and shellfish. This culture was damaged by a smallpox epidemic thought to have traveled north from Mexico even before the arrival of European explorers (Boyd 1996). With tribes already negatively impacted by disease, fewer native peoples were present to defend their land when expansionists reached Washington in efforts set by President Thomas Jefferson (Ojibwa 2011).

### ***Stevens Treaties***

As Westward expansion gained momentum, conflict over land use persisted for tribal entities and expansionists (Anderson 1999). To ease transitioning, Isaac Stevens, the Territorial Governor and Superintendent of Indian Affairs, was charged with coordinating treaties to end inter-tribal strife and displace treaty tribes onto reservations, allowing for a greater influx of settlers (Gates 1955; Anderson 1999). Using a common language known as “chinook jargon,” Stevens and other government officials conveyed their demands to the native population, although many of the complex legalities were lost in translation (Ojibwa 2011).

In 1854 and 1855 Stevens introduced three treaties to Western Washington, later known as the Stevens Treaties (Gates 1955; Anderson 1999). These treaties comprised the Treaty of Medicine Creek, The Treaty of Point Elliott, and The Treaty of Point-no-Point. In return for ceding large portions of land, these treaties guaranteed certain tribes “usual and accustomed” zones for fishing and hunting (Combs 1999). In Olympia 1855,

Territorial Governor Stevens and three major western Washington tribes convened: the S’Klallam, Chimacum, and Skokomish, for the Treaty of Point-No-Point (Gates 1955). This Treaty included specific language pertaining to allocated hunting and harvesting areas:

“The right of taking fish at usual and accustomed grounds and stations is further secured to said Indians, in common with all citizens of the United States; and of erecting temporary houses for the purposes of curing; together with the privilege of hunting and gathering roots and berries on open and unclaimed lands. Provided, however, they *shall not take shellfish from any beds staked or cultivated by citizens.*”

- Treaty of Point No Point, Jan. 26, 1855

Initially tribal leaders refused to sign the Point-No-Point agreement, stating they have no wish to leave their homes and history, but on the second day leaders ceded after much debate (Gates 1955). In return for the land given to settlers, tribal nations were left with small reservations along with hunting and fishing grounds. Today, preserving tribal culture and historical rights within the confines of the U.S. government is aided through continuous discussion. For Washington State, certain Acts and legal decisions currently in place continue to affect tribal rights to farmed shellfish.

### ***Bush and Callow Acts***

The 1895 Bush and Callow Acts assisted oyster culturing, and contrary to the Treaty of Point-No-Point, pushed tidal lands away from native hands. The Bush Act allowed

private citizens to purchase shellfish grounds at \$1.25 per acre, with 100 acres per individual maximum. However, under the Bush Act, tidal “shellfish grounds” must be suitable for oyster growth to qualify. If grounds sold are found unsuitable, purchasers are allowed to sell those tidelands back in exchange for more prosperous grounds. The main condition for the Bush act requires tidelands to be used for oyster growth and development, and if oysters fail to be found on the land, purchasing titles may be revoked (RCW. 79. 135.010 Bush act/ Callow act lands).

The Callow Act was enacted for private citizens who prior to 1890 innocently began cultivation of shellfish on state owned tidelands. The Act allowed those citizens to purchase the cultivated lands under the condition the land was predominately produced oysters. If tidelands became unfit for oyster growth, or the owner failed to grow oysters on site, legal grounds existed to remove tidelands from private ownership (RCW. 79. 135.010 Bush act/ Callow act lands).

### ***Commercial Growers and Tideland Owners***

In the early 1900s as Washington grew in size, commercial growers and homeowners purchased remaining Bush and Callow tidal lands. Many of these new landowners were unaware of treaty rights held by the native populace. Contention quickly grew as treaty natives tried to collect their rightful bounty from their usual and accustomed areas, now claimed by western colonizers. Many residents of tidal areas built fences and wrote signs demanding tribes to stay away (Anderson 1999). Conflict continued to grow between tribes and the State of Washington.

Throughout this conflict, a central advocate for tribal treaty rights and environmental protection was Billy Frank Jr. of the Nisqually tribe. In the 1960s and 70s, tensions were at peak between tribal peoples and Washington State. The State accused tribes of over-harvesting salmon on state lands, lessening the natural population available to non-tribal residents. Billy Frank Jr. led the resistance, insisting tribes had rights to harvest based on the Stevens Treaties. This era was marked as the “fish wars” of the Northwest with numerous “fish-ins” led by Billy Frank Jr. (equivalent to the 1970s peaceful “sit-ins”).

### ***Boldt and Rafeedie Decision***

In 1974, Judge George Hugo Boldt reaffirmed the Stevens treaty rights that allocate 50% of all harvestable salmon stock to treaty tribes (NWIFC 2016a). Though the Boldt decision focused on salmon runs, it created the basis for equitable distribution of native harvest species for tribal and non-tribal peoples. In 1994, Judge Edward Rafeedie officially included shellfish within the Boldt decision. The Rafeedie decision reaffirmed the rights of Tribes signatory to the Point No Point Treaty. Under the Boldt and Rafeedie decisions, tribes were to take 50% of all harvestable wild shellfish stock within their usual and accustomed grounds and were recognized as co-managers of commercial shellfisheries (Anderson 1999; NWIFC 2016a). The Rafeedie decision also allocated treaty tribes \$2 million worth of naturally growing shellfish for annual harvest.

Also included within the Rafeedie decision was the Shellfish Proviso dictating any shellfish plots “staked” or “cultivated” are exempt from providing 50% of their stock as per the language within the Treaty of Point-No-Point. Staked or cultivated refer to

farm raised shellfish, rather than pre-existing shellfish beds (Anderson 1999). To be exempt, the plot must not include any naturally occurring shellfish. If a shellfish grower plants over naturally occurring shellfish on the plot, the shellfish grower is responsible for determining the 50% quantity allocated to tribes (Anderson 1999).

### ***Commercial Shellfish Growers Settlement (CSGS)***

Prior to the 1994 Rafeedie decision, a majority of the best shellfish growing lands were sold or leased (c.f. Bush-Callow lands) into shellfish production. With the Rafeedie decision, the state and tribes were mandated to co-manage these same beds, creating conflict between non-tribal shellfish farmers and tribes. Commercial growers feared for the health of their cultivated stock through the harvesting of the natural shellfish beds, while tribes felt their treaty rights were withheld (Dunagan 2007). In 2007, a landmark settlement called the Commercial Shellfish Growers Settlement (CSGS) was introduced regarding commercial shellfish growers and 17 Pacific Northwest treaty tribes (NWIFC 2016b).

The CSGS established three agreements between tribes and commercial growers. Firstly a \$33 million trust was granted to treaty tribes to enhance existing shellfish grounds. Secondly, commercial growers were to provide 80 acres of tidelands to tribes for shellfish growth, 40 of which to be located in Samish Bay and available to be sold at fair market price. And lastly, commercial growers agreed to enhance public shellfish grounds by providing \$50,000 in shellfish stock or growing materials to the public every year for ten years starting in 2007.

For the settlement to work, government aid was necessary, and was provided by both Federal and State entities to the 17 tribes involved. A shellfish grower, in return, would receive federal protection over their plots. To be protected, the grower's tidelands must first be deemed "covered" for commercial growth under definitions provided in the settlement. Though the CSGS satisfied many areas of concern, tension still remains. Disputes over the broad definitions of "covered" tidelands continue and rights over certain parcels remain uncertain (*USA vs State of Washington* 2009).

### **III. Identification of Regulatory Barriers**

In this section, I address the current regulatory environment surrounding Washington shellfish aquaculture. I then ask which, if any, aspects hinder growth of the industry. I focus on regulations regarding shellfish, specifically on the commercial permit process and the local shoreline management acts. I then include how growers and the public perceive regulations. I pinpoint three areas of discussion: timeliness and quantity of permits within the system, public perceptions, and county permits. In a later section, I evaluate the Washington agriculture regulatory framework as an alternative framework to reduce the identified barriers.

Regulatory barriers can increase time and monetary costs and decrease new entrants into the industry (Gibbs 2009; Cheney 2013). Takoukam and Erikstein (2013) assess federal aquaculture frameworks and identify areas of importance when creating a regulatory framework. I use their research as a basis to examine the Washington shellfish aquaculture regulatory framework. Takoukam and Erikstein (2013) identify key policies and procedures intending to ensure rights protection for aquaculture farmers, stakeholders and comply with necessary local, state, and federal actions. Their recommendations range from integrated coastal management techniques, to administration simplification. Through analyses of regulatory approaches in different countries, the authors define the legal requirements and best environmental management practices for successful farms. In their conclusions, they offer advice to future farmers on lowering investment risks and minimizing negative social impacts.

Addressing barriers posed by aquaculture regulations is not a new topic. Historically, studies have found several barriers to aquaculture. These barriers can include wetland, waterway, and pollutant discharge restrictions, inadequate funding, trust laws and disease (Green and Tracy 2013). DeVoe (1997) addressed the regulatory barriers to marine aquaculture in South Carolina and offered multiple actions for removal of barriers. However, at the time the state lacked a necessary aquaculture policy framework, so no actions could be implemented. In 2013, Washington Sea Grant in conjunction with the Pacific Shellfish Institute (PSI), began a project to address “Economic impact, Barriers to Entry, and Opportunities for Expanded Production” for all West Coast aquaculture programs (Cheney 2013; Washington SeaGrant 2015; PSI 2012; Northern Economics 2013; Northern Economics 2009; Hudson 2009). Over time, as the Washington shellfish industry expands, attention to regulatory barriers continues.

### **Barriers within Regulations and Permitting Process in Washington**

Shellfish farmers must comply with a long list of requirements, starting on state and national levels, then addressing county requirements. Many of the national requirements are met through Washington State-sanctioned actions. To begin with, a prospective farmer’s first action is obtaining a commercial license. The WDOH issues three license types: Harvester, Shellstock Shipper, and Shucker-Packer licenses.

The Shellstock Shipper licenses enables aquaculture producers to commercially harvest, sell, buy and ship produce. The Shucker-Packer license authorizes the producer to shuck shellfish, pack (the produce) into containers for transport and sale and ship produce to distributors and wholesalers. The Harvester license is the least

expensive, allowing for shellfish harvest directly on site and sale to licensed commercial Shellstock-Shippers or Shucker-Packers. Producers with only a Harvester license are encouraged to partner with an existing commercially licensed supplier. Once any of the aforementioned licenses is obtained, it is active for a year and must be renewed annually. Along with each license, the harvest site area is tested for harmful biotoxins, imposing an additional fee to prospective growers.

#### Joint Aquatic Resource Permit Application

After receiving the approval for license type from WDOH, submission of a Joint Aquatic Resource Permit Application (JARPA) to the national Army Corps of Engineers (ACOE) is the next step for a grower. The ACOE is given authority in this process through Section 404 of the Clean Water Act. The JARPA is a streamlined application connecting federal, state, and local governments. The JARPA is an individual permit (IP), applying to a specific activity and requires public notice and comment period. The individual permit within the JARPA is first federally evaluated by ACOE. The Washington Department of Ecology (Ecology), the Washington Department of Fish and Wildlife (WDFW), and the Washington Department of Natural Resources WDNR then review the application at the state level. If deemed necessary the JARPA is passed to the county level for further review. Once submitted, the JARPA takes approximately nine months for approval from ACOE. The overall JARPA process can take at least 1 to 2 years, or potentially longer depending upon the complexity of the application. The JARPA permit lasts for 10 years once approved (ACOE, Feb. 19, 2016).

## Section 10 Rivers and Harbors Act

For JARPA approval, the ACOE evaluates the potential aquaculture site under Section 10 of the Rivers and Harbors Act of 1899 on the federal level. This Act requires a permit for any work or structures built on navigable waters. Navigable waters in Washington include all tidal waters, Puget Sound, Hood Canal, the Strait of Juan de Fuca and Willapa Bay. Activities and structures of concern are buoys, shellfish rafts, and oyster racks. If no structures will be built, the project is exempt from this evaluation.

## Hydraulic Project Approval

An additional component of the JARPA is the Hydraulic Project Approval (HPA) under the WDFW. The Hydraulic Project Approval permit evaluates the site for any work with potential to “divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state” (RCW 77.55.021). This permit imposes an additional cost within the JARPA process. With the permit application, the ACOE may determine that an environmental assessment is necessary. Any time a federal agency takes action on a proposal that agency must solicit comments from NOAA and WDFW. If an environmental assessment is needed NOAA and WDFW conduct a section 7 evaluation of the site under the Environmental Protection Act (EPA).

To limit agency involvement, ACOE created a programmatic evaluation which began spring of 2016. The programmatic evaluation gives ACOE authority to conduct environmental assessments under Section 7 of the EPA with no extra charge to the applicant. This assessment is conducted by ACOE, shortening the application process and hear-back time (Diane Cooper, Taylor Shellfish Pers. Comm. Feb. 10, 2016).

Along with the environmental assessment, ACOE determines whether proposed sites disrupt policies in place under the Coastal Zone Management Act (CZMA).

After ACOE approval, tribes with treaty rights in the vicinity of a proposed shellfish farm must be notified of the upcoming commercial site. Tribes evaluate the site and determine the amount of naturally occurring shellfish present. Based on the determination provided through the CSGS, tribes may then harvest up to 50% of the natural stocks. Notice by the grower to tribes must be given at least 60 days before the first commercial stocks are planted.

#### Nationwide Permit 48

Pre-existing shellfish farms seeking to expand to new tidelands or increase aquatic gear on existing space, have the option to apply for the Nationwide Permit 48 (NWP 48) issued by the ACOE. The NWP 48 covers a range of shellfish activities, authorizing the use of buoys, floats, nets, racks, trays, lines, tubes and other floating installments in navigable waters. Initial issuance of NWP 48 requires an environmental assessment through ACOE and public notice and hearing, but once issued, individual activities require no further notice. NWP 48 is a general permit, and since a revamping in 2012 better suits the current shellfish aquaculture permitting system. The NWP 48 is streamlined to fit within pre-existing federal, state and local regulatory authorities. Streamlining reduces paperwork and need for agency involvement between shellfish growers and the ACOE.

To minimize concerns for aquatic vegetation, the NWP 48 specifies a maximum total limit of ½ acre of perturbed eelgrass or other submerged vegetation present at the site. This limitation eliminates the potential for large-scale harm resulting from shellfish grow-out or removal methods (Walsh 2012). If further environmental concerns are encountered on site, a Section 7 consultation under the ESA, or a determination under the Magnuson-Stevens Fisheries Management and Conservation Act is performed.

#### NWP Pre-Construction Notifications

Preconstruction notifications (PCN) are used by the ACOE to limit paperwork for projects that impose minimal environmental harm (ACOE 2016). Currently, PCNs must be submitted for new project areas not previously farmed on, and changes to grow-out methods: such as shifting from bottom-culture grow-out to suspended or floating culture. ACOE must also be notified for changes in species type cultivated, particularly if new species had not previously been grown on site. Finally, notification is currently necessary for harvesting by use of tilling, dredging, or harrowing in areas with aquatic vegetation. Once a PCN is approved, the lasting period is 5 years (Olson 2016).

Throughout 2016, ACOE proposed changes to existing PCNs to lessen redundancies and unnecessary paperwork. Findings from numerous studies and reports allowed the ACOE to determine that a majority of work performed on shellfish farming sites involves minimal disturbance on surrounding aquatic ecosystems, especially vegetation, removing the need for most PCNs (Walsh 2012; Dumbauld and McCoy 2015, ACOE 2016).

Proposed actions to begin March 2017 for streamlining PCNs include removing notifications for tilling, harvesting, and dredging in areas with aquatic vegetation, and for changing from bottom to floating or suspended culture (Olson 2016). The Army Corps of Engineers also proposes rewording the definition for “new aquaculture” to specify as “grounds which have not been used as an aquaculture site in over 100 years” (ACOE 2016). This rewording aims to ensure farmers need only apply for one PCN during the 5-year approval period. In order to aid in this aim, shellfish aquaculture owners must supply a list of all proposed species, grow-out and harvesting methods.

### Shoreline Management Act

To protect shoreline natural beauty and please Washington residents, shoreline counties require additional permits for aquaculture sites under the Shoreline Management Act (SMA). The Shoreline Management Act regulates the use of submerged lands and uplands including wetlands drawing a 200 feet boundary inland from the project area (Peters 2008). The objectives of the SMA are:

“1) Recognize and protect the statewide interest over local interest; 2) Preserve the natural character of the shoreline; 3) Result in long term over short term benefit; 4) Protect the resources and ecology of the shoreline; 5) Increase public access to publicly owned areas of the shorelines; 6) Increase recreational opportunities for the public in the shorelines; and 7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary”  
(RCW. 90.58.020 (2009)).

These objectives are in place to ensure that public access to tidelands are unrestricted and the natural character of a shoreline is retained. The SMA regulation of tidal or

submerged lands usually requires developments to obtain a Substantial Development Permit (SDP). A development consists of any exterior construction or alteration which obstructs navigation or displaces the natural character of the land through dredging, drilling, or dumping (PAC 2016).

### Preferred Use Concept

The SMA establishes the *preferred uses* concept, placing priority on local interests for shoreline use (RCW 90.58.100). Under “preferred use”, aquaculture is ranked high among uses of county shorelines, however the SMA must also comply with Shoreline Management Plans (SMPs), which may prioritize aesthetic beauty or natural ecology over man-made shellfish aquaculture sites (Ward 2014).

### Barrier within Permits and Regulations in Washington: Time Involvement

The length of time required to obtain the numerous permits to initiate a shellfish farm is difficult to determine. Multiple factors affect hear-back time: location of farm, species type, culture grow-out method, and public opposition (Schwaab 2010; Engle and Stone 2013; Cicin-Sain et al. 2001; Cheney 2013). For one shellfish farmer, the regulatory process apparently failed them. In a public Aquaculture Listening Session conducted by NOAA in April of 2010 a participant stated, as a result of delays, they waited 14 years for a permit to use raft-culture as a grow-out method for mussels. During the same session, shellfish farmers reported moving to different countries to grow products under less strict regulation (NOAA Listening Session, April 22, 2010). For example, Taylor Shellfish has opened farms in British Columbia, Canada because of fewer regulatory

restrictions lowering regulatory involvement time and stronger public acceptance of shellfish aquaculture (Dewey, Letter, April 11, 2011).

#### Barrier within Permit and Regulations in Washington: Costs

Cost of permits, along with costs of running a business are a reoccurring issue for shellfish growers (PCGSA n.d.; PSI 2013; Washington Sea Grant 2015, PCGSA Conference 2016). Initial cost of permits can range from \$25 to potentially thousands of dollars without including license fees. Though initial permitting costs may not be overly expensive, post start-up regulatory fees and lost growing time due to hear-back waiting affect new shellfish farmers (Table 1). After waiting twenty years for regulatory permission to construct a mussel raft, Taylor Shellfish spent over \$1 million in permit processing fees (Bill Dewey, Letter, April 11, 2011; APHETI 2015). As of 2015, the proposal has yet to be approved. While waiting for permits, and accumulating fees, existing farms must continue to operate. A survey performed for the Pacific Shellfish Institute (PSI) found a majority of large farms spend between \$500,000 to \$1,000,000 per year on payroll, seeds and shellfish, and capital (boats, grow-out equipment) (Northern Economics 2013). The lowest operational costs for small farms were \$75,000 per year. Without proper permits to expand growing sites and sales, small farms could find it difficult to continue forward and be economically viable.

## Initial licenses and permits for shellfish farming businesses in Washington

Requirement Level	Agency Name	Permit	Cost (\$)	Review Period
Mandatory	WDFW	Aquatic Farm Registration	105	7-10 business days
Optional	WDFW	Shellfish Transport Permit	0	30 days
Mandatory	WDFW	Hydraulic Project Approval	150	45 days
Mandatory	WDOH	Harvest Site Certification	263 to 1,210	1 week to 5 years
Mandatory	WDOH	Shellfish Operation License	263 to 1,210	4 weeks
Optional	Ecology	Section 401	0	up to 1 year
Mandatory	WDNR	Aquatic Lands Lease	25	6 months – 1 year
Optional	County Government	Shoreline Conditional Use Permit	1,000+	3-4 months
		<b>Minimum Overall Total</b>	<b>806</b>	<b>~38 weeks</b>
		<b>Maximum Overall Total</b>	<b>3,700+</b>	<b>~92 weeks</b>

**Table 1:** Display of existing costs, review times and agency placement of most commonly used permits included for the initial startup of a shellfish farm in Washington State. All mandatory permits stem from JARPA (ORIA 2016)

### Barrier within Permit and Regulations in Washington: Permitting Delays

Between 2005 and 2012 not a single commercial shellfish farm was started in Washington, due in large part to permitting delays (NOAA 2012; Cheney 2013). Because the current aquaculture framework involves a large consortium of regulatory agencies, permit applications are at high risk of being lost or forgotten (PCSGA n.d.). This division in the permitting process between multiple agencies is a regulatory barrier. Grower confusion over permit applications locations and lack of inter-agency communication over similar permits increase delays to receive proper permits. Consolidation of permits into one standard agency as the NWP and JARPA are attempting to do through limiting pre-construction notifications and streamlining JARPA between agencies, and as proposed by Takoukam and Erikstein (2013) is a direction Washington could further explore to limit this barrier.

### **Barriers within Public Perception in Washington**

Public opinion varies concerning Washington shellfish aquaculture; some Washingtonians feel the industry encourages community participation and creates a sense of “pride” within the community, while others believe the aquaculture practice is too environmentally risky (Hudson 2016; Northern Economics 2009). How information is delivered affects public perception and challenges the public views on perceived risk and actual risk (Baker 2016). Hudson (2016) found that 34% of survey participants gained aquaculture information from television news, while 70% of participants heard no information from government agencies. Regarding the perception of aquaculture, the public has expressed three main concerns: economic costs of living near a farm, social costs from loss of public tidal space, and environmental costs through damaging grow-

out and harvesting techniques (Baker 2016, Hudson 2016; Northern Economics 2009; Gibbs 2009).

Access and land ownership are a source of conflict for homeowners and businesses within shellfish farming areas (Table 2). Though shellfish farming generates revenue through tourism and increased local jobs (Hudson 2016; Northern Economics 2009), homeowners and businesses find themselves paying more because of environmentally based property restrictions. Continual need to check on septic leaking and restoration costs on septic tanks put excessive strain on their livelihoods and pocketbooks (Northern Economics 2009; Gibbs 2009). Stakeholder perceptions indicate prime public space is felt to be lost due to commercial shellfish farming (Table 2). Other concerns are that shellfish aquaculture would impede navigation and potentially pollute nearby waters (Murray 2014; Rudell 2012; Baker 2016; Donahue 2015). Table 2 lists potential public concerns brought out through research.

<b>Concern</b>	<b>Authors</b>
Property Restriction	Hudson 2016, Northern Economics 2009
Septic Upkeep	Gibbs 2009, Northern Economics 2009
Lost Public Land	Hudson 2016, Northern Economics 2009, Rudell 2012,
Navigation	Murray 2014, Rudell 2012
Landscape View (NIMBY)	Murray 2014;
Chemical Pollution	Baker 2016, Donahue 2015
Impact on Habitat (eelgrass, salmon)	Rudell 2012, Ward 2014
Threat to alternative industry (fisheries)	Northern Economics 2009

**Table 2:** Public Concerns regarding Shellfish Aquaculture in Washington.

These eight conflicts are apparent in literature as the most prominent forms of public concern. Washington land and waterfront owners find environmental harm, safety of alternative industries, and personal involvement rank highest among concerns. “Not in My Back Yard” or NIMBY is a common issue in project constructions. Waterfront homeowners usually pay high costs for unrestricted views of natural landscapes. Aquaculture sites, depending on personal preference, can sully the pristine “natural” view. Waterfront homeowners have expressed this perception for shellfish aquaculture, along with concerns over economic costs and unwanted personal involvement with indirect residue from the shellfish farm (Northern Economics 2009).

#### Barrier of Public Opinion in Washington: Education and Understanding

A major barrier facing public opinion is education and understanding of the situation. Assumptions regarding the ability of shellfish farms to negatively impact on their habitat, threaten alternative industries, and increase chemical pollutions (Table 2) could be due to lack of easily accessible information despite a growing literature countering these assumptions (Dumbauld 2009; McDonald 2015; Reum 2015, Martin 2015, Ferriss 2015, Washington Sea Grant 2015). If there was greater public awareness of current shellfish aquaculture literature, Washington residents might have fewer conflicts with increasing the shellfish industry.

## **Barriers within County Permits in Washington**

Over the past 5 years' population migration to Washington has steadily increased. The 2015 State of Washington Population Trends reported a net increase of 57,400 people from 2014 to 2015, of which 62% occurred through migration. This marks an increase from 2013 and 2014, during which 44% and 58% of population growth, respectively, was due to migration (Forecasting and Research Division 2015). As urban population grows, family households move to suburban or coastal areas (WSDA 2009), contributing to a reduction in tideland space available for aquaculture (PCSGA n.d.).

Aquaculture takes place in 12 of 39 Washington counties (Northern Economics 2013). The Shoreline Management Act SDP is required in most shoreline counties (PCSGA n.d., Barney and Worth Inc. and GlobalWise Inc 2006). This permit is in compliance with the Shoreline Master Program under the SMA, county Development Regulations and the Environmental Policy Act, with a lifespan of 5 years (SARC 2007). Shellfish growers in all counties may also apply for a conditional use permit (CP) meaning "a use, development, or substantial development which is classified as a conditional use or not classified within this master program", including floating or otherwise visible aquaculture (PAC 2016). Substantial Development is "*any development of which the total cost or fair market value exceeds five thousand dollars, or any development which materially interferes with the normal public use of the water or shorelines of the state*" (RCW 90.58.020(3) (e)).

### Barrier within County Permits in Washington: Processing Delays

County level regulations contribute substantially to regulatory processing time (Northern Economics 2013) through lack of knowledge among county agency staff and public appeals (SIP April, 2016). County permits are open to appeal by anyone, including site owners, and cost on average about \$1300 (SARC 2007). Appeals at the county level contribute significantly to delays in receiving permits (SARC 2007; SIP April, 2016). When fast-tracked, permit acceptance times take 4-6 months, through hear-back can last a year (SARC 2007). Arcadia Point Seafood in Mason County waited over 500 days for a grow-out permit due to appeals at county and state levels (SIP April, 2016). The quickest possible turnaround time for permits, with no appeals, is approximately 150 days (SIP April, 2016). Appeals, however, can last indefinitely and could cost the grower thousands if not more (SARC 2007).

### County Shoreline Management Plans

The Mason county SMP focuses on lessening environmental impacts of and to shellfish aquaculture through strictly assessing pollutant outputs of nearby houses and businesses. To reduce regulatory complexity, the county seeks to work with existing federal and state permits; limiting redundancies through accepting previously written permit applications that mirror SDPs and CPs requirements (PAC 2016).

Kitsap County, similar to Mason County, works closely with federal and state government offices limiting paperwork on SDP or CP applications by accepting previously submitted permit applications. Small-scale aquaculture endeavors in Kitsap County are exempt from an SDP if total cost or fair market price of the operation does

not exceed \$5,000 and activities do not interfere with normal public use of the area (KCDCCD 2013). Small aquaculture enterprises are further supported under the Rural Conservancy Designation. The Rural Conservation Designation aims: “to protect ecological functions, conserve existing natural resources and valuable historic and cultural areas to provide for sustained resource use, achieve natural floodplain processes, and provide recreational opportunities” (KCDCCD 2013).

The Pierce County SMP requires analysis of environmental cumulative impact from multi-species farms and new farms on land without a previous history of aquaculture. The SMP also requires a habitat assessment permit for “...*when the Department’s maps, sources, or field investigation indicates that the site for a proposed regulated activity is located within a potential regulated fish or wildlife habitat area, the Department shall require the submittal of a fish and wildlife application and habitat assessment to determine the presence or absence of a regulated fish or wildlife species or habitat*” (Pierce County Code 18E.40.030 A.3). The habitat assessment is semi-redundant as permit requirements match those for the ACOE biological assessment. ACOE is currently looking to remove the habitat assessment for shellfish aquaculture in Pierce County (SIP April, 2016). Unlike Kitsap County, permit applicants must re-submit all material even if requirements are identical to previously submitted federal or state applications. Pierce county shellfish growers must also apply for a financial guarantee, which is a bond of \$1.00 for each PVC growing tube to removal post use (Pierce County Council 2013).

The Thurston county SMP dates to 1990 and differs significantly from newer SMPs. Consequently, current county managers are looking to update the document. Unlike newer SMPs, the Thurston county SMP fails to provide adequate information on necessary aquaculture permits. The SDP and CP are mentioned as possible permitting requirements, but how to obtain those permits or meet the filing requirements is not explained. Instead, the Thurston county SMP focuses on establishing Aquaculture Districts, simulating requirements within the JARPA or environmental assessments (location, project size, operation type, structures, and possible impact). Shellfish farms existing before May 21st, 1976 are automatically designated Aquaculture Districts (Thurston SMP 1990). Neither Thurston nor Mason counties require or conduct regulator checks on shellfish farms to ensure the growers are following rules within the SMP (SCS 2015).

#### Barriers of County Permits in Washington: Lack of Updated Material

SMPs can be updated for each county to reduce barriers to permitting. The Jefferson county SMP dates from 1986 and includes online revisions, but obtaining copies of the 1986 SMP are difficult. Details for specific shellfish permits needed are found online and not within the SMP itself. The Pacific County SMP dates from 2001 with current revisions, but lacks specific detail for aquaculture permitting. Mason County cooperates largely with the state and was found to have the shortest permit turn-around time. However, the 1990 Thurston county SMP could contribute to permitting delays resulting from lack of specific regulatory language in the SMP (SIP April, 2016). Aquaculture farms use SMPs widely as foreknowledge on accepted land use and regulatory needs for the county. The Clallam County SMP is an updated final draft from 2014. The

aquaculture section includes aquaculture policies, regulations and distinguishes necessary permits. This is a good example of how an SMP can address the needs of the aquaculture community.

Lack of clarity within county SMPs is a barrier for beginning farmers because it: 1) increases planning difficulty, 2) increases time spent searching for necessary county permits, and 3) could contribute to further land use difficulties because the farmer was not given knowledge beforehand. Increasing clarity could come through updating SMPs and obtaining cooperation between counties. Doing so could lower shellfish farming costs through increased efficiency by facilitating discussion of common issues between county shellfish growers and managers, and communicating with the state as a cooperative county group (DNR 2009).

## **IV Current programs addressing barriers**

Here I illustrate programs within Washington that address regulatory barriers. Along with state and federal shellfish initiatives, state-led programs aim to fulfill regulatory objectives and address concerns within the shellfish aquaculture industry. These programs were created to assess the state shellfish industry and provide feedback to stakeholders and policymakers for future actions. These programs focus on regulatory efficiency, the environmental concerns of aquaculture, and stakeholder communication. This section discusses the three most prominent programs currently in place; however, there are also smaller local programs working towards increased education and participation within the shellfish industry.

### **SIP Phase I Report**

Created April 2016 by the Shellfish Interagency Permitting (SIP) Team, the Phase I Report recommends regulatory changes to streamline shellfish aquaculture. The report goal is to remodel shellfish permitting, limiting government-holding time and garnering stakeholder trust through knowledgeable actions (SIP April, 2016). Through discussions with stakeholders, beginning in December 2011, the SIP Team made 10 recommendations for future initiatives:

- Establish a state Shellfish Aquaculture Coordinator
- Create a Centralized Mapping and Data Tracking Portal
- Address Overall Permit Timeliness
- Continue Outreach to Growers
- Develop Consistent, Practicable, and Effective Best Management Practices (BMP)
- Provide Technical Assistance to Local Government

- Assess Permit Compliance
- Reduce Redundancies and Improve Interagency Coordination
- Dedicate Funding to Support Shellfish Aquaculture Permitting
- Designate a Lead State Agency to Manage Shellfish Aquaculture

During their investigation, the SIP Team worked with local agencies, tribes, and commercial shellfish growers to create four distinct new products clarifying the shellfish aquaculture permitting process. The products are a Table of Permits listing necessary permits and licenses condensed in two pages; an Existing Permit Process Flowchart and Narrative to better understand application steps; a Uniform Map Specifications displaying all agencies involved in permit application; and a Joint Aquatic Resource Permit Application or JARPA Guidance to help Shellfish Growers with the complex JARPA application. Currently, the SIP Team continues research in streamlining regulatory processes and expand outreach and education to improve public understanding of the positive role shellfish aquaculture plays ecologically and economically for Washington.

### Pacific Aquaculture Caucus

In 2002, the Pacific Aquaculture Caucus (PAC) held a two-day workshop engaging aquaculture industry representatives, academics, government and non-government agencies, and tribes to discuss future aquaculture regulations and research goals. During the workshop, council members pinpointed primary concerns within the Pacific shellfish industry. Many concerns are like those of the SIP Team, including need for greater participation between industries and states on both federal and local levels. The PAC believes an enhanced relationship between these two sectors can be

accomplished through unifying leadership. Creating an aquaculture coordinator at the state level to provide a single political voice for the Pacific shellfish industry on the federal level could aid to unify the sector. The coordinator's main role would be to promote aquaculture at the state level, and increase cooperation and efficiency between multiple industries involved in shellfish aquaculture. The PAC workshop also pressed the need for greater education between public and industries to further increase transparency.

#### Pacific Shellfish Growers Environmental Policy

The Pacific Coast Shellfish Growers Association (PCSGA) established a set of environmental policy aims for shellfish growers (PCSGA 2001). The aims are continued Environmental Stewardship and Responsible Management, striving for Environmental Excellence, enhanced Regulatory Compliance, minimizing waste through Waste Management and creating positive relationships between industries and the public through Sharing Resources. The PCSGA sets forth to improve public perception and relationships between the public and growers through enhanced environmental policy. Through the policy, the public can be less concerned with any environmental harm that shellfish aquaculture may produce. The system is based on a simple equation:

*Environmental Policy (EP) + Environmental Codes of Practice (ECOP) = Environmental Management System (EMS) (PCSGA 2001).*

Shellfish are highly dependent on a healthy environment, and with ongoing help and encouragement from West Coast Shellfish Farmers, PCSGA aims to continue productive shellfish farming practices, ensuring a healthy aquatic environment.

These three programs were designed to streamline the regulatory process, increase transparency both between growers to the public, and the government to the growers, and improve overall public perception of shellfish aquaculture. The SIP report strives to advance regulation on all levels of government, through continuous action toward achieving future initiatives. More meetings, like the PAC, should aid in improving transparency through open discussion and collaboration, while the PCSGA Environmental Policy will help improve public perception by holding shellfish growers accountable for environmental stewardship. These programs can provide examples that succeeded in positively progressing the shellfish aquaculture system.

## ***V Review of Alternative Frameworks***

The Washington Shellfish Aquaculture regulatory framework potentially benefits from the introduction of ideas from comparable alternative frameworks. From shellfish growers to the federal government, people and institutions are convening to create a streamlined, efficient, and transparent regulatory process. Introducing new ideas allows an opportunity to expand and strengthen existing regulatory processes. Here I use the Washington Agriculture Framework as a comparative tool to identify inefficiencies and possible processes to strengthen the Washington aquaculture permitting process. I then use the Florida aquaculture-agriculture program as an example of a working dual-division regulatory framework.

As investigation into streamlining continues, one question recurs: should a division of aquaculture be reinstated, and if so, within which state agency should it be placed? (PCSGA Conference 2016; SIP April, 2016). Though formerly placed in the Washington Department of Agriculture, the division was suspended in the early 2000s due to underuse (10.12.16 PCSGA Conference). With continual growth of Washington's aquaculture program, the need to reopen the division has been proposed. Aquaculture is defined as a form of Agriculture by many state governments and researchers (FDACS 2015; WSDA 2009). Analysts at the local and federal levels seek an appropriate agency in which to place a Washington Aquaculture coordinator. Assessment of the Washington agriculture framework could aid that decision. Washington's agriculture division seeks industry protection through environmental and economic changes and an updated regulatory system (WSDA 2009). Reviewing the Florida aquaculture program

potentially helps to inform the establishment of an aquaculture program capable of sharing authoritative work between limited agencies.

### Washington Agriculture Framework

The agricultural regulatory framework addresses broad issues before focusing on local level regulations. The federal framework for agriculture is built upon the Clean Air Act (CAA), the Clean Water Act (CWA), and the supervision of chemical use. The CWA presents most agricultural regulatory burdens, due to the point source pollution commonly associated with agricultural run-off and the EPA section 404 for “dredge and fill material” related to irrigation. Under the CAA, agriculture is largely exempt because it is not considered to be a “major source” emitter of airborne pollutants. However, studies are currently being conducted to clarify whether agriculture is in fact a major source emitter (Stapleton 2014). Chemical use is largely unsupervised on the federal level, the “closest the statute comes to regulation of agricultural chemical use is by defining rules that describe who may apply the pesticide” (Stapleton 2014). The Right-to-Farm act passed in the 1980s is a federal act protecting farmers’ rights to use machinery and land regardless of adjacent area uses. The Right-to-Farm act allows farmers who use necessary equipment, potentially accompanied by lights or noise, to work without fear of litigation by surrounding residential neighbors who moved to the area more recently (National Agricultural Law Center n.d.). These federal requirements aid decision-making on the state and county levels.

The Washington Department of Agriculture (WDA) at the state level controls restrictions and permits necessary for Washington agriculture while ensuring compliance with

federal needs. For county needs, the Washington regulatory framework involves land issuance, building requirements, state-sanctioned pesticide use, and production methods. County level regulations shape farm-life efficiency, with much of the effort put in the hands of small-scale farmers. Public interest in local farming and “sustainable farms” is helping to keep the farming industry alive in Washington, but urban sprawl excludes small farms from viable land (Globalwise Inc. 2013, Hammond 2013). For instance, in the Puyallup Valley in Pierce County, agricultural land has been turned over to non-agriculture uses. Elsewhere, many small farms are giving over to larger industrial farming operations (Globalwise Inc. 2013). One of the main reasons for landowner turnover is the spread of people from nearby cities into the countryside (Globalwise Inc. 2013; DNR 2009).

“Affordable housing, access to urban amenities plus the natural beauty and open spaces surrounding (Orting) led to fast-paced growth until the great recession of 2008. As the economy recovers the area will likely continue to attract new residents and their demand for more housing and services” (Globalwise Inc 2013).

The Washington agriculture framework works to ensure adequate farmland and push back against urban sprawl. County reports specify urban sprawl as a potential issue to farming rights, and state level loans protect existing and new farmers from being overly affected by increasingly high land taxes (DNR 2009; WSDA 2009). These types of projects help keep farming a central source of revenue for Washington State. Efficiency of agricultural regulatory processes varies from county to county. Farmers in Pierce County find communication with local government officials difficult or even non-existent

(Barney & Worth Inc. et al. 2006). In contrast, Snohomish County has an agricultural coordinator in place who is the “go-to” person for all questions related to agriculture. Snohomish County also offers an online interactive map, displaying zoning lines, soil types and regulations for each zone. This tool allows prospective farmers in Snohomish County to prepare for necessary permit requirements or regulatory barriers they may encounter. Pierce County also discussed creating a county agricultural coordinator in 2006, however, due to unknown restraints the position is yet to be created (Barney and Worth Inc. and GlobalWise Inc. 2006).

The King County Farms report (2009) is a highly-detailed county level agricultural assessment. The King County Farms report discusses county agriculture using information from multiple interviews with local farmers, and includes updated production values. Based on the information, the report made recommendations on issues related to water, marketing and economic development, strategies to keep farmers farming, farmer succession, Farm-City Connection, and financial and inter-local support (DNR 2009).

To encourage public participation in agriculture, local farmers are working closely with the public and local government officials to ease concern over environmental effects of agriculture. The increasing number of farmer’s markets, the “local-food” movement, and “sustainable eating” has helped open public interest in farming (Gibbs 2009; Hammond et al. 2013; Globalwise inc 2013). Washington farmers envision policy change within the government through education and outreach, internship programs and partnerships with universities, rather than government price support programs (Hammond et al. 2013).

Both the Pierce County Strategic plan (2006) and the American Farmland trust (Stuart 2009) call for government to incentivize farmers to be environmentally friendly, instead of forcing regulation. Providing farmers with cash incentives or environmental rewards, would allow the public to better discern “environmentally friendly” food alternatives.

### Future of Farming: Washington Agriculture and Aquaculture

The 2009 WDA Future of Farming Strategic Plan for Washington State indicated competition as the main driver for change in agriculture and aquaculture. Competing foreign farmers offer lower production and retail costs, pulling consumers away from pricier local markets. Inefficiencies within current regulatory processes on small-scale farmers help to keep product pricing high. These burdens on local farmers keep customers purchasing cheaper foreign alternatives, with many small-scale farms finding it difficult to remain economically viable (WSDA 2009). The Future of Farming Strategic plan aimed to identify these regulatory burdens, and help small scale Washington farmers remain competitive with out-of-state and foreign agriculture.

Land, agricultural water, energy, labor, capital and credit were found to exacerbate competition between local farmers. To combat foreign agricultural demand, the WDA introduced five areas of future investment to assist the current regulatory framework. The first area is to make agriculture a priority, followed by eliminating regulatory barriers, protecting resources, strengthening support services, and finally harnessing emerging opportunities (Barney & Worth Inc. 2006; WSDA 2009). When eliminating regulatory barriers, the WDA (2009) called for establishing a Blue Ribbon Panel,

increasing education, and implementing a streamlined permit application. The WSI and SIP Team compiled objectives similar to the WDA goals.

### ***Comparing Aquaculture to Agriculture***

The Washington agricultural framework reports issues like those in aquaculture. For example, Washington farmers seek to alleviate regulatory burdens, and expressed desire for a closer relationship with consumers. Through studies like the Future of Farming and King County's Farm report, Washington agriculture is pinpointing areas of concern and readying farmers and government agencies for future discussion. Shared concerns between the agriculture community and the aquaculture community suggest that a closer working relationship between the two could be beneficial moving forward. On the federal level, agriculture and aquaculture sectors are closely associated within the USDA. Connectivity between sectors diminishes at state and local levels. No department of aquaculture exists within the WDA, and the Washington farming manuscript only mentions aquaculture briefly. A closer working relationship between the two sectors could benefit both entities.

### Initial licenses and permits for agricultural farming businesses in Washington

Requirement Level	Agency Name	Permit	Cost (\$)	Review Period
Mandatory	WDA and DOC	Master's business license	24	10days-6weeks
Mandatory	WDA and DOC	Nursery retailer (specialty license)	65-138	10days-6weeks
Optional	WDA	Organic Food License	450+	3-5months
Optional	WDA	Organic Food Producer Certification	470+	3.5 months
Optional	Ecology	NPDES (Construction Storm-water General Permit)	630-2,346	60days
		<b>Minimum</b>	<b>87</b>	<b>~3 weeks</b>
		<b>Overall Total</b>	<b>87</b>	<b>~3 weeks</b>
		<b>Maximum</b>	<b>3,428</b>	<b>~58 weeks</b>
		<b>Overall Total</b>	<b>3,428</b>	<b>~58 weeks</b>

**Table 3:** Breakdown of permit requirements for initial startup of an organic row crop farm in Washington State. Displays agencies with authority over permits and potential timescales (ORIA 2016; WSDA 2009; WSDA 2016; EPA 2016)

Table 3 displays the start-up permits required for an agriculture farm. The NPDES license is a federal requirement and the ACOE determines if it is necessary. The NPDES general permit should be obtained if there is threat of contamination to nearby water resources. The Master business license is required by all farming companies and

is obtained on the state level. The Nursery and Organic license are not required but should be obtained if preferred.

Starting businesses is difficult and for farming producers, knowing the processes for initializing their company is a must. The agriculture licenses and permits shown in Table 3 are those necessary to start an inland organic small-scale row crop farm. An organic row crop farm is best compared to a shellfish farm because of the minimal chemical use (pesticides, herbicides) and the crop dependence on natural resources (the earth), similarly to shellfish (WSDA 2016). The purpose of these tables is to compare number of permits, agencies, costs of permit/ license and review times between aquaculture and agriculture, to further understand regulatory difficulties.

**Comparison of Permitting Requirements and Costs for Washington Aquaculture and Agriculture**

	<b>Number of Permits/ Licenses</b>	<b>Number of Agencies Involved</b>	<b>Minimum Costs (\$)</b>	<b>Maximum Costs (\$)</b>	<b>Review Period (Low)</b>	<b>Review Period (High)</b>
<b>Aquaculture</b>	8	5	806	3,700	1 week	1 year
<b>Agriculture</b>	5	3	87	3,482	10 days	5 months

**Table 4:** Condensed information from Table 1 and Table 3 to compare Washington permitting requirements for Aquaculture and Agriculture.

Table 4 shows the permitting process overall timeliness and permit requirements for aquaculture include longer review periods. This lengthening is in large part due to

county SMA permits. Both the Shoreline Conditional Use permit and the Substantial Development Permit add at least 3-4 months to the permitting process and cost \$1,000 to over \$6,000 per farm. Inland small-scale agricultural row-crop farms require fewer permits and are less costly to permit than small-scale shellfish farm counterparts. For inland farms located near water bodies, the greatest permitting cost is the NPDES permit (Table 3), which is required for point source pollution threats to nearby water tributaries (EPA 2016). Certifying an agricultural farm as organic requires the longest review period and must be completed before the first crop is grown. The WDA monitors chemical and fertilizer usage on the farm before labeling the product as organic (WSDA 2016).

Permit and licensing requirements for aquaculture farms are generally more expensive than agriculture and review periods are longer, especially at the county level. The Aquaculture Lands Lease is one of the least expensive requirements for the shellfish farm, but can potentially take a year.

Fewer agencies are involved in agricultural permitting than in aquaculture permitting: three different agencies as opposed to five (Table 4). However, obtaining a master's business license in farming can be daunting. Though two departments are officially involved, there are multiple online avenues through alternative departments websites to reach the license, which can confuse the potential producer on actual department authority. To apply for a master's business license a potential producer could search in five different Washington departments: Department of Agriculture, Department of Licensing, Department of Revenue, Department of Commerce, and the Business

Licensing Services within the Department of Revenue. The online information from each department fails to visibly state which department has actual authority over the license (i.e WDA and DOC), aiding in confusion.

The difference in review periods within the agriculture and aquaculture regulatory frameworks is a barrier within aquaculture regulatory industry. Agriculture spends on average five months at most reviewing permits; while aquaculture can potential take a year or more (Table 4). Shortening review periods for aquaculture could potentially lower overall costs by allowing shellfish farmers to start producing at an earlier period. To streamline the aquaculture regulatory framework, this discussion alludes to the idea fewer agencies can be involved for each permit.

*Key lessons:*

Agriculture regulations hold key lessons for aquaculture. First, the Right to Farm arrangement could be applied to aquaculture establishments existing in areas prior to settlement of homeowners (Stapleton 2014; National Agricultural Law Center n.d.; PCGSA n.d.). If aquaculture is defined as agriculture, the Right-to-Farm could provide protection to local shellfish growers. Second , a coordinated multi-county report, like the Farms Report, could potentially alleviate issues between counties through attention by state regulators. And third, by placing value on environmental benefits of agriculture and aquaculture, there could be a tangible increase in societal trust (Stuart 2009; Hammond et al. 2013).

The comparison also shows agency involvement could potentially be reduced if aquaculture regulations were housed under one division, as in agriculture. However, permitting costs would remain much the same, as the greatest costs are at the county level and would not be overly affected by a relocation of state level regulations. However, it is possible hear-back times would decrease with a reduction in agencies involved.

### **Example of Aquaculture within Agriculture: Florida**

The Florida aquaculture regulatory branch was moved from the Florida Department of Environmental Protection (FDEP) to the Florida Departments of Agriculture and Consumer Services (FDACS) in 1999 (Schiavinato 2007). Four goals were associated with this transfer. By placing the Department of Aquaculture within FDACS, Florida regulators hoped the move would 1) improve process efficiency and 2) “maximize delegation to the lowest level possible in the agency” to allow for people with the greatest amount of knowledge on shellfish aquaculture to be closest to growers and public eyes (Schiavinato 2007). Third, during the exchange, aquaculture regulatory experts were moved from FDEP to FDACS to ease transitioning, and a memorandum of understanding (MOU) was signed between the two departments ensuring that the FDEP would help in smoothing agency transfer. Enforcement was the final goal. To increase protection of shellfish sites from public interference and product theft, shellfish farmers called for FDACS to either purchase enforcement boats to patrol growing areas or create an MOU between FDACS and FDEP in which FDEP continued protection

enforcement while FDACS controlled regulations (Schiavinato 2007; Hill 2013). FDACS and FDEP decided to jointly purchase enforcement boats.

Florida presently defines aquaculture as agriculture, and combining the agencies was done partly due to this definition (FDACS 2015). This change received commercial and recreational shellfish support. Shellfish growers believed the transfer would provide “better customer service” than they encountered in the past because of the experience FDACS has with farming (Schiavinato 2007). The current role of FDACS is:

- Issuing or denying aquaculture certificates of registration that identify aquaculture producers and products and collect all related fees;
- Coordinating the development, revision, and implementation of the state aquaculture plan;
- Developing memoranda of agreement with groups involved in the state aquaculture plan, which include the FDEP, the Florida Fish and Wildlife Conservation Commission, and the Florida Sea Grant College Program;
- Providing developmental assistance to the aquaculture industry; and
- Making available state lands and the water column for aquaculture production when it is compatible with state resource management and environmental protection goals, and when those areas are suitable for such production (FLA. STAT. ANN. § 597.003(1)).

Overall, shellfish farmers backed this move, however, some farmers do feel the FDACS has not fully accepted aquaculture, because much of the wording in regulations still reflects land-based agriculture and not in-water farming (Shiavinato 2007). The move was also supported through the Florida Aquaculture Policy Act, which, along with aiding the move to FDACS also created the Aquaculture Review Council and the Aquaculture

Interagency Coordination Council. These councils support interagency communication especially between industry leaders and government regulators.

Unlike other states, Florida provides a Best Management Practice (BMP) for all aquaculture related activities. Shiavinato (2007) states, “the purpose of the BMP Manual is to maintain environmental integrity while simplifying the permitting process”. The BMP guide lists necessary requirements upholding shellfish sites while detailing rules shellfish growers should follow (FDACS 2015; Hill 2013). The guide requires growers to obtain an ACOE general programmatic or individual permit. Subsequently, Florida growers must obtain a Sovereignty Submerged Lands Lease Agreement, which is both inheritable and transferable, lasts for 5 years and costs an annual fee of \$15 per acre at minimum (Hill 2013; Shiavinato 2007). A Florida aquaculture farmer must also apply for the Aquaculture Certification Program (ACP), costing \$100 for new and renewed, requiring all products to be identified from growth to sale. Through the ACP program aquaculture producers are trained in product handling, cleaning, and transportation to lessen *Vibrio* contamination. The ACP program grants aquaculturists the same tax benefits and reduction in permits as a licensed agricultural producer (Shiavinato 2007; FDACS 2017).

## VI Conclusion and Recommendations

My analysis suggests several ways to promote aquaculture in Washington. 1)

Establishing clear financial, social, and environmental sustainability goals is essential.

In the case of aquaculture, these goals involve a strong licensing program requiring a high degree of government oversight, while still allowing farmers to feel in control. 2)

State and local officials should try to harmonize the needs of aquaculturists with the terms of the Shoreline Management Act to reduce conflict over land use. Creating and maintaining space for future shellfish growers helps sustain the aquaculture business.

3) There must be strong environmental management. Environmental management begins on all levels of government through clear and concise language and convening of multiple organizations and sectors, including agriculture and aquaculture. 4)

Investment risks should be mitigated to the extent possible. One method is to use a “single window approach” to limit simplify permitting and number of agencies. Other methods to mitigate risk are to provide financial incentives for farmers and to lessen the social impact of aquaculture. 5) Provisions for enforcement must be developed and adhered to. Enforcement could consist of policing aquaculture sites to ensure regulatory compliance. Alternatively, mechanisms such as “eco-contracts” —used in Denmark as a recognized legal document to decrease pollution outputs at aquaculture sites—could be implemented.

Moreover, agriculture and aquaculture could be drawn closer together at the level of state agencies. Currently, agriculture and aquaculture are different commodities in Washington. If aquaculture were to partner with agriculture there is potential for

regulatory efficiency. The WDA is intricately connected to other state agencies, licensing programs, and Washington farmers. The WDA is also the main driver for all agricultural needs. If aquaculture finds placement within the WDA, shellfish farmers could benefit from strategies that affect the overall efficiency of agriculture. The combination would also create a stronger voice for every farmer in Washington. Instead of being separate, land and aquatic farmers could work together on environmental and social issues associated with farming practices, lessening contention among consumers and possibly decreasing purchase of foreign goods. However, the largest issue facing aquaculture permitting regulations is on the federal level. The NSI and the NWP 48 are steps the federal government is taking to ensure shellfish rights within the United States.

Still, a change in perception of aquaculture is necessary to further promote the industry. Outreach and education are the largest barriers to improving public perception. A regulatory framework emphasizing strengthened relationships between government agencies, shellfish growers, and the public could aid in lifting the public's mood towards shellfish aquaculture. The U.S. also has a long history of fishing, but with wild stocks declining, new sources of seafood will be required. Creating environmentally friendly food alternatives, locally grown and accessible to every class of U.S. citizen is the final goal. Having regulations in Washington to promote shellfish farming is just the first step.

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