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Regulating the Blue Revolution: a Sea of Change for the United States' Offshore Aquaculture Industry or a Missed Opportunity for Increased Sustainability

Elan Lowenstein

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REGULATING THE BLUE REVOLUTION: A SEA OF CHANGE FOR
THE UNITED STATES' OFFSHORE AQUACULTURE INDUSTRY OR A
MISSED OPPORTUNITY FOR INCREASED SUSTAINABILITY

*"We must plant the sea and herd its animals using the sea as
farmers instead of hunters. That is what civilization is all about –
farming replacing hunting"*

Jacques Cousteau

Aquaculture has the potential to be one of the most efficient methods of food production to date. In recent years, the developments in offshore finfish aquaculture have proven to be more environmentally friendly than large-scale terrestrial animal farming, requiring a fraction of resources such as freshwater which are becoming more scarce in the face of global population growth, while also relieving pressures on wild fisheries. The United States is one of the largest global consumers of seafood, importing about ninety-percent of its supply. The current regulatory framework for offshore aquaculture in the United States is effectively non-existent. Federal courts have yet to designate a controlling agency to regulate aquaculture and legislation has fallen short of providing any foundation. More recent offshore aquaculture activities have been administered by the National Marine Fisheries Service (NMFS), but a United States District Court ruled in 2018 that the NMFS was not authorized to regulate aquaculture based on an interpretation of aquaculture as a fishery in the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This leaves the United States' much needed aquaculture sector dead in the water during the ever-growing global Blue Revolution. To bolster the need for a proper regulatory structure for domestic aquaculture production, this note will discuss the current federal regulations in the United States as well as other countries that deploy varying management methods to the benefit, and sometimes detriment, of aquaculture production.

Elan Lowenstein

TABLE OF CONTENTS

I.	INTRODUCTION.....	475
II.	OFFSHORE AQUACULTURE IN THE UNITED STATES.....	478
A.	POLITICAL ATMOSPHERE	479
B.	ATTEMPTS TO REGULATE	483
C.	EFFECTS ON THE CURRENT REGIME.....	485
III.	INTERNATIONAL PRECEDENTS.....	493
A.	NORWAY AND CHILE: REGULATORY SUCCESSES AND FAILURES AMONG SIMILAR INDUSTRIES.....	493
IV.	CONCLUSION	497

I. INTRODUCTION

Aquaculture is the fastest growing food production industry in the world.¹ Almost half of all seafood consumption is produced through aquaculture practices.² In 2016 global aquaculture production included 80 million tons of food fish and 30.1 million tons of aquatic plants, estimated at a value of USD 243.5 billion.³ The Food and Agriculture Organization of the United Nations (FAO) estimates that global fish consumption is growing twice as fast as population growth and is relying on the aquaculture sector to help achieve its goal of a world without hunger and malnutrition.⁴ Much of the rising demand for seafood in the developed world is attributed to consumers who view seafood as a healthier and less resource intensive source of protein compared to terrestrially farmed animals.⁵

The explosion of global aquaculture production in recent years that has been dubbed as the “Blue Revolution,” synonymous with the Green Revolution experienced in land based agriculture during the 1960’s (but with the goal of avoiding practices deleterious to the environment), is a result of recent technological advances coinciding with a global increase in demand for seafood⁶. However, like its’ terrestrial

¹ FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, *THE STATE OF WORLD FISHERIES AND AQUACULTURE*, at 17 (2018).

² *Id.* at 18.

³ *Id.* at 17.

⁴ *Id.* at vii.

⁵ *Id.* at 69.

⁶ See BARRY A. COSTA-PIERCE, *ECOLOGICAL AQUACULTURE: THE EVOLUTION OF THE BLUE REVOLUTION* xii (Barry A. Costa-Pierce eds., Blackwell Science, 2002).

counterpart, aquaculture developed past its subsistence era with a learning curve – creating a source of contention that has followed the industry into a new age where environmental and economic stability have been more prevalent. The aquaculture sector is now in a precarious position as it is both praised and contested by groups claiming to be proponents of environmental stewardship.

The criticisms of aquaculture in general did not come without merit. Historically, industrial aquaculture practices have been associated with environmental degradation through effluent discharge in low-flow benthic areas, disease outbreaks among culture species spreading to wild stocks, and ecological impacts on genetic diversity of wild fish populations from escaped fish.⁷ The wide use of antibiotics throughout commercial aquaculture also posed qualified risks to the environment and concerns in consumer health.⁸ These externalities didn't just effect the surrounding environment, but the producers themselves. Instances due to mismanagement or lapses in technology such as harmful algae blooms, disease spread, and the resulting fish die offs have hurt producers' bottom lines and even sometimes resulted in economic collapse of species-specific industries in the surrounding regions that relied on them.⁹ These realities

⁷ See generally T.H. Pearson & K.D. Black, *The environmental impacts of marine fish cage culture*, in ENVIRONMENTAL IMPACTS OF AQUACULTURE 18-20 (Kenneth D. Black, eds., Sheffield Academic Press Ltd, 2001).

⁸ See P.-S. Choo, *Environmental effects of warm water culture in ponds/lagoons*, in ENVIRONMENTAL IMPACTS OF AQUACULTURE 87 (Kenneth D. Black, eds., Sheffield Academic Press Ltd, 2001).

⁹ See generally Michiko Lizuka & Jorge Katz, *Natural Resource Industries, "Tragedy of the Commons" and the Case of Chilean Salmon Farming*, in EVIDENCE-BASED DEVELOPMENTAL ECONOMICS 137-55 (Carlo Pietrobelli &

greatly diminished the incentives to produce at the expense of the environment and the industry began to learn that environmental sustainability would translate into economic sustainability in the long run.

Advances in technology as a result of investments by governmental, private, and international organizations have substantially changed the viability of aquaculture as a sustainable source of food production. Alternatives to antibiotics such as probiotics, vaccinations, and plant-based treatments are making the phasing-out of antibiotic use in the near future more of a reality.¹⁰ Additionally, new designs in culture methods such as submersible open-ocean cages allow increased resilience to perturbations in remote areas of the ocean where environmental impacts are minimized.¹¹ Increased feed efficiencies through species domestication and improved commercial feed development also result in less resource intensive production.¹²

With over 95 thousand miles of coastline¹³ and 3.4 million square nautical miles of ocean in its Economic

Rajah Rasiah eds., University of Malaya Press, 2012) (discussing the causes and effects of the collapse of the Chilean salmon industry in 2008).

¹⁰ See Jaime Romero, Carmen Gloria Feijoo, & Paolo Navarrete, *Antibiotics in Aquaculture – Use, Abuse and Alternatives*, in HEALTH AND ENVIRONMENT IN AQUACULTURE 159, 175-184 (Edmir Carvalho, eds., InTech, 2012).

¹¹ See CAROL SEALS PRICE AND JAMES A. MORRIS, JR., MARINE CAGE CULTURE AND THE ENVIRONMENT: TWENTY-FIRST CENTURY SCIENCE INFORMING A SUSTAINABLE INDUSTRY 9-13 (Nat'l Oceanographic Atmospheric Agency eds., 2013).

¹² *Supra* note 1, at 116.

¹³ NAT'L OCEANOGRAPHIC AND ATMOSPHERIC ADMIN, Shoreline Website, shoreline.noaa.gov/faqs.html?faq=2.

Exclusive Zone¹⁴, the United States is a prime candidate for being among the top seafood producers globally. In reality, the United States imports roughly ninety-percent of its seafood and exports about half of its domestic supply¹⁵ due to high demand for American seafood abroad. Even if the domestic markets purchased all of the United States' wild catch, it would not satisfy demand, which is currently rising.¹⁶ With only about three-percent of its domestic seafood produced through aquaculture, the United States relies on foreign producers that have capitalized on the efficiencies of aquacultural advances of the past half century, consisting of half of its 14 billion dollar seafood trade deficit.¹⁷

II. OFFSHORE AQUACULTURE IN THE UNITED STATES

In the past decade, many offshore aquaculture projects have tried to operate in the United States, but few have been able to successfully navigate the often uncertain regulatory processes.¹⁸ Those that have, often moved or expanded outside of the United States to countries with favorable regulatory frameworks more suitable for the growth and

¹⁴ *Id.*

¹⁵ NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION, FISHERIES OF THE UNITED STATES 2017 REPORT, at ix (2018).

¹⁶ Gunnar Knapp & Michael C. Rubino, *The Political Economics of Marine Aquaculture in the United States*, 24 REVIEWS IN FISHERIES SCIENCE AND AQUACULTURE 213, 214 (2016).

¹⁷ NAT'L OCEANOGRAPHIC AND ATMOSPHERIC ADMIN, <https://www.fisheries.noaa.gov/national/aquaculture/us-aquaculture>

¹⁸ See *supra* note 16, at 219.

longevity of aquaculture operations.¹⁹ The current regime of aquaculture regulation in the United States can be viewed as a result of political influence and pitfalls in legislation that emphasize the disconnect between science and lawmaking.²⁰

A. POLITICAL ATMOSPHERE

Offshore aquaculture is a polarizing subject with two sides that share the same perceived goals. Opponents and proponents of aquaculture argue that their interests are in environmental sustainability and economic security.

In the past, environmental non-governmental organizations (eNGOs) and other like-minded groups were predominantly against general aquaculture practices.²¹ Main arguments to ban or heavily restrict aquaculture practices were founded on the principles that aquaculture would cause pollution, harm marine ecosystems, and increase pressures on wild fish stocks used to produce fish meal and fish oil for feed manufacturers.²² Now, there are a number of eNGOs that have turned into advocates of aquaculture as technologies have made certain practices more sustainable including offshore aquaculture and integrated multi-trophic aquaculture (a method that resembles permaculture).²³ Yet, despite a plethora of peer-reviewed studies on sustainable aquaculture practices, many environmental groups still go through great lengths to oppose any advances in the offshore

¹⁹ *Supra* note 16, at 219.

²⁰ *See generally supra* note 16, at 213.

²¹ *Cf.* RIGHT FROM THE START: OPEN-OCEAN AQUACULTURE IN THE UNITED STATES 12-24 (Ocean Conservancy, 2011).

²² *Supra* note 16.

²³ *See supra* note 21, at 16.

aquaculture industry.²⁴ Whether or not this a result of aquaculture advocates' failure to effectively articulate the benefits of sustainable practices²⁵ or an opposition that selectively chooses to focus on the risks, much of which is outdated, associated with aquaculture, the talking points have remained the same.

The common arguments that offshore aquaculture in the United States would translate into "factory farms" that pollute the ocean and harm marine resources have been unsupported by the scientific community²⁶ that has come to the conclusion that offshore aquaculture can be an effective mode of producing sustainable foods with minimal detriment to the environment.²⁷ Groups that try to promote efficient resource allocation contradict their goals when they oppose offshore aquaculture without considering the superior feed conversion ratios and fresh water requirements of aquacultured finfish species compared to farming animals on land.²⁸ Additionally, arguments that the prevalence of offshore aquaculture would increase stress on wild fish stocks used in commercial aquaculture feed are unfounded, as landings for fish meals and oils have remained static for

²⁴ *Supra* note 16, at 219.

²⁵ *Id.*

²⁶ Note: there is a distinction between offshore aquaculture and near-shore aquaculture which has had many instances of environmental degradation in regions of Chile and Asia due to mismanagement and placement of operations in unsuitable culture environments.

²⁷ See generally Michael B. Rust et al., *Environmental Performance of Marine Net-Pen Aquaculture in the United States*, 39 FISHERIES 508, 509 (2014).

²⁸ See Halley E. Froehlich et al., *Comparative terrestrial feed and land use of an aquaculture dominant world*, 115 PNAS 5295, 5295-5300 (2018).

decades even with the growth of aquaculture.²⁹ Higher prices for wild fish products due to high demand from other industries such as supplemental products for human consumption have resulted in feed manufacturers increasingly replacing wild derived fish meals with those sourced from waste and scraps already in the current seafood supply chain as well as plant and insect based alternatives³⁰. Advances in rearing, grow-out practices, and alternative treatments have also given arguments of rampant antibiotic use less weight, although in developing countries with underenforcement or lack of regulations these problems persist.³¹ Nevertheless, misconceptions are extensive in the political and social atmosphere surrounding offshore aquaculture.³² Of course, without proper management and a regulatory framework that ensures producers are in line with the most sustainable practices, defenses from such arguments against aquaculture are moot.

An analysis of lobbies for and against aquaculture by Welch 2015 showed that there was about an equal number of groups solely dedicated to the issue on each side.³³ However, pro-aquaculture lobbies invested significantly more than anti-aquaculture groups to no success in gaining favorable legislation.³⁴ This has been the cycle during the many attempts to establish a regulatory framework at the federal

²⁹ *Supra* note 16, at 220.

³⁰ *Supra* note 16, at 222.

³¹ *See supra* note 27, at 514-19.

³² *Id.*

³³ AARON W. WELCH, FARMING IN THE COMMONS, FISHING IN THE CONGRESS, AND U.S. AQUACULTURE IN THE 21ST CENTURY 123 (Open Access Dissertations, 2015).

³⁴ *Id.* at 124.

level in the past.³⁵ This suggests that the main opposition that influences the outcomes of aquaculture initiatives may not lie within environmental concerns. As Welch points out, an overwhelming number of wild-fishery lobbyist compared to aquaculture-related lobbyist were present in Washington to make their voices heard.³⁶

Opposition to offshore aquaculture that stems from the wild fishery industry is mostly based on the fear that domestic aquaculture production would be a major competitor.³⁷ However, the United State's seafood demand far exceeds domestic supply and even if all fish landings were consumed domestically, there would still be a high and growing demand among consumers.³⁸ Commercial fisheries have benefited from aquaculture in the past. The introduction of farmed salmon³⁹ to consumers in the United States faced major opposition from the wild salmon industry but resulted in a market expansion that benefited the wild market far past the initial price drops fisherman experienced.⁴⁰ Advances in aquaculture technology such as hatchery production of juvenile fish have also supplemented around 70-80 percent of wild-caught salmon in the Pacific Northwest.⁴¹ Thus, the

³⁵ *Id.* at 115.

³⁶ *Id.* at 129.

³⁷ *Supra* note 16, at 216.

³⁸ *Supra* note 16.

³⁹ Note that salmon is not a species normally considered for offshore aquaculture in the United States, but this serves as an important economic example of the relationship between aquaculture and wild commercial fisheries.

⁴⁰ *Supra* note 16, at 216.

⁴¹ FISH AND WILDLIFE SERVICES,
<https://www.fws.gov/arcata/fisheries/reports/tamwg/2008/March10-11/Attachment4.pdf>.

relationship between fisheries and aquaculture has potential to be synergetic, rather than the dichotomy it is portrayed as. While anti-aquaculture campaigns can affect public perception thus influencing lawmaker's decisions, the real barrier to establishing a comprehensive framework for offshore aquaculture may not be exclusively coming from such arguments, whether they worry about economic competition or environmental matters, that vehemently oppose offshore aquaculture. As this note discusses, aquaculture regulation has been coupled with fisheries regulation. It follows that when policies have been introduced, there has been much more input and focus from commercial fishery industries.⁴² As a result, aquaculture has been in the peripheral of the legislative process.⁴³ Consequently, aquaculture issues have been muted by the much louder voices of fishery policy and have effectively been, as Welch describes, "drowned in a sea of inattention."⁴⁴ Though misinformation and outdated concerns have heavily impacted the legislative process of creating an efficient framework for a sustainable offshore aquaculture industry in the United States, it is quite possible that the grouping of aquaculture with fisheries, that has been its main impediment.

B. ATTEMPTS TO REGULATE

The adoption of a comprehensive framework for offshore aquaculture regulation is not a new idea. Congress

⁴² *Supra* note 33, at 129.

⁴³ *Id.*

⁴⁴ *Supra* note 33, at 131.

first recognized the importance of aquaculture in reducing the United States' trade-deficit by securing stronger domestic seafood production in the National Aquaculture Act of 1980.⁴⁵ However, many attempts to create a comprehensive policy thereafter have failed. The National Offshore Aquaculture Act was introduced to congress in 2005 and reintroduced in 2007 but each time the bill died in committee. During each respective introductory period, opposition groups attacked the bill over concerns of inadequate environmental oversight and economic threats to the commercial fishing industry.⁴⁶

An environmentally upgraded bill, the National Sustainable Offshore Aquaculture Act, was introduced 2009.⁴⁷ The Act had all the elements that would seem to satisfy both the problems of a fragmentation in regulation and assurance of sustainable practices.⁴⁸ However, certain provisions such as permit tenure were found to be unworkable by industry leaders and the bill never passed committee.⁴⁹

The most recent attempt for a comprehensive offshore aquaculture bill was the Advancing the Quality and Understanding of American Aquaculture Act (the AQUAA Act). The 2018 bill, introduced by Senators Wicker and Rubio, proposed to establish an Office of Marine Aquaculture within the National Marine Fisheries Services that would coordinate

⁴⁵ 16 U.S.C.A. § 2801

⁴⁶ Kristen L. Johns, *Farm Fishing Holes: Gaps in Federal Regulation of Offshore Aquaculture*, 86 S. CAL. L. REV. 681, 716 (2013).

⁴⁷ National Sustainable Offshore Aquaculture Act of 2009, H.R. 4363, 111th Cong. (2009)

⁴⁸ See *Generally Supra* note 46 for a more in depth analysis of satisfactory framework.

⁴⁹ *Supra* note 33, at 116.

regulatory, scientific, outreach, and international issues related to aquaculture with NOAA.⁵⁰ It also provided support for extension services and conservation organizations.⁵¹ Permits under the AQUAA Act would have an initial 25 year duration which could be terminated if actors failed to comply with the procedures developed by NOAA.⁵² Among other improvements, the Act specified that aquaculture would not be considered fishing under the MSA. While the bill died with the end of the 115th congress, a reintroduction is expected in 2019.⁵³

C. EFFECTS OF THE CURRENT REGIME

i. Federal Level

To successfully establish an offshore aquaculture operation in federal waters, applicants must work with a number of regulatory agencies and a wide range of statutory consideration. Under the existing framework, as many as 120 statutory programs have direct or indirect implications on the offshore aquaculture permitting process.⁵⁴ Primary agencies applicants must deal with include the U.S. Army Corps of Engineers, the National Oceanographic and Atmospheric Association (via the National Marine Fisheries Institute), and

⁵⁰ S. 3138, 115th Cong.

⁵¹ *Id.*

⁵² *Id.*

⁵³ Personal communication with Henderson Strategies Inc.

⁵⁴ Rebecca Kihslinger, *Federal Environmental Permitting of Offshore Aquaculture: Coverage and Challenges*, 45 ENVTL. L. REP. NEWS & ANALYSIS 10875, 10876 (2015).

the Environmental Protection Agency.⁵⁵ During the permitting process these agencies, among others, apply the Rivers and Harbors Act, Magnuson-Stevens Fishery Conservation and Management Act, and the Clean Water Act.⁵⁶ While this note will not delve into the intricacies of each regulatory process⁵⁷, which changes in one way or another on a relatively common basis, the most center regulatory agency is NOAA.

NOAA has asserted its regulatory authority on offshore aquaculture through the MSA, which was formed to direct NOAA and the NMFS to regulate fishing in federal waters based on Fishery Management Plans (FMPs) that were created by Regional Fishery Management Councils.⁵⁸ The purpose of the MSA specifically applies to the harvest of wild fish, but NOAA has defined aquaculture as “fishing.” However, aquaculture, as an act of fishing, has not been effectively integrated into the FMPs across the board.⁵⁹ Because the FMPs were originally setup on the basis of commercial and recreational fishing, there are inconsistencies with their respective requirements for operating gear and capture methods that would bar aquaculture practices.⁶⁰ As a result, if offshore aquaculture were to be implemented, some requirements would have to be forgone.⁶¹ This disconnect has

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ *See id.* for an in-depth overview.

⁵⁸ OFFSHORE AQUACULTURE REGULATION UNDER THE MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT, 8 (Emmett Environmental Law & Policy Clinic, 2013).

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ *Id.*

caused worry among advocates that the current framework may not address all environmental and socioeconomic elements that differ between aquaculture and conventional fishing.⁶² NOAA's aquaculture policy has only been implemented through a single FMP in the Gulf of Mexico in an attempt to develop a regional framework.⁶³

What seems like a myriad of processes to apply for a federal permit for offshore aquaculture in the United States results in, as Welch describes in a comprehensive study of aquaculture in federal waters, a *de facto* ban on marine aquaculture.⁶⁴ Although there have been a small number of offshore aquaculture operations in the United States, Welch offers them as an exception to the rule.⁶⁵

Others point to current offshore aquaculture projects as proof that a comprehensive regulatory framework is unneeded for the growth of offshore aquaculture in the United States even with a current regime riddled with uncertainty and high costs of permit acquisition.⁶⁶ Such reasonings, however, are flawed for a number of reasons. First, offshore aquaculture operations are considerably high-capital intensive ventures that are less resilient to the risks and costs of a trial-and-error permitting process. Second, returns on investments in offshore aquaculture are realized

⁶² *Id.* at 9.

⁶³ *Id.* at 7.

⁶⁴ *Supra* note 33, at 114

⁶⁵ *Id.*

⁶⁶ *Cf. supra* note 54. (Where author outlines the "uncertain world" of the offshore aquaculture permitting process in the United States and concludes that a comprehensive framework is unnecessary because consistency will come with increased experience in navigating the permitting system.)

long term. This requires assurances to producers and their investors that they will be allowed to operate for long periods of time under a consistent framework.⁶⁷ Lastly, the United States can be seen as an incubator for innovative offshore aquaculture projects that take advantage of high skilled labor and technological availability before expanding, or moving, abroad.⁶⁸ For example, Open Blue Sea Farms, a sustainable offshore cobia farm originally started in Puerto Rico but relocated to Panama in part due to the over-complicated permitting system in the United States.⁶⁹ Kampachi Farms, a common example of the current success of offshore aquaculture by proponents of the current regulatory regime,⁷⁰ is currently expanding its operation to Mexico largely due to government policies.⁷¹ Under the current regime, this trend should not be expected to change anytime soon.⁷²

The lack of a comprehensive framework also leaves many vulnerabilities in the current regime. In 2018, the National Marine Fisheries Service's authority to regulate aquaculture through the Magnuson-Stevens Fishery Conservation and Management Act was challenged in federal court by a number of special interest groups from the

⁶⁷ See *supra* note 16, at 217.

⁶⁸ *Supra* note 16, at 219.

⁶⁹ *Id.*

⁷⁰ *Supra* note 54, at 10888.

⁷¹ <https://www.seafoodsource.com/news/aquaculture/kona-blue-dissolved-kampachi-farms-launched>

⁷² See generally *Supra* note 33, at 140.

commercial and recreational fishing industry and opponents of large-scale food production in the United States.⁷³

In *Gulf Fishermens Association v. National Marine Fisheries Service*, the NMFS authorized a commercial aquaculture permitting framework for federal waters. The regulations were reviewed by an FMP and programmatic Environmental Impact Statements that considered aquaculture as a fishery under the MSA. The framework established an application process for permitting offshore aquaculture in the Gulf Mexico with oversight by the NMFS on an individual applicant basis.

The United States District Court, in *Gulf Fishermens Association v. National Marine Fisheries Service*, held that the MSA does not authorize regulation of aquaculture by the NMFS.⁷⁴ The court applied two legal standards. First, the Administrative Procedural Act, noting that courts should only overturn rules if agency action is “arbitrary, capricious, and abuse of discretion, not in accordance with law, or unsupported by substantial evidence on the record taken as a whole.”⁷⁵ Then, the two-step *Chevron* test requiring a court to first ask whether congress has addressed the precise question at issue to determine congressional intent. If the statute is ambiguous with regard to the issue, the question shifts to whether agency action is based on the “permissible construction” of the statute. All considered, the court cannot

⁷³ *Gulf Fishermens Association v. National Marine Fisheries Service*, 341 F. Supp. 632 (D. La., 2018); see also

<http://www.recirculatingfarms.org/about-us/>

⁷⁴ *Gulf Fishermens Association v. National Marine Fisheries Service*, 341 F. Supp. 632 (D. La., 2018)

⁷⁵ *Id.* at 636.

substitute such a construction for a reasonable interpretation made by the administrator of the agency.

The court scrutinized the NMFS's "broad authority" to regulate based on the definition of fishing under the MSA, which it defines as:

- (A) *the catching, taking, or harvesting of fish;*
- (B) *the attempted catching, taking, or harvesting of fish;*
- (C) *any other activity which can reasonably be expected to result in the catching, taking, or harvesting of fish; or*
- (D) *any operation at sea in support of, or in preparation for, any activity described in subparagraphs (A) through (C).*⁷⁶

The court rejected the NMFS argument that the term harvesting is interpreted as the "act or process of gathering a crop" thus turning the "harvesting" of fish" from an aquaculture operation, rather than "catching" or "taking," into a fishing activity.⁷⁷ Under *Chevron*, the court looked to congresses intent in the drafting of the word "harvesting" and determined that its interpretation would have to be based on the context of the words surrounding it in the text.⁷⁸ In this review, the court found that aquaculture was mentioned discretely in the MSA showing that congress knew what aquaculture was during the drafting of the MSA, but failed to specifically list it as a function of NMFS's authority.

⁷⁶ 16 U.S.C. § 1802; court at 637-38

⁷⁷ *Gulf Fishermens Association v. National Marine Fisheries Service*, 341 F. Supp. 632, 638 (D. La., 2018)

⁷⁸ *Id.*, at 639.

Additionally, the incompatibility of FMP fishing requirements with aquaculture operations added weight against congress's intent to include aquaculture regulation in the MSA. It noted that this was not "an unfortunate happenstance, but rather, as a clear indication that Congress did not intend for the MSA to grant NMFS the authority to regulate aquaculture."⁷⁹

Although a pitfall to offshore aquaculture in the United States, the court's reasoning exemplifies the risks of proceeding without a comprehensive framework and relying on vague interpretations of authority for regulation.

ii. State Level

Offshore aquaculture is generally not suitable for state waters which extend 3 nautical miles from the coast in most states,⁸⁰ but the frameworks that are used for other aquaculture methods can provide minor insights for developing a better regulatory plan. For example, in Florida and many other states, aquaculture is classified as agriculture.⁸¹ This benefits aquaculturists by providing the same structures that have bolstered agricultural programs such as extension services, governmental help with financing, and tax incentives. Within the Department of Agriculture and Consumer Services, the Division of Aquaculture has regulatory authority throughout the state. Included in the Florida plan for aquaculture, is an Aquaculture Review

⁷⁹ *Id.*, at 641

⁸⁰ Note that Gulf states have 9 nautical miles but the topography of the Gulf and use conflicts make these areas equally unsuitable.

⁸¹ Florida Aquaculture Policy Act.

Council consisting of the chair of the State Agricultural Advisory Council and other members with experience across the aquaculture sector. Compared to the federal FMP's, this system may be more qualified as it relates to the science and implementation of sound aquacultural practice.

Many coastal states also use a lease system rather than issuing permits for individual aquaculture projects.⁸² The certainty of lease requirements eliminates part of the problems associated with a permit process where aquaculture ventures have to invest significant amounts of capital and time during start-up with little predictability on how various federal agencies or management councils will proceed.⁸³ The state leasing systems has resulted in a growing coastal shellfish industry along the Gulf and east coast of the United States as well.⁸⁴ The Florida Aquaculture and Policy Act, for example, outlines specific requirements for leasing submerged lands in coastal and state waters.⁸⁵ It also requires certificate holders to perform environmental impact assessments, comply with best management practices and attend annual trainings. Within the enumerated guidelines, farmers are able to operate comfortably without the worries of unforeseen regulatory changes that would shut them down.

While the prospects of offshore aquaculture as a large-scale sustainable source of food production exceeds that of land based or near-shore production, regulations at the state

⁸² *Supra* note 54, at 10876.

⁸³ *Supra* note 16, at 224.

⁸⁴ *See supra* note 16, at 216.

⁸⁵ Note these are not suitable for finfish aquaculture and are in the context of shellfish.

level have many times been more comprehensive and simplified than federal frameworks, though they still have their respective issues, thus more suitable for aquaculture security and growth.

III. INTERNATIONAL PRECEDENTS

A. NORWAY AND CHILE: REGULATORY SUCCESSES AND FAILURES AMONG SIMILAR INDUSTRIES

Norway and Chile both have thriving salmon net-pen industries and are the first and second largest producers of farmed salmon in the world respectively.⁸⁶ The differences in their regulatory structures and enforcement principles have led to drastic differences in economic and environmental stability as well as how the market views their products. While these two countries generally do raise salmon “offshore,” their handlings of two of the largest aquaculture industries in the world provide an important anecdote to the effects of regulations and enforcement.

Large scale salmon aquaculture – and thus the early marine aquaculture industry in general – started in Norway in the 1960s.⁸⁷ Norway adopted a management system early on where producers were required to follow environmental

⁸⁶ Alejandro H. Buschmann et al., *Salmon aquaculture and coastal ecosystem health in Chile: Analysis of regulations, environmental impacts and bioremediation systems*, 52 OCEAN & COASTAL MANAGEMENT 243, 243 (2009).

⁸⁷ Bernt Aarset & Stig-Erik Jakobsen, *Political regulation and radical institutional change: The case of aquaculture in Norway*, 33 MARINE POLICY 280, 282 (2009).

quality standards that were consistently monitored.⁸⁸ Cage operations were classified by predicted environmental impact ranging from no impact outside immediate cage area to mid and high level impacts.⁸⁹

The first Norwegian aquaculture Act was introduced in 1973 and granted permits for most net-pen farmers that applied.⁹⁰ To curb over-production and environmental concerns, the second Aquaculture Act of 1981 capped new permit authorizations and promoted small enterprises and geographically dispersed producers.⁹¹ During this time, there was a political struggle between fishery and agriculture representatives for access to aquaculture as an industry resource.⁹² The legislators realized that aquaculture was too different from the commercial fishing industry and never labeled it as a "fishery."⁹³

The regulatory regime then fell solely under the Aquaculture Act. The comprehensive framework applied in Norway was restrictive and mandated high levels of education for producers, developed marketing infrastructure, research, and veterinary services through government extensions.⁹⁴ This framework acted as a damper during market lows from foreign competition and disease outbreaks that occurred in the late 1980s.⁹⁵ However, economic aspects that still mirrored fishery policies led to hardship in the

⁸⁸ *Supra* note 7, at 9.

⁸⁹ *Id.*

⁹⁰ *Supra* note 87.

⁹¹ *Id.*

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

aquaculture industry requiring the framework to be restructured.⁹⁶

In the 1990s Norway implemented a slow growth model with a high level of environmental monitoring that included restrictions on how much feed can be given to net-pens and recorded mortality and disease events.⁹⁷ In 2004, a technology standard regulation was introduced. It required farmers to meet certain requirements to in their production to limit escapes of fish and maintain the quality of the location in which they operate.⁹⁸ Incorporated in this regulation were accredited inspection bodies. Additionally, an internal control regulation required farmers to create a system that allows governmental interventions when regulations are not in compliance.⁹⁹ The self-reporting requirement coupled with government oversight created an efficient and sustainable industry highly regulated on the merits of aquaculture.

In Chile, producers are able to operate under concessions or authorizations (if private land owners) administered by the Ministry of Defense and Sub-Secretariat for Fisheries.¹⁰⁰ The Fisheries and Aquaculture Law provides some requirements for environmental protection and disease control at it relates to authorization of aquaculture facilities but does not include specific procedures for operations.¹⁰¹ When an aquaculture authorization is granted by the Sub-

⁹⁶ *Id.*

⁹⁷ *Id.* at 283.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, National Aquaculture Legislation Overview: Chile, http://www.fao.org/fishery/legalframework/nalo_chile/en.

¹⁰¹ *Id.*

Secretariat of Fisheries, producers are granted an “indefinite” right to use and benefit from aquaculture practices from any water bodies not under the authority of the Ministry of Defense that are suitable for aquaculture.¹⁰² Aquaculture operators have to submit an environmental impact declaration that may be followed by more scrutinized study if any environmental or human health concerns are raised.¹⁰³ However, the lack of a more comprehensive framework leaves the process to multiple legal bodies including the Ministry of the Economy, Ministry of National Defense, and the Sub-Secretariat for Marine Affairs.¹⁰⁴ Unlike its Norwegian counterpart, Chile’s aquaculture regulations failed to check its extremely rapid growth of salmon aquaculture and provided little government oversight.¹⁰⁵ As a result, sustainable management practices were scarce throughout the industries development in the 1990s.¹⁰⁶

Underenforcement and regulatory inefficiencies have aided to the detrimental learning curve leading up to the current efforts to remediate the economic and environmental hardships the Chilean aquaculture industry faced during its development. For example, salmon net-pens are required to be at least three kilometers apart, but licenses granted prior to regulations and uncited violations have resulted in a much more intensive practice. Thus, regulations intended for individual sites have been ineffective in addressing the environmental reality of locations housing multiple

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ *See Id.*

¹⁰⁵ *See generally supra* note 86.

¹⁰⁶ *Id.*

aquaculture operations in low-flow benthic areas.¹⁰⁷ Additionally, government monitoring and enforcement efforts are extremely limited financially and technologically. As a result, the private sector has taken a lead in self-regulation for quality and environmental standards.¹⁰⁸ This has put sustainable practices, like reducing antibiotic use and proper spacing of net-pens, in the hands of individual producers with the means of implementing and investing in such procedures. Without a comprehensive management plan and strong governmental oversight, sustainable Chilean aquaculture can be classified on a producer basis rather than on a national level.

IV. CONCLUSION

The United States needs to adopt a comprehensive plan to offshore aquaculture in order to ensure robust and sustainable domestic seafood production. To assume that a disconnected regulatory framework can achieve the same goals as a comprehensive plan is dangerous as it would result in the underdevelopment of sustainable aquaculture practices and quite possibly environmental degradation. Although this note has suggested that the grouping of aquaculture as a fishery may be an improper approach for regulation, the agency with the most technological and research intensive programs towards aquaculture should maintain authority. In one way or the other, NOAA should be the regulating agency for offshore aquaculture to maintain proper procedures and scientifically backed development. NOAA's reliance on the

¹⁰⁷ *Id.* at 244.

¹⁰⁸ *Id.* at 244.

MSA has proven to be its Achilles heel for asserting regulatory authority, but without proper legislation the cycle of uncertainty in the United States' offshore aquaculture sector will continue.