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## STATE-LEVEL AQUACULTURE LEASING AND PERMITTING REGULATIONS: BALANCING A GROWING AMERICAN INDUSTRY WITH ENVIRONMENTAL PROTECTION

### I. INTRODUCTION

Seafood regulation and the safety of seafood in the United States recently began attracting serious attention from popular media and causing concern for American consumers. Popular news sources have released articles discussing rampant mislabeling of fish in restaurants and grocery stores,<sup>1</sup> the dwindling populations of wild-caught fish,<sup>2</sup> and the contaminated conditions in which imported fish are cultured and harvested.<sup>3</sup> This attention and the resulting consumer reactions

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<sup>1</sup> Press Release, Oceana, *Oceana Study Uncovers Widespread Seafood Fraud Nationwide* (Feb. 21, 2013), <http://oceana.org/en/news-media/press-center/press-releases/oceana-study-uncovers-widespread-seafood-fraud-nationwide>. Oceana's study on 1,215 seafood samples collected from 674 retail outlets revealed that 33% of the samples were mislabeled as a fish species other than the species listed on the label. KIMBERLY WARNER ET AL., OCEANA, *OCEANA STUDY REVEALS SEAFOOD FRAUD NATIONWIDE 1* (Feb. 2013). Oceana found the highest misleading rates for samples sold as snapper and tuna. *Id.*

<sup>2</sup> Damian Carrington, *Five Shark Species Win Protection Against Finning Trade*, THE GUARDIAN (Mar. 11, 2013), <http://www.guardian.co.uk/environment/2013/mar/11/shark-species-greater-protection-finning>.

<sup>3</sup> Nguyen Dieu Tu Uyen & William Bi, *Asian Seafood Raised on Pig Feces Approved for U.S. Consumers*, BLOOMBERG (Oct. 10, 2012, 9:00 PM),

caused a chain reaction of corporate social responsibility in the seafood business. As two common examples, McDonald's is now only serving fish that is certified sustainable by the Marine Stewardship Council<sup>4</sup> and Whole Foods stopped selling fish considered unsustainable by the Monterey Bay Aquarium's Seafood Watch and the Blue Ocean Institute.<sup>5</sup> Seafood safety and fraud issues have also spurred government action, including the reintroduction of the Safety and Fraud Enforcement for Seafood Act in the U.S. House of Representatives.<sup>6</sup> These movements, from citizens to retailers and grocery stores to the federal government, show that Americans are becoming more conscious of seafood's environmental and health impacts. Consumers will likely continue asking for safe and sustainable seafood.

Although mass trends come and go, the publicity surrounding unsustainable and unsafe seafood stems from legitimate causes for concern. The rapid depletion of wild fisheries has been well known for many years, but this most recent surge of attention brought to light the United States' lax regulation of imported fish.<sup>7</sup> Americans are learning that 91% of seafood consumed in the United States is imported and most of these imports come from Asian, primarily Chinese, fish farms.<sup>8</sup> The conditions in which Asian-raised fish are cultured and harvested are far below the standards required in the United States.<sup>9</sup> Much of the imported fish is contaminated with harmful pathogens or

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<http://www.bloomberg.com/news/2012-10-11/asian-seafood-raised-on-pig-feces-approved-for-u-s-consumers.html>.

<sup>4</sup> Press Release, McDonalds USA, McDonald's USA First National Restaurant Chain to Serve MSC-Certified Sustainable Fish at All U.S. Locations (Jan. 24, 2013), [http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/Sustainability/Library/US\\_MSC\\_Release\\_Final.pdf](http://www.aboutmcdonalds.com/content/dam/AboutMcDonalds/Sustainability/Library/US_MSC_Release_Final.pdf).

<sup>5</sup> Press Release, Whole Foods Market, Whole Foods Market to Stop Selling Red-Rated Seafood (Mar. 30, 2012), <http://media.wholefoodsmarket.com/news/whole-foods-market-to-stop-selling-red-rated-seafood>.

<sup>6</sup> Safety and Fraud Enforcement for Seafood Act, H.R. 1012, 113th Cong. (2013).

<sup>7</sup> For purposes of this Article, the term "fish" includes both finfish (e.g. trout, salmon, tilapia) and shellfish (e.g. oysters, clams, mussels).

<sup>8</sup> *Aquaculture in the United States*, NOAA FISHERIES SERV., [http://www.nmfs.noaa.gov/aquaculture/aquaculture\\_in\\_us.html](http://www.nmfs.noaa.gov/aquaculture/aquaculture_in_us.html) (last visited Oct. 17, 2013).

<sup>9</sup> IMPORT ALERT: GOVERNMENT FAILS CONSUMERS, FALLS SHORT ON SEAFOOD INSPECTION, FOOD & WATER WATCH 1, 5-6, 11-13 (2007), available at <http://www.foodandwaterwatch.org/reports/import-alert/>; Chenglin Liu, *The Obstacles of Outsourcing Imported Food Safety to China*, 43 CORNELL INT'L L.J. 249, 300-03 (2010).

tainted with residues of drugs that are illegal to use in fish production in the United States.<sup>10</sup> The U.S. Food and Drug Administration (“FDA”), the agency responsible for inspecting seafood imports, is only able to inspect a small fraction of imported fish for illegal drug residues.<sup>11</sup> Thus, a significant amount of the fish consumed in the United States is tainted with drugs that were banned in the United States due to their harmful nature.<sup>12</sup>

Increasing domestic aquaculture production is an apt solution to this problem, as it reduces the need for imported fish and decreases dependence on wild fisheries, which risk overexploitation and are being increasingly protected. However, the regulatory framework for aquaculture in the United States is onerous. Federal regulations are numerous and sometimes prohibitive for aquaculture. In addition, each state has its own process for permitting aquaculture operations or leasing marine areas for aquaculture production. State regulatory frameworks for aquaculture vary greatly by region and state, and, although an all-state survey would be instructive, this Article focuses on California, North Carolina, and Maine as regulatory case studies. These states provide examples of drastically different aquaculture industries and regulations that have influenced the success or stagnation of each state’s aquaculture industry.

These states’ successes and challenges, especially as they relate to environmental concerns regarding aquaculture, lend themselves to suggestions for an improved state-level aquaculture regulatory framework. A state-level framework should allow for more efficient growth of the aquaculture industry by streamlining the leasing and permitting process. This can occur by moving towards a single application that is coordinated by a lead agency. States should also offer various types of leases to decrease barriers to entry. This framework should also maintain environmental protection and regulation. Current research and technological developments in aquaculture continuously prove that this balance is becoming increasingly possible and practical.<sup>13</sup> Proper siting and incorporating

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<sup>10</sup> U.S. Gov’t Accountability Office, GAO-11-286, *Seafood Safety: FDA Needs to Improve Oversight of Imported Seafood and Better Leverage Limited Resources* 21 (2011).

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> For example, see *Research Programs and Projects at This Location*, U.S. DEP’T OF AGRIC., AGRIC. RESEARCH SERV., [http://www.ars.usda.gov/research/projects\\_projects.htm?modecode=62-25-10-00](http://www.ars.usda.gov/research/projects_projects.htm?modecode=62-25-10-00)

iterative processes into leasing and permitting can help balance aquaculture and environmental protection.

Current domestic aquaculture production is comparatively low but there is domestic demand and opportunity for growth.<sup>14</sup> Federal and state regulatory structures as they pertain to aquaculture are significant factors in stifling the industry.<sup>15</sup> While federal reform is necessary especially in the long-term, streamlining state-level permitting and leasing applications and procedures could help alleviate some stagnation. Best practices of certain states inform this analysis. Part II of this Article constructs a picture of current international and domestic aquaculture production. This includes the risks associated with imported seafood. Part III analyzes the state-level regulatory frameworks for California, North Carolina, and Maine. Part IV outlines suggestions for state-level leasing and permitting regulations and maintaining environmental protection.

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(last visited Dec. 12, 2013); *Aquaculture Research Institute*, UNIV. OF ME., <http://umaine.edu/aquaculture/> (last visited Dec. 12, 2013); *Projects*, SWANSEA UNIVERSITY PRIFYSGOL ABERTAWE, <http://www.swansea.ac.uk/csar/projects/> (last visited Dec. 13, 2013) for current research and projects aiming to make aquaculture more sustainable. A recent example is a research project on turning aquaculture waste into renewable energy. *Turning Agriculture and Aquaculture Waste into Renewable Energy*, NANOWERK (Dec. 5, 2013),

<http://www.nanowerk.com/news2/green/newsid=33575.php#.UqtgNrn-PV4.twitter>.

<sup>14</sup> See NAT'L MARINE FISHERIES SERV., FISHERIES OF THE UNITED STATES: 2011 47 (Alan Lowther ed., Aug. 2012), available at

[http://www.st.nmfs.noaa.gov/st1/fus/fus11/FUS\\_2011.pdf](http://www.st.nmfs.noaa.gov/st1/fus/fus11/FUS_2011.pdf).

<sup>15</sup> M. Richard DeVoe, *Marine Aquaculture Regulation in the United States: Environmental Policy and Management Issues*, in *Interactions Between Cultured Species and Naturally Occurring Species in the Environment: Proceedings of the Twenty-Fourth U.S.-Japan Aquaculture Panel Symposium*, U.S.-JAPAN COOPERATIVE PROGRAM IN NATURAL RESOURCES TECHNICAL REPORT NO. 24 1, 3-4 (1995), available at

<http://www.lib.noaa.gov/retiredsites/japan/aquaculture/report24/report24.pdf>;

BILIANA CICIN-SAIN ET AL., RECOMMENDATIONS FOR AN OPERATIONAL FRAMEWORK FOR OFFSHORE AQUACULTURE IN U.S. FEDERAL WATERS 8-9 (Oct. 2005), <http://darc.cms.udel.edu/sgeez/sgeez2final.pdf>.

## II. BACKGROUND

A. *The Growing Amount of Seafood Imports*

The United States imports an enormous percent and amount of seafood at great cost.<sup>16</sup> The National Oceanic and Atmospheric Administration (“NOAA”) estimates that the United States imports 91% of its seafood annually.<sup>17</sup> In 2012, the United States imported \$16.4 billion worth of fish, which is a 70% increase from eleven years earlier, in 2001, when the United States only imported \$9.66 billion worth of fish.<sup>18</sup> The United States has imported more fish, by value, than any other country since at least 2006.<sup>19</sup>

The United States spends more money on Chinese fish imports than on fish imports from any other country.<sup>20</sup> In 2008, fish and seafood accounted for 41% of the total value of food that was imported from China.<sup>21</sup> In 2011, the United States spent 16% of its total fish import expenditures on Chinese fish.<sup>22</sup> Although this may seem like a small percentage, it represents \$2.6 billion that was spent on seafood

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<sup>16</sup> See *U.S. Food Imports: Value of U.S. Food Imports by Food Group*, ECON. RESEARCH SERV., U.S. DEP’T OF AGRIC., <http://www.ers.usda.gov/data-products/us-food-imports.aspx#25437> (last updated Mar. 29, 2013) (follow links for “Summary data on food import values for 14 food categories, annual data since 1999”); *U.S. Food Imports: Volume of U.S. Food Imports by Food Group*, ECON. RESEARCH SERV., U.S. DEP’T OF AGRIC., <http://www.ers.usda.gov/data-products/us-food-imports.aspx#25437> (last updated Mar. 29, 2013) (follow “Summary data on food import volumes for 14 food categories, annual data since 1999”).

<sup>17</sup> Aquaculture in the United States, NOAA FISHERIES SERV., *supra* note 8.

<sup>18</sup> See *U.S. Food Imports: Value of U.S. Food Imports by Food Group*, ECON. RESEARCH SERV., U.S. DEP’T OF AGRIC., *supra* note 16 (follow links for “Summary data on food import values for 14 food categories, annual data since 1999”); *U.S. Food Imports: Volume of U.S. Food Imports by Food Group*, ECON. RESEARCH SERV., U.S. DEP’T OF AGRIC., *supra* note 16 (follow “Summary data on food import volumes for 14 food categories, annual data since 1999”).

<sup>19</sup> Nat’l Marine Fisheries Serv., Fisheries of the United States: 2011, *supra* note 14, at 50.

<sup>20</sup> *U.S. Food Imports: Value of U.S. Food Imports: Fish and Shellfish*, ECON. RESEARCH SERV., U.S. DEP’T OF AGRIC., *supra* note 16 (follow link for “Fish and Shellfish” under “Value of U.S. food imports, by food group” category).

<sup>21</sup> Fred Gale & Jean C. Buzby, *Imports from China and Food Safety Issues*, 52 ECON. INFO. BULL. i, iii (2009), available at [http://www.ers.usda.gov/media/156008/eib52\\_1\\_.pdf](http://www.ers.usda.gov/media/156008/eib52_1_.pdf).

<sup>22</sup> *U.S. Food Imports: Value of U.S. Food Imports: Fish and Shellfish*, U.S. DEP’T OF AGRIC., *supra* note 16 (calculations done by author based on USDA data).

imported from China in 2011 alone.<sup>23</sup> This is a staggering 301.5% increase from 2001, when the United States imported only \$655.7 million in fish from China.<sup>24</sup> The value of fish that is imported into the United States from China has increased almost every year since at least 1999.<sup>25</sup>

Imports from other Asian countries are extremely high as well.<sup>26</sup> In 2012, the year that the United States spent \$2.6 billion on Chinese fish and shellfish imports, the United States spent \$2.02 billion on Thai, \$1.27 billion on Indonesian, and \$1.11 on Vietnamese fish imports.<sup>27</sup> Together, these four countries comprised 42.9% of the United States' total fish imports in 2012.<sup>28</sup>

The method of how imported fish are most commonly cultured and harvested is transforming.<sup>29</sup> Around half of the fish that are imported into the United States were bred, raised, and/or harvested in a fish farm, a practice known as aquaculture.<sup>30</sup> Aquaculture is an alternative to fishing for wild finfish<sup>31</sup> or harvesting wild shellfish.<sup>32</sup> Aquaculture practices can be traced back to some of the earliest civilizations,<sup>33</sup> and aquaculture is an established industry in the United States. Internationally, the aquaculture industry has grown dramatically within the past few decades and is projected to continue growing as wild fish stocks continue to decline or become subject to protection from individual countries or international agreements.<sup>34</sup> Thus, dependence on aquaculture as a source of fish will continue to increase. However,

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<sup>23</sup> *Id.*

<sup>24</sup> *Id.*

<sup>25</sup> *Id.* A 6% decrease is seen in value of fish imports from China between 2008 and 2009, when total fish imports declined by 7%. *Id.*

<sup>26</sup> *Id.*

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> See U.S. Gov't Accountability Office, *supra* note 10, at 1.

<sup>30</sup> *Id.*

<sup>31</sup> "Finfish" is a term used throughout this Article to denote true fish, as distinguished from shellfish.

<sup>32</sup> Sustainable Marine Aquaculture: Fulfilling the Promise; Managing the Risks, Marine Aquaculture Task Force 9, 89 (Jan. 2007).

<sup>33</sup> William Howarth, *Global Challenges in the Regulation of Aquaculture* 15, in AQUACULTURE LAW AND POLICY (David L. VanderZwaag & Gloria Chao eds., 2006); MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 13.

<sup>34</sup> The State of World Fisheries and Aquaculture 2012, Fisheries & Aquaculture Dep't, U.N. Food & Agric. Org. 24 (2012).

the increase of aquaculture imports also increases concerns associated with international aquaculture production.

### *B. The Problems Associated with Importing Seafood*

Importing fish, especially from countries such as China, Thailand, Indonesia, and Vietnam, presents problems and risks that make importing unattractive. These problems include a massive seafood trade deficit, health risks, and international environmental harms.

#### *1. Economic Impacts*

The per unit price of imported fish has been steadily increasing.<sup>35</sup> Over the last ten years, the price per metric ton of fish has increased 33%.<sup>36</sup> Seafood consumption per capita is higher in the United States than the global average.<sup>37</sup> When coupled with the United States' large population, "this makes the United States the third largest consumer of edible fish products in the world."<sup>38</sup>

The rising cost of seafood in combination with America's seafood demand resulted in an annual seafood trade deficit of over \$11.2 billion annually.<sup>39</sup> A trade deficit occurs when the value of a country's imports exceeds its exports, and over the long term, trade deficits can have a negative impact on the country's economy. Trade deficits in a particular industry can cause domestic companies to go out of business if imported products can be sold at a cheaper price than the same domestic product. This will cause the domestic industry to lose expertise and create fewer domestic jobs.

In contrast, jobs in that industry overseas will increase in response to the demand for that country's exports. Thus, a large trade deficit in fish production in the United States may be detrimental to domestic

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<sup>35</sup> U.S. Food Imports: Value of U.S. Food Imports by Food Group, U.S. DEP'T OF AGRIC., supra note 16; U.S. Food Imports: Volume of U.S. Food Imports by Food Group, U.S. DEP'T OF AGRIC., supra note 16.

<sup>36</sup> See U.S. Food Imports: Value of U.S. Food Imports by Food Group, U.S. DEP'T OF AGRIC., supra note 16; U.S. Food Imports: Volume of U.S. Food Imports by Food Group, U.S. DEP'T OF AGRIC., supra note 16 (percentage reached per author's calculations).

<sup>37</sup> Craig S. Tucker et al., *Aquaculture and the Environment in the United States*, in ENVIRONMENTAL BEST MANAGEMENT PRACTICES FOR AQUACULTURE 3, 5-6 (Craig S. Tucker & John A. Hargreaves eds., 2008).

<sup>38</sup> Id.

<sup>39</sup> Aquaculture in the United States, NOAA FISHERIES SERV., supra note 8.

seafood production. Some domestic fish farmers are already reporting the harmful economic effects of imported seafood on their aquaculture business.<sup>40</sup>

## 2. Health Risks

When noting that China was the largest exporter of farmed fish to the United States, an author of a *Fortune Magazine* article stated “[l]et’s just hope the Chinese grow fish more carefully than they make pet food.”<sup>41</sup> This statement alluded to the melamine-tainted pet food made in China that brought attention to failed food safety oversight of imported food in 2007.<sup>42</sup> Unfortunately, lax health and safety standards are also apparent in many countries’ aquaculture practices.<sup>43</sup> An account of practices on a Vietnamese fish farm stated that shrimp were packed in dirty tubs in an unchilled room and covered in ice made from untreated tap water, which can spread pathogenic bacteria to the shrimp.<sup>44</sup> Another report recounts a Chinese tilapia farm that feeds its fish with pig and geese feces, which are at risk of being contaminated with salmonella that can spread to the fish.<sup>45</sup> Both of these farms export their products to the United States.<sup>46</sup>

The FDA sampling program inspects only one out of every one-thousand imported seafood products for sixteen drugs that are banned

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<sup>40</sup> See, e.g., Barry Estabrook, *The FDA Is Out to Lunch*, ONEARTH 3 (Nov. 30, 2012), <http://www.onearth.org/article/out-to-lunch>.

<sup>41</sup> Marc Gunther, *A Fight About Fish Farms*, CNNMONEY (June 8, 2007, 10:58 AM), [http://money.cnn.com/2007/06/08/news/pluggedin\\_Gunther\\_fishfarms.fortune/index.htm](http://money.cnn.com/2007/06/08/news/pluggedin_Gunther_fishfarms.fortune/index.htm).

<sup>42</sup> Liu, *supra* note 9, at 251.

<sup>43</sup> FOOD & WATER WATCH, *supra* note 9; Liu, *supra* note 9, at 300-03. It is extremely difficult to ensure the safety of food from polluted farms, a chronic problem in China due to its environmental problems and “pollute first, control later” development model.” *Id.* at 300-01. China’s industrial revolution has had “catastrophic effects” on its water systems. *Id.* at 301. Untreated sewage runs into China’s water, which is then used for aquaculture. FOOD & WATER WATCH, *supra*, at 5. To maximize production, producers overpopulate their facilities, a practice that spreads disease, bacterial infections, and parasites. *Id.* This can kill off the entire crop if left untreated, so producers try to control it with antibiotics and pesticides, some of which are banned in the United States. *Id.*

<sup>44</sup> Nguyen & Bi, *supra* note 3.

<sup>45</sup> *Id.*

<sup>46</sup> *Id.*

in seafood production in the United States.<sup>47</sup> These particular drugs were banned because these drugs “can cause cancer, allergic reactions, and antibiotic resistance when consumed by humans . . . .”<sup>48</sup> The imported seafood that is checked by the FDA is frequently found to be contaminated.<sup>49</sup> Additionally, the FDA does not check for some drugs that are banned in the United States but approved in other countries, making it more likely that these drugs are entering the food system without detection via imported seafood.<sup>50</sup>

Many states, including Louisiana, Georgia, Alabama, Mississippi, Arkansas, Tennessee, Oklahoma, and Florida, are frustrated that their seafood producers must compete with cheaper imports.<sup>51</sup> These states attack imported seafood by conducting their own testing programs on imported seafood that is sold in grocery stores.<sup>52</sup> Seafood tested under these programs frequently tests positive for drugs that are dangerous and banned in the United States.<sup>53</sup> For example, Alabama’s Department of Agriculture and Industries tested 258 samples of imported seafood between 2002 and 2010, and half of these samples tested positive for drugs that are illegal to use in aquaculture in the United States.<sup>54</sup>

### 3. *International Environmental Harms*

Aquaculture can be very detrimental to the surrounding environment.<sup>55</sup> Unchecked and poorly regulated aquaculture poses

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<sup>47</sup> U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 10, at 10, 21; Estabrook, *supra* note 40, at 2.

<sup>48</sup> U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 10, at 10.

<sup>49</sup> *Id.* at 21 (noting that 18% of the shrimp samples tested in 2008 tested positive for nitrofurans, a drug that is banned in the United States, and that no catfish were sampled for nitrofurans between 2006 and 2009); Estabrook, *supra* note 40, at 2; Nguyen & Bi, *supra* note 3.

<sup>50</sup> U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 10, at 20.

<sup>51</sup> *About*, SOUTHERN SHRIMP ALLIANCE, <http://www.shrimppalliance.com/about/> (last visited Oct. 12, 2013).

<sup>52</sup> *State Seafood Testing Programs*, SOUTHERN SHRIMP ALLIANCE, [http://www.shrimppalliance.com/new/?page\\_id=1482](http://www.shrimppalliance.com/new/?page_id=1482) (last visited Oct. 12, 2013).

<sup>53</sup> *Id.*

<sup>54</sup> Estabrook, *supra* note 40, at 3.

<sup>55</sup> Although this section discusses environmental harms from an international perspective, domestic aquaculture can also cause environmental harms. These harms are central to ongoing debates about the desirability of a domestic aquaculture industry. This Article does not review literature detailing environmental harms that

serious environmental risks in the form of water pollution and degradation, drug and chemical contamination, and threats to native and wild fish stocks.<sup>56</sup>

The environmental harms caused by imported aquaculture products will be located in other countries, which poses international policy questions. By purchasing farmed fish from countries with poor environmental standards, United States consumers are perpetuating and promoting environmental harms in foreign countries. Many of these harms will be imposed on people who will not benefit from the sale of the farmed fish, such as those who rely on the water downstream from an aquaculture facility that degrades the water quality. Although many of the environmental harms of importing farmed fish may be localized in other countries, it is still important to consider what practices the United States promotes in other countries through its trade demands.

In addition, usually more greenhouse gases are emitted the further a product is transported. Thus, transporting domestically, rather than internationally, produced fish to a domestic market would release less greenhouse gases associated with climate change.

### *C. Increased Domestic Aquaculture Production as a Solution*

Considering the problems and risks posed by imported seafood, the United States should build a robust domestic seafood production industry to fulfill domestic demand. Domestic demand was relatively stable for the last decade but is expected to increase because of “population growth, the aging of the population (older people generally consume more seafood), and greater emphasis on eating seafood as part of a healthy diet.”<sup>57</sup> Wild fish landings cannot be expected to meet this demand. First, wild fish landings have leveled off because our ability to catch fish exceeds the marine ecosystem’s

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can be caused by aquaculture as many others have undertaken that discussion. For a thorough discussion of environmental harms of concern in aquaculture production, see Tucker et al., *supra* note 37, 13-16.

<sup>56</sup> See David L. VanderZwaag, *Introduction: Aquaculture Law and Policy: Struggling in the Wake of the Blue Revolution 1*, in *AQUACULTURE LAW AND POLICY* (David L. VanderZwaag & Gloria Chao eds., 2006); CICIN-SAIN ET AL., *supra* note 15, at 3, 7.

<sup>57</sup> MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 14. In comparison to domestic demand, “global consumption of edible fishery products tripled . . .” Tucker et al., *supra* note 37, at 3.

ability to produce fish.<sup>58</sup> Second, wild fish stocks are overexploited or at risk of overexploitation and are subject to many protections and regulations that decrease the number of wild fish that may be caught.<sup>59</sup> Third, if wild fish stocks are revitalized, it is unlikely that the fishing industry will be allowed to exploit the stocks to near disappearance again.<sup>60</sup> Thus, to produce more fish domestically, a move towards aquaculture is necessary to complement and eventually surpass wild fisheries as a source of seafood.<sup>61</sup>

This movement has already begun, as almost half of the seafood consumed in the United States comes from aquaculture.<sup>62</sup> Additionally, the U.S. Department of Commerce's aquaculture policy aims to increase the value of domestic aquaculture by fivefold, to \$5 billion, by 2025.<sup>63</sup>

The rest of the world has been dramatically expanding its aquaculture industry over the last three decades to respond to demand for fish.<sup>64</sup> Almost half of the seafood that is imported into the United States is grown and harvested through aquaculture, and almost half of the world's demand for seafood is met through aquaculture.<sup>65</sup> China experienced the most dramatic expansion of its aquaculture industry,

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<sup>58</sup> Marine Aquaculture Task Force, *supra* note 32, at 9.

<sup>59</sup> FISHERIES & AQUACULTURE DEP'T, U.N. FOOD & AGRIC. ORG., *supra* note 34, at 11-13, 53; Tucker et al., *supra* note 37, at 3-4.

<sup>60</sup> Tucker et al., *supra* note 37, at 4 ("Current 'best-case' scenarios for fisheries management indicate, however, that it will not be possible to increase marine fisheries landings past levels obtained in the 1980s.").

<sup>61</sup> MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 13 ("Most experts believe that aquaculture is the only means to produce the additional seafood that the world's consumers are demanding."); Tucker et al., *supra* note 37, at 4 ("Aquaculture must therefore continue to expand to meet any increase in demand for fishery products.").

<sup>62</sup> Marine Aquaculture Task Force, *supra* note 32, at 14; Fisheries & Aquaculture Dep't, U.N. Food & Agric. Org., *supra* note 34, at 15, 26.

<sup>63</sup> MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 21, 89.

<sup>64</sup> FISHERIES & AQUACULTURE DEP'T, U.N. FOOD & AGRIC. ORG., *supra* note 34, at 3, Table 1 (showing total global aquaculture production statistics increasing every year from 2006-2011); see NOAA: U.S. Domestic Seafood Landings and Values Increase in 2010, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Sept. 7, 2011), [http://www.noaanews.noaa.gov/stories2011/20110907\\_usfisheriesreport.html](http://www.noaanews.noaa.gov/stories2011/20110907_usfisheriesreport.html).

<sup>65</sup> *Id.*; Fisheries of the United States, 2011: A Statistical Snapshot of 2011 Fish Landings, NOAA FISHERIES SERV. (2012), [http://www.nmfs.noaa.gov/stories/2012/09/docs/fus\\_2011\\_fact\\_sheet\\_final\\_v2.pdf](http://www.nmfs.noaa.gov/stories/2012/09/docs/fus_2011_fact_sheet_final_v2.pdf).

and now most of the fish harvested in China is raised in an aquaculture system rather than caught from wild stocks.<sup>66</sup>

Comparatively, the aquaculture industry in the United States has remained globally insignificant and stagnant.<sup>67</sup> Worldwide, between the years 2009 and 2010, the total number of fish harvested from aquaculture increased by 7.5% and the total number of fish caught in the wild decreased by 1.2%.<sup>68</sup> During those same years, aquaculture in the United States grew by only 3.17%, falling behind the world's aquaculture growth rate.<sup>69</sup> This is also behind the 5.62% growth rate of China, which already has the most robust aquaculture industry in the world.<sup>70</sup>

China's aquaculture industry is by far the largest in the world and produced over 36.7 million metric tons of fish, mollusks, and crustaceans in 2010.<sup>71</sup> The next closest country is India, which produced 4.65 million tons of the same products in the same year.<sup>72</sup> The United States lags far behind, as it did not produce even half of a million tons of the same products in the same year through aquaculture.<sup>73</sup> In fact, the United States produces less fish from aquaculture than countries in all parts of the world and of different developing statuses.<sup>74</sup> In 2010, China, India, Indonesia, Vietnam, Japan, Burma, Norway, Chile, the Philippines, Thailand, Bangladesh, and Egypt all produced more seafood through aquaculture than the United States.<sup>75</sup>

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<sup>66</sup> Nat'l Marine Fisheries Serv., Fisheries of the United States: 2011, *supra* note 14, at 48.

<sup>67</sup> Nat'l Oceanic & Atmospheric Admin., *supra* note 64.

<sup>68</sup> Nat'l Marine Fisheries Serv., Fisheries of the United States: 2011, *supra* note 14, at 47.

<sup>69</sup> *Id.* at 48 (calculations done by author).

<sup>70</sup> *Id.*; for visual representations provided by NMFS, see also *World Production of Aquaculture*, NAT'L MARINE FISHERIES SERV., [http://www.nmfs.noaa.gov/aquaculture/docs/aquaculture\\_docs/world\\_prod\\_consumtion\\_value\\_aq.pdf](http://www.nmfs.noaa.gov/aquaculture/docs/aquaculture_docs/world_prod_consumtion_value_aq.pdf) (last visited Dec. 13, 2013).

<sup>71</sup> Nat'l Marine Fisheries Serv., Fisheries of the United States: 2011, *supra* note 14, at 48.

<sup>72</sup> *Id.*

<sup>73</sup> *Id.*

<sup>74</sup> *Id.*

<sup>75</sup> *Id.*

Not surprisingly, NOAA reports that domestic aquaculture meets less than 5% of the country's demand for seafood.<sup>76</sup> This failure to fill the gap in the seafood market leaves the United States with an economically compelling opportunity to develop an aquaculture industry in response to the domestic demand for fish products.<sup>77</sup> Aquaculture has the potential to supplement the diminishing wild catch fisheries in the United States and provide for more of the United States' seafood demand, which is projected to increase by 70% in the next thirty years.<sup>78</sup>

The aquaculture industry's stagnation in the United States is explained by a combination of factors.<sup>79</sup> Navigating federal- and state-level regulatory frameworks is a primary problem, especially because the federal regulatory framework has not been streamlined for aquaculture.<sup>80</sup> One report asserted that fifty federal statutes directly affect aquaculture and eleven federal agencies are involved in aquaculture permitting.<sup>81</sup> In addition to federal statutes and agencies, every state has a different regulatory model for aquaculture, some better planned than others, which the aquaculturalist must navigate.<sup>82</sup> State regulations and permitting procedures are usually more restrictive than federal regulations and only a few states compile information on the legal requirements that the aquaculturalist must meet.<sup>83</sup> The sheer time and cost of obtaining permits to start an aquaculture operation can be prohibitive.<sup>84</sup> One study estimated that it

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<sup>76</sup> NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 64; *Fisheries of the United States, 2011: A Statistical Snapshot of 2011 Fish Landings*, NOAA FISHERIES SERV., *supra* note 65, at 4; *see also* MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 14.

<sup>77</sup> *Aquaculture in the United States*, NOAA FISHERIES SERV., *supra* note 8 (noting that because the United States is a major consumer of aquaculture products, yet ranks thirteenth in the world in total aquaculture production, there is a compelling case for increasing domestic aquaculture production).

<sup>78</sup> CICIN-SAIN ET AL., *supra* note 15, at 3; *Aquaculture*, NAT'L INSTIT. OF FOOD & AGRIC., U.S. DEP'T OF AGRIC., <http://www.csrees.usda.gov/aquaculture.cfm> (last visited Dec. 13, 2013).

<sup>79</sup> These factors include increasing feed prices, competition from imports, financing obstacles, and domestic regulatory structures.

<sup>80</sup> DeVoe, *supra* note 15, at 3-4.

<sup>81</sup> *Id.* at 4.

<sup>82</sup> *Id.*

<sup>83</sup> *Id.*

<sup>84</sup> *Id.*

could take four years and possibly over \$100,000 to obtain the necessary permits to start an operation.<sup>85</sup>

Considering the problems with an underdeveloped domestic aquaculture industry, now is the time to address barriers facing the aquaculture industry and modernize the regulatory framework at both federal and state levels.

#### *D. Current Types of Aquaculture Production in the United States*

Although aquaculture production in the United States lags behind that of other countries, domestic aquaculture does exist and is an important segment of the economy.<sup>86</sup> Aquaculture is a diverse industry, as there are many different types of aquaculture so that it is compatible with a large scope of needs and geographic areas.<sup>87</sup> Aquaculture can be categorized in many ways: state-jurisdiction versus federal-jurisdiction, marine (or “offshore” or “mariculture”) versus freshwater (or “land-based”), food versus non-food production, hatcheries versus nurseries versus growout,<sup>88</sup> mobile versus non-mobile species,<sup>89</sup> or by species that is being raised. The place in which farmed fish are bred, raised, and harvested, can be in the form of ponds, net pens, flow-through systems or raceways, silos, circular pools, recirculating aquaculture systems, sea ranches, rafts, long lines, open water molluscan culture, and other systems.<sup>90</sup> The domestic aquaculture industry is currently dominated by catfish production.<sup>91</sup> Crawfish, trout, salmon, oysters, and tilapia are the next most prevalent domestic aquaculture species by weight.<sup>92</sup>

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<sup>85</sup> *Id.*

<sup>86</sup> See Dicks et al., *Economy-Wide Impacts of U.S. Aquaculture* (1996).

<sup>87</sup> Tucker et al., *supra* note 37, at 6 (“Physical resources in the United States make it possible raise fresh-, brackish-, or saltwater organisms from tropical, temperate, and arctic climates.”)

<sup>88</sup> Different types of aquaculture operations have different growout stages. For example, one type of operation that separates the stages might fertilize and hatch fish eggs in hatcheries, grow the fry into fingerlings or larger at a nursery, and grow the fish to commercial harvest size in a growout area, such as a pond, net pen, or intertidal zone. See CICIN-SAIN ET AL., *supra* note 15, at 1.

<sup>89</sup> Molluscs, such as oysters, clams, and mussels, are examples of non-mobile species whereas crustaceans, such as shrimp, lobster and crayfish, and finfish, such as catfish, salmon, and carp, are examples of mobile species.

<sup>90</sup> CICIN-SAIN ET AL., *supra* note 15, at 5.

<sup>91</sup> MARINE AQUACULTURE TASK FORCE, *supra* note 32, at 15-16, Table 2-2.

<sup>92</sup> *Id.*

Marine aquaculture refers to aquaculture operations that exist in the ocean, estuaries, and intertidal areas.<sup>93</sup> Within the marine waters of the United States, two regulatory zones exist.<sup>94</sup> One is the zone that is 0-3 nautical miles off a state's coast.<sup>95</sup> Under the Submerged Lands Act, the states have title to the natural resources in this zone.<sup>96</sup> The area is controlled by the state, although it is also subject to federal jurisdiction.<sup>97</sup> Commercial-scale marine aquaculture operations exist in this zone.<sup>98</sup> The other zone is the United States' Exclusive Economic Zone ("EEZ"), waters that are 3-200 nautical miles off the coast of the United States.<sup>99</sup> Aquaculture in the EEZ can be included in the term "offshore" aquaculture.<sup>100</sup> EEZ waters are controlled by the federal government under the United Nations Convention on the Law of the Sea, and are outside of state control.<sup>101</sup> Although there is currently no commercial-scale aquaculture in federal waters, expansion into this area is being researched, attempted, and encouraged by some.<sup>102</sup> For instance, shellfish farms have been proposed in federal waters in the Nantucket Sound and off the

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<sup>93</sup> See CICIN-SAIN ET AL., *supra* note 15, at 1. The term "marine aquaculture" can also be used to refer to marine species grown in land-based systems. However, most marine aquaculture will be in oceanic environments.

<sup>94</sup> *Id.*

<sup>95</sup> *Id.* See also Submerged Lands Act, 43 U.S.C. § 1312 (2012) (setting the seaward boundary).

<sup>96</sup> 43 U.S.C. § 1312.

<sup>97</sup> *Id.* at §§ 1314, 1315.

<sup>98</sup> CICIN-SAIN ET AL., *supra* note 15, at 4, 6.

<sup>99</sup> *Id.* at 1.

<sup>100</sup> *Id.*

<sup>101</sup> The United Nations Convention on the Law of the Sea established EEZs, granting sovereign control of the waters up to 200 nautical miles off the United States' coast to the federal government. UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, art. 57, 1982. The Submerged Lands Act granted control over nautical miles 0-3 to the states, which is why the federal government has exclusive jurisdiction only over nautical miles 3-200. 43 U.S.C. § 1312.

<sup>102</sup> See CICIN-SAIN ET AL., *supra* note 15, at 6. Extensive analysis of aquaculture in federal waters calls for additional research outside the scope of this Paper. Few studies analyze the problem of aquaculture in federal waters and the federal regulatory framework and make recommendations for effective reform. For recent reports that address aquaculture in federal waters, see CICIN-SAIN ET AL., *supra* note 15 and MARINE AQUACULTURE TASK FORCE, *supra* note 32 (noting that industrial terrestrial agriculture has caused significant and needless damage to ecosystems and that marine aquaculture cannot be allowed to make the same mistake).

southern California coast.<sup>103</sup> If approved, these projects would be the first commercial-scale aquaculture projects in federal waters.<sup>104</sup>

Land-based aquaculture, on the other hand, can be located in ponds or rivers, and tanks can be used to raise freshwater or marine species.<sup>105</sup> About 60% of the value and about 70% of the volume of aquaculture production in the United States comes from land-based, freshwater aquaculture.<sup>106</sup> This ratio will differ significantly from state to state, as some states are land-locked and have no to little access to marine aquaculture, whereas other states have impractical permitting programs for land-based aquaculture and will produce almost all their farmed fish from marine-based aquaculture.

At the last reporting of the U.S. Census of Aquaculture, in 2005, Louisiana had the most aquaculture farms, totaling 873.<sup>107</sup> Mississippi, although it only reported 403 aquaculture farms, reported the highest sale values, at almost \$250 million.<sup>108</sup> Arkansas, Alabama, and Louisiana reported the next highest sale values, which were in the low hundred millions.<sup>109</sup>

Aquaculture is a diverse industry and requires flexible regulations in order to capture the various possibilities of the industry. The United States' current number of farms and total production value is low, but the country has the capacity to increase these numbers because of aquaculture's unique ability to exist in such a wide variety of geographic areas.

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<sup>103</sup> Doug Fraser, *Mussel Beds Planned Near Cape Wind Farm*, CAPE COD TIMES (Oct. 7, 2013), <http://www.capecodonline.com/apps/pbcs.dll/article?AID=/20131007/NEWS/310070310>; Louis Sahagun, *Long Beach Entrepreneur Has Fresh Idea for Shellfish Farm*, LOS ANGELES TIMES (Aug. 6, 2012), <http://articles.latimes.com/2012/aug/06/local/la-me-oyster-ranch-20120806>.

<sup>104</sup> Fraser, *supra* note 103; Sahagun, *supra* note 103.

<sup>105</sup> Tucker et al., *supra* note 37, at 9. For example, some inland ponds in Texas are used to raise marine shrimp. *Id.*

<sup>106</sup> *Id.* at 6. This statistic is as of 2006 data. *Id.*

<sup>107</sup> *2002 Census of Agriculture: Census of Aquaculture (2005)*, U.S. DEP'T OF AGRIC. 1 (Oct. 2006), available at

<http://www.agcensus.usda.gov/Publications/2002/Aquaculture/AQUACEN.pdf>.

<sup>108</sup> *Id.*

<sup>109</sup> *Id.*

## III. STATE REGULATORY FRAMEWORKS

The labyrinth of extensive federal and state agencies and regulations that an operator of an aquaculture operation must navigate is often credited with overburdening the aquaculture industry in the United States.<sup>110</sup> Depending on the type of operation, aquaculturalists will be subject to a variety of major federal permitting schemes including the Rivers and Harbors Act,<sup>111</sup> Section 404 of the Clean Water Act (“CWA”),<sup>112</sup> National Pollution Discharge Elimination System (“NPDES”) permit requirements,<sup>113</sup> the Endangered Species Act,<sup>114</sup> the Marine Mammal Protection Act,<sup>115</sup> the Ports and Water Safety Act, and other federal laws.<sup>116</sup> Adding to the complexity of the federal framework, states have varying state-level agencies that regulate aquaculture.<sup>117</sup> As a result, aquaculture producers navigate regulations differently in each state.<sup>118</sup> Few states have created a consolidated, comprehensive regulatory framework for aquaculture that is both easy for an owner-operator to navigate and environmentally protective.<sup>119</sup> The regulatory process in some states can be just as complicated as the federal framework and add complications on top of federal regulations.<sup>120</sup>

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<sup>110</sup> See DeVoe, *supra* note 15, at 3-4.

<sup>111</sup> 33 C.F.R. §§ 320.1-320.4 (2012).

<sup>112</sup> Clean Water Act, 33 U.S.C. § 1344 (2012); 33 C.F.R. §§ 323.1-323.6 (2012).

<sup>113</sup> See 40 C.F.R. § 122.24 (“Concentrated aquatic animal production facilities, as defined in this section, are point sources subject to the NPDES permit program.”); 40 C.F.R. pt. 122 app. C. Although the Environmental Protection Agency (“EPA”) is the default agency for issuing NPDES permits, a state can submit its own permit program to the EPA and, if approved, can issue NPDES permits in accordance with its discharge program. *State Program Status*, ENVTL PROTECTION AGENCY, <http://cfpub2.epa.gov/npdes/statestats.cfm> (last updated Apr. 14, 2003).

<sup>114</sup> 16 U.S.C. § 1531 *et seq* (2012). Depending on the operation, the Fish and Wildlife Service or the National Marine Fisheries Service oversees Endangered Species Act permitting.

<sup>115</sup> 16 U.S.C. § 1361 *et seq* (2012).

<sup>116</sup> See, e.g., Marine Region – Information Leaflet Regulations Governing Leasing of State Water Bottoms for Aquaculture, CAL. DEP’T OF FISH AND GAME 5-6 (Dec. 2010), available at

<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=27450&inline=true>.

<sup>117</sup> DeVoe, *supra* note 15, at 4.

<sup>118</sup> CICIN-SAIN ET AL., *supra* note 15, at 8.

<sup>119</sup> *Id.*

<sup>120</sup> *Id.* at 8-9 (“Some states still apply laws designated for other applications, such as those for fisheries management and agriculture[, to aquaculture].”).

Some states have streamlined and clarified the permitting process, established institutional authorities to address aquaculture issues, adopted policies to address environmental and biological risks, incorporated aquaculture in state legislation, and included aquaculture in the state coastal zone management plans.<sup>121</sup> State frameworks shed light on how various states have decided to exercise their authority over the aquaculture industry. They also reveal the great extent to which states can affect the aquaculture industry through cooperation, promotion, regulations, or restrictions. California, North Carolina, and Maine provide examples of very different state-level legal frameworks that have greatly influenced the success or stagnation of the aquaculture industry in each state. This Article focuses on these three states because they are located in different regions of the country and exemplify some of the efforts and challenges in state-level aquaculture regulation.

### *A. California*

California is geographically well-suited for aquaculture. It has the longest coastline of the western contiguous states and has many connecting rivers, bays, and estuaries.<sup>122</sup> California is also one of the largest agricultural producers in the United States.<sup>123</sup> Thus, California would seem well-suited to host aquaculture production. However, California is known to have some of the most difficult aquaculture regulations and permitting processes in the country. Consequently, compared to other states, California has few commercial aquaculture operations and low output from these farms.<sup>124</sup>

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<sup>121</sup> *Id.* at 10.

<sup>122</sup> *Aquaculture and Bay Management Program*, CAL. DEP'T OF FISH & WILDLIFE, <http://www.dfg.ca.gov/marine/abmp/index.asp> (last visited Dec. 1, 2012) (noting that California has 3,400 miles of tidal shoreline and twenty bays that each cover at least 500 acres of shoreline).

<sup>123</sup> *California Agricultural Production Statistics*, CAL. DEP'T FOOD & AGRIC., <http://www.cdfa.ca.gov/statistics/> (last visited Nov. 5, 2013) (In 2012, "California remained the number one state in cash farm receipts with 11.3 percent of the US total.").

<sup>124</sup> See 2002 Census of Agriculture: Census of Aquaculture (2005), U.S. DEP'T OF AGRIC., *supra* note 107.

### *1. Leasing and Permitting*

The California Department of Fish and Wildlife (“DFW”) is the lead agency for aquaculture in California,<sup>125</sup> even though California formally recognizes aquaculture as a branch of the agricultural industry.<sup>126</sup> Every aquaculture operation in California must register with the DFW on an annual basis.<sup>127</sup> Each new registration application costs \$800 to process and renewing the registration costs \$500 each following year.<sup>128</sup> Additionally, the operation must pay a surcharge fee of \$600 per year if it grosses over \$25,000 in annual revenue.<sup>129</sup> Registration may be denied if the DFW determines that the operation or species cultured would be detrimental to native wildlife in the area.<sup>130</sup>

If a producer privately owns water bottoms that are contiguous to state-owed water bottoms, he must apply for an aquaculture agreement to establish an aquaculture operation on his private water bottoms.<sup>131</sup> An aquaculture agreement application requires a \$500 filing fee.<sup>132</sup>

A producer may also lease water bottoms and water columns from the state for aquaculture.<sup>133</sup> Marine leases were greatly affected by California’s Sustainable Oceans Act of 2006, or S.B. 201, a statute that made California “the first state to enact stringent environmental standards for marine finfish aquaculture.”<sup>134</sup> The Sustainable Oceans Act authorizes the Fish and Game Commission (“FGC”), which is

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<sup>125</sup> *Aquaculture*, CAL. DEP’T OF FISH & WILDLIFE, <http://www.dfg.ca.gov/marine/abmp/aquaculture.asp> (last visited Dec. 9, 2013).

<sup>126</sup> General Provisions and Definitions, CAL. FOOD & AGRIC. CODE § 23.5 (West 2013).

<sup>127</sup> CAL. FISH & GAME CODE § 15101(a) (West 2014).

<sup>128</sup> *Id.* § 15101(b). The prices were increased from \$549 to process a new registration and \$275 to renew a registration to \$800 and \$500, respectively, by Assembly Bill No. 1886, which was signed by Governor Jerry Brown in 2012. A.B. 1886, 2011-12 Leg. (Cal. 2012).

<sup>129</sup> CAL. FISH & GAME CODE § 15103(a) (West 2014). This price is effective in 2013 and was raised from \$412. CAL. LEGIS. INFO., *supra* note 128.

<sup>130</sup> *Aquaculture in Inland Waters of California*, CAL. DEP’T OF FISH & GAME 5 (June 2011), available at

<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3256&inline=true>.

<sup>131</sup> Marine Region – Information Leaflet Regulations Governing Leasing of State Water Bottoms for Aquaculture, CAL. DEP’T OF FISH & GAME, *supra* note 116, at 1.

<sup>132</sup> *Id.* at 3.

<sup>133</sup> CAL. FISH & GAME CODE § 15400(a) (West 2014).

<sup>134</sup> *California Enacts Sustainable Oceans Act*, NAT’L SEA GRANT LAW CENTER (Aug. 2006), <http://nsglc.olemiss.edu/Advisory/CAAquaculture.pdf>.

comprised of five appointed members, to lease water bottoms and water columns in California for offshore finfish aquaculture.<sup>135</sup> A new lease for finfish may not exceed ten years, and it may be renewed for periods that do not exceed five years.<sup>136</sup> Water bottom leases go to the “highest responsible bidder” and the lease must be for at least \$2 per acre or, if the lease is ten acres or less, \$10 per acre.<sup>137</sup>

## 2. Environmental Monitoring and Protection

Under the Sustainable Oceans Act, each lease must be subject to a public hearing and meet a variety of standards.<sup>138</sup> The aquaculture operation must minimize the use of fishmeal, fish oil, drugs, chemicals, and antibiotics.<sup>139</sup> Facilities must be designed to prevent farmed fish from escaping, but all the fish must be tagged or marked unless the FGC determines that identifying farmed fish is unnecessary to protect wild fish, the marine environment, and any ocean use.<sup>140</sup> The lease site must be appropriate for farming finfish and may not unreasonably interfere with fishing, other uses, or public trust values or unreasonably disrupt wildlife or the marine environment’s ability to support significant wildlife.<sup>141</sup> The lessees must create best management practices, including regular monitoring, reporting, and site inspection, that they submit to the FGC for approval.<sup>142</sup> The lessee must restore the lease area to its original condition when the lease ends.<sup>143</sup>

The Sustainable Oceans Act also imposed water quality monitoring requirements in order to ensure the highest environmental protection standards.<sup>144</sup> The lessee must provide the regional water quality control board with an assessment of the proposed site’s benthic

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<sup>135</sup> *Id.*

<sup>136</sup> CAL. FISH & GAME CODE § 15405(b) & 15406(d) (West 2014); NAT’L SEA GRANT LAW CENTER, *supra* note 134.

<sup>137</sup> CAL. FISH & GAME CODE § 15406.5(a) (West 2014).

<sup>138</sup> Cal. Fish & Game Code § 15400(a); Nat’l Sea Grant Law Center, *supra* note 134.

<sup>139</sup> CAL. FISH & GAME CODE § 15400(b)(3), 15400(b)(7).

<sup>140</sup> *Id.* § 15400(b)(8)-(9).

<sup>141</sup> *Id.* § 15400(b)(2).

<sup>142</sup> *Id.* § 15400(b)(4).

<sup>143</sup> CAL. FISH & GAME CODE § 15409(a) (West 2014).

<sup>144</sup> Marine Aquaculture Task Force, *supra* note 32, at 38.

conditions.<sup>145</sup> The board can determine how the producer must monitor the benthic conditions during the lease.<sup>146</sup> The producer is responsible for the assessment and monitoring costs.<sup>147</sup> Discharges from the operation must be prevented to the maximum extent possible.<sup>148</sup>

The Sustainable Oceans Act required the DFW to prepare a programmatic environmental impact report (“PEIR”) if state funding was appropriated for this purpose and matched by the aquaculture industry.<sup>149</sup> Both groups provided the funding and the PEIR was near completion in the fall of 2013.<sup>150</sup> As legislatively required, the PEIR identifies “[a]ppropriate areas for siting marine finfish aquaculture operations to avoid adverse impacts,” effects on various environmental concerns, and facilities design and farming practices that avoid adverse environmental impacts and minimize unavoidable impacts.<sup>151</sup> The PEIR also includes baseline environmental conditions, projects that are likely to be proposed and considered first, probable impacts of those projects, and siting locations and conditions that minimize impacts.<sup>152</sup> Establishing this baseline information through the PEIR will enable future aquaculture project applicants to avoid producing an individualized, expensive, and time-consuming environmental impact report (“EIR”) from scratch.<sup>153</sup> PEIRs efficiently streamline the environmental review process for individual projects under the California Environmental Quality Act (“CEQA”) while still ensuring the integrity of the required review process.<sup>154</sup>

In 2003, the Governor approved Senate Bill 245 (“S.B. 245”) to amend California’s Fish and Game Code to prohibit the aquaculture of salmon, unless it comes from California stocks and is used for ocean

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<sup>145</sup> CAL. FISH & GAME CODE § 15400(b)(5). “Benthic” means the bottom under a body of water, such as sand bottoms and sediment surfaces.

<sup>146</sup> *Id.*

<sup>147</sup> *Id.*

<sup>148</sup> *Id.* § 15400(b)(10).

<sup>149</sup> CAL. FISH & GAME CODE § 15008(a) (West 2014).

<sup>150</sup> Email from Randolph Lovell, State Aquaculture Coordinator, Cal. Dep’t Fish & Wildlife, to author (Sept. 30, 2013).

<sup>151</sup> Cal. Fish & Game Code § 15008(b).

<sup>152</sup> Email from Randolph Lovell, State Aquaculture Coordinator, Cal. Dep’t Fish & Wildlife, to author (Sept. 30, 2013).

<sup>153</sup> *Id.*

<sup>154</sup> *See* CAL. PUB. RES. CODE § 21157-21157.7 (West 2013) (outlining the procedure and requirements for preparing a PEIR).

ranching.<sup>155</sup> S.B. 245 also explicitly prohibits the cultivation of transgenic (genetically engineered) fish and non-native fish.<sup>156</sup>

Aquaculturalists in California are subject to additional state agencies and laws, namely CEQA, the California Department of Public Health, the Regional Water Quality Control Boards, and the California Coastal Commission.<sup>157</sup>

CEQA is California's primary environmental protection statute and requires agencies issuing permits to assess the environmental impacts of proposed projects.<sup>158</sup> If a lead agency on a permit, likely the DFW for an aquaculture operation, conducts an initial study and determines that the project will have no significant environmental impacts, the agency may prepare a negative declaration, which merely discloses the analysis of the impacts.<sup>159</sup> However, if the agency determines that a project will significantly impact the environment, the agency must prepare an EIR, complete with mitigation measures and possible alternatives to the project.<sup>160</sup> If the agency determines that it must prepare an EIR for a proposed aquaculture operation, the aquaculturalist must pay a filing fee to defray the costs of the process.<sup>161</sup> Projects can be delayed for many years due to CEQA litigation and project proponents may be required to undertake certain mitigation measures under CEQA.<sup>162</sup> When the PEIR is finalized, marine aquaculture operations will avoid this CEQA process and instead be subject to the more streamlined, tiered process allowed under the PEIR.<sup>163</sup>

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<sup>155</sup> *S.B. 245*, LEGISINFO.CA.GOV (Feb. 14, 2003), [http://www.leginfo.ca.gov/pub/03-04/bill/sen/sb\\_0201-0250/sb\\_245\\_bill\\_20031012\\_chaptered.html](http://www.leginfo.ca.gov/pub/03-04/bill/sen/sb_0201-0250/sb_245_bill_20031012_chaptered.html). Ocean ranching is considered a form of aquaculture. It is the practice of raising juvenile salmon in a particular location, releasing them, and then catching them when they return to where they were raised. They are caught by both commercial and sport fishermen.

<sup>156</sup> *Id.*

<sup>157</sup> See Marine Region – Information Leaflet Regulations Governing Leasing of State Water Bottoms for Aquaculture, CAL. DEP'T OF FISH & GAME, *supra* note 116, at 3-6.

<sup>158</sup> CAL. PUB. RES. CODE § 21002.1 (West 2013).

<sup>159</sup> CAL. PUB. RES. CODE § 21064, 21080.1 (West 2013).

<sup>160</sup> CAL. PUB. RES. CODE § 21061 (West 2013).

<sup>161</sup> Marine Region – Information Leaflet Regulations Governing Leasing of State Water Bottoms for Aquaculture, CAL. DEP'T OF FISH & GAME, *supra* note 116, at 3-4.

<sup>162</sup> See CAL. PUB. RES. CODE § 21002, 21004 (West 2013).

<sup>163</sup> See Email from Randolph Lovell, State Aquaculture Coordinator, Cal. Dep't Fish & Wildlife, to author (Sept. 30, 2013).

The California Department of Health Services (“DHS”) is responsible for regulating the health and sanitation of the shellfish industry.<sup>164</sup> Under the National Shellfish Sanitation Program, a federal and state cooperative program under the FDA, DHS sets sanitary requirements for shellfish growing and harvesting, including maximum levels of bacteria, pesticides, toxic organic compounds, heavy metals, and other contaminants, so that shellfish are safe for human consumption.<sup>165</sup> To ensure compliance with these standards, DHS monitors the growing areas of shellfish and can issue or deny a Shellfish Growing Area Certificate.<sup>166</sup>

If the aquaculture operation will release discharges, the aquaculturalist must obtain Waste Discharge Requirements under California’s Porter-Cologne Water Quality Control Act.<sup>167</sup>

An activity that changes the public access to coastal waters usually requires a coastal permit from either the California Coastal Commission (“CCC”) or a local government with a program certified by the CCC.<sup>168</sup> The activity cannot begin until it receives a coastal permit, so an aquaculturalist will likely have to apply for this permit as well.<sup>169</sup>

### 3. *Drakes Bay Oyster Company Conflict*

Use conflicts and permitting difficulties involving aquaculture in California recently became very public. The Secretary of the Interior decided not to extend Drakes Bay Oyster Company’s special use permit in order to allow Drakes Estero, where the oyster company is located, to convert to a wilderness area.<sup>170</sup> Although there was a provision to extend the lease, the National Park Service was reportedly concerned with the oyster operation’s environmental impacts, which

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<sup>164</sup> Marine Region – Information Leaflet Regulations Governing Leasing of State Water Bottoms for Aquaculture, CAL. DEP’T OF FISH & GAME, *supra* note 116, at 4.

<sup>165</sup> *Id.*

<sup>166</sup> *Id.*

<sup>167</sup> *Id.* at 5.

<sup>168</sup> *Id.*

<sup>169</sup> *Id.*

<sup>170</sup> Julie Cart, *First Marine Wilderness in Continental U.S. is Designated*, L.A. TIMES (Nov. 29, 2012, 8:40 PM), <http://www.latimes.com/news/local/la-me-1130-oysters-wilderness-20121130,0,6358160.story>.

were hotly contested.<sup>171</sup> The Ninth Circuit affirmed the district court's decision that the Secretary's decision was not arbitrary or capricious.<sup>172</sup> The oyster company stated that it will be seeking review from the United States Supreme Court.<sup>173</sup>

The possibility of relocating the shellfish operation to a nearby bay arose early in the conflict.<sup>174</sup> However, the marine aquaculture coordinator for the DFW stated that the required studies and approvals would be overwhelming and impractical.<sup>175</sup> The shellfish-growing lease proposal would have to be studied and approved by the DFG, the county, the CCC, and the Regional Water Quality Control Board in addition to federal agencies such as the Army Corps and Coast Guard.<sup>176</sup> The coordinator stated that "[v]irtually no one can afford the cost, which is why no new leases have been issued for years[.]"<sup>177</sup> This notion captures current difficulties in California aquaculture.

### B. North Carolina

North Carolina boasts to be one of the friendliest states to aquaculture in the United States.<sup>178</sup> Aquaculture oversight in North Carolina is divided between multiple departments, drawing the

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<sup>171</sup> *Id.* Drakes Estero is in the Point Reyes National Seashore, which is also home to dairy and cattle ranches that operate in a designated pastoral zone. *Id.* The ranches will enjoy the continuation of their leases, as Salazar stated that he is interested in extending the ranch leases from ten to twenty years. *Id.* This may understandably trouble the aquaculture community, as cattle ranching can destroy land and adjacent waters, which suffer from nutrient loading due to cattle runoff and increased sedimentation due to erosion. Yet, the cattle are permitted to stay while the oysters are excluded.

<sup>172</sup> *Drakes Bay Oyster Co. v. Jewell*, 729 F.3d 967, 987 (9th Cir. 2013).

<sup>173</sup> Mark Prado, *Court Denies Drakes Bay Oyster Co., Owner Says Fight Will Go to the U.S. Supreme Court*, MARIN INDEP. J. (Jan. 14, 2014, 1:37 AM), [http://www.marinij.com/ci\\_24909002/court-denies-drakes-bay-oyster-co-petition-have](http://www.marinij.com/ci_24909002/court-denies-drakes-bay-oyster-co-petition-have).

<sup>174</sup> David Mitchell, *Drakes Bay Oyster Company Struggles on Against Park Service*, SPARSELY SAGE AND TIMELY (July 10, 2012, 6:53 PM), <http://www.sparselysageandtimely.com/blog/?p=15259>.

<sup>175</sup> *Id.*

<sup>176</sup> *Id.*

<sup>177</sup> *Id.*

<sup>178</sup> *Aquaculture & the NCDA&CS*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., <http://www.ncagr.gov/markets/aquaculture/general.htm> (last visited Dec. 20, 2012).

distinction between freshwater and marine aquaculture.<sup>179</sup> Freshwater aquaculture decision-making powers are consolidated with the North Carolina Department of Agriculture and Consumer Services (“DACS”) and the North Carolina Wildlife Resources Commission (“WRC”).<sup>180</sup> The North Carolina Division of Marine Fisheries (“DMF”) oversees marine aquaculture.<sup>181</sup>

### *1. Land-Based Aquaculture Permitting*

In North Carolina, aquaculture is explicitly by statute considered a form of agriculture.<sup>182</sup> Thus, the DACS is the lead state agency for aquaculture and has the power and duty to be a source of information for aquaculturalists, assist aquaculturalists in obtaining the appropriate permits, promote investment to expand aquaculture production, and work with state and federal agencies to create “policies and procedures to facilitate aquacultural development.”<sup>183</sup> In conjunction, the DACS is the regulator of the production and sale of freshwater fish and crustacean species.<sup>184</sup> The Board of Agriculture authorizes, licenses, and prescribes the conditions of operation.<sup>185</sup> North Carolina also created an Aquaculture Advisory Board that would recommend changes based on state and federal aquaculture policies, though the statutory authorization for the board has since been repealed.<sup>186</sup>

North Carolina makes available three types of land-based aquaculture licenses: a five-year aquaculture production (including holding tanks and ponds) license, a five-year fee-fishing license, and a two-year holding tank or pond license.<sup>187</sup>

The process to obtain a land-based aquaculture license in the state of North Carolina is relatively simple. The prospective aquaculturalist

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<sup>179</sup> Email from Craig Hardy, N.C. Div. of Marine Fisheries, to author (Dec. 13, 2012, 11:52 PST) (on file with author).

<sup>180</sup> *Id.*

<sup>181</sup> *Id.*

<sup>182</sup> N.C. GEN. STAT. § 106-759 (2013).

<sup>183</sup> *Id.*

<sup>184</sup> *Id.* § 106-761(a).

<sup>185</sup> *Id.* § 106-761(d).

<sup>186</sup> *Id.* § 106-760 (repealed 2011).

<sup>187</sup> *North Carolina Department of Agriculture & Consumer Services Aquaculture License Application*, N.C. DEP’T OF AGRIC. & CONSUMER SERVS., <http://www.ncagr.gov/markets/aquaculture/documents/AquacultureLicenseApplication.pdf> (last visited Dec. 20, 2012).

must fill out the one-page aquaculture license application and submit it to the DACS.<sup>188</sup> The license is free, valid for five years, covers twenty-one species, and can be obtained within a few weeks.<sup>189</sup> It is likely that no other environmental-related permits will be required as long as the proposed operation (1) is not in a wetland and (2) does not discharge water more than thirty days per year and does not produce more than 100,000 pounds of fish per year.<sup>190</sup> If a discharge permit is required, the North Carolina Department of Water Quality assists with discharge requirements for potential farm sites.<sup>191</sup>

If a producer cultures a freshwater species, it must get a letter of authorization from the WRC.<sup>192</sup> If the producer wants to culture an estuarine or marine species, it must get an Aquaculture Operation Permit from DMF.<sup>193</sup> The permit approval process for a species that is not already covered by North Carolina permitting must be approved by the WRC, which determines potential environmental impacts, and can take at least one month to be approved.<sup>194</sup> The DACS makes the request to the WRC on the producer's behalf, and the authorization only needs to be renewed every five years.<sup>195</sup>

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<sup>188</sup> *NCDA&CS Aquaculture License Information*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., <http://www.ncagr.gov/markets/aquaculture/license.htm> (last visited Nov. 30, 2012). The one-page license application is available at *North Carolina Department of Agriculture & Consumer Services Aquaculture License Application*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., *supra* note 187.

<sup>189</sup> *NCDA&CS Aquaculture License Information*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., *supra* note 188; *Aquaculture in North Carolina: Catfish*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS. 13, <http://www.ncagr.gov/markets/aquaculture/Catfish01.pdf>; Matt Parker, *Aquaculture in Education: What Other States are Doing and Permits Needed in NC*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS. (2006), available at <http://www.ncaquaculture.org/2006presentations/parkereducation06.pdf>.

<sup>190</sup> *Aquaculture in North Carolina: Catfish*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., *supra* note 189, at 13. If an operation with warm water fish discharges at least thirty days per year and/or produced 100,000 pounds of fish or more per year, then it is considered a concentrated aquatic animal production facility under the CWA and must apply for an NPDES permit. 40 C.F.R. pt. 122 app. C.

<sup>191</sup> *Marketing – Aquaculture: Contacts*, N.C. DEP'T OF AGRIC. & CONSUMER SERVS., <http://www.ncagr.gov/markets/aquaculture/contacts.htm> (last visited Dec. 20, 2012).

<sup>192</sup> Email from Craig Hardy, N.C. Div. of Marine Fisheries, to author (Dec. 13, 2012, 11:52 PST) (on file with author).

<sup>193</sup> *Id.*

<sup>194</sup> Parker, *supra* note 189.

<sup>195</sup> *Id.*; *Authorization to Culture Non-Approved Fish Species*, N.C. WILDLIFE RES. COMM'N,

## 2. Marine Aquaculture Leasing

North Carolina's regulatory framework does not currently support marine aquaculture of finfish or crustaceans.<sup>196</sup> DMF's regulations are "limited to shellfish culture and the shellfish lease program."<sup>197</sup> A DMF representative said there has not been enough interest in marine finfish aquaculture to warrant a program and that such a program would have to provide benefits that outweighed the public's loss of the area used for operations.<sup>198</sup>

To lease waterbeds for marine shellfish aquaculture, the prospective producer must fill out an application that includes verification that the operation is not within one-hundred feet of developed shoreline owned by another person or signed consent from the owner, a management plan for the shellfish operation, and a drawn map of the aquaculture lease location.<sup>199</sup> The application costs \$200 to file, which is returned in the event the lease is not approved.<sup>200</sup> The lease costs \$10 per acre per year, is good for five years, and costs \$100 to renew every five years.<sup>201</sup> A lease for a shellfish operation typically needs to be between one-half and five acres, must produce at least ten bushels of shellfish per acre per year, and must plant certain numbers of seed shellfish or cultch.<sup>202</sup> If the producer also leases the water column over his benthic

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<http://www.ncwildlife.org/Licensing/OtherLicensesPermits/AuthorizationtoCultureNonApprovedFishSpecies.aspx> (last visited Dec. 18, 2012).

<sup>196</sup> *North Carolina Analysis*, MARINE CONSERVATION AGREEMENTS, [http://www.mcatoolkit.org/Country\\_Analyses/United\\_States/North\\_Carolina.html](http://www.mcatoolkit.org/Country_Analyses/United_States/North_Carolina.html) (last visited Dec. 12, 2012).

<sup>197</sup> Craig Hardy, *Aquaculture Conference*, N.C. DIV. OF MARINE FISHERIES 6 (Feb. 9, 2007), available at [http://www.ncaquaculture.org/2007Presentations/Hardy\\_AquacultureConference2-9-07.pdf](http://www.ncaquaculture.org/2007Presentations/Hardy_AquacultureConference2-9-07.pdf).

<sup>198</sup> Email from Craig Hardy, N.C. Div. of Marine Fisheries, to author (Dec. 13, 2012, 13:06 PST) (on file with author).

<sup>199</sup> *North Carolina Shellfish Bottom Lease Application*, N.C. DIV. OF MARINE FISHERIES, [http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=be849a63-3480-48c0-96a6-0919865d1cba&groupId=38337](http://portal.ncdenr.org/c/document_library/get_file?uuid=be849a63-3480-48c0-96a6-0919865d1cba&groupId=38337).

<sup>200</sup> *Id.* at 3.

<sup>201</sup> *Id.* at 3.

<sup>202</sup> Standards for Shellfish Bottom and Water Column Leases, 15A N.C. ADMIN. CODE 03O .0201 (a)(3) & (c)(1)-(2) (2011).

lease, he must produce and plant four times as many shellfish than with just the benthic lease.<sup>203</sup>

These shellfish production requirements are in place to ensure a proper tradeoff for the public, which loses use of the leased area.<sup>204</sup> The public loses use of the resource but gains a bountiful shellfish harvest that can be purchased and consumed.<sup>205</sup>

Marine aquaculture operations must secure an Aquaculture Operation Permit from the Director of the Marine Fisheries Commission under DMF.<sup>206</sup> By having an Aquaculture Operation Permit, the producer may obtain an Aquaculture Collection Permit, which allows producers to collect their farmed species.<sup>207</sup> Both the Operation and Collection Permits are free and DMF typically takes less than five weeks to review the permit applications.<sup>208</sup> The producer must hold the appropriate licenses for whatever gear is used or species are harvested under the Aquaculture Collection Permit.<sup>209</sup>

### 3. Marine-Based Environmental Conservation

North Carolina's marine aquaculture regulations include environmental considerations even though shellfish are generally considered a net positive on the environment.<sup>210</sup> Before issuing an Aquaculture Operation Permit, a DMF biologist visits the site to conduct a sampling of the proposed lease site in order to determine if it contains any submerged aquatic vegetation or a natural shellfish

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<sup>203</sup> *Id.* § 03O .0201 (g).

<sup>204</sup> Email from Craig Hardy, N.C. Div. of Marine Fisheries, to author (Dec. 13, 2012, 13:06 PST) (on file with author).

<sup>205</sup> *Id.*

<sup>206</sup> 15A N.C. ADMIN. CODE 3O .0503 (f)(1) (2005).

<sup>207</sup> Procedures and Requirements to Obtain Permits, 15A N.C. ADMIN. CODE 03O .0501 (e)(1) (2011).

<sup>208</sup> LICENSE AND PERMIT GUIDE, N.C. DIV. OF MARINE FISHERIES 20-21 (Apr. 2013), available at [http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=801cdc8f-8ef4-4f5a-b2a9-b715e0fb5fdd&groupId=38337](http://portal.ncdenr.org/c/document_library/get_file?uuid=801cdc8f-8ef4-4f5a-b2a9-b715e0fb5fdd&groupId=38337).

<sup>209</sup> Procedures and Requirements to Obtain Permits, 15A N.C. ADMIN. CODE 03O .0501 (e)(2) (2011).

<sup>210</sup> Shellfish are net positives because they filter more nutrients and particulate than they excrete. R. LeRoy Creswell & Aaron A. McNevin, *Better Management Practices for Bivalve Molluscan Aquaculture*, in ENVIRONMENTAL BEST MANAGEMENT PRACTICES FOR AQUACULTURE 427, 427-29 (Craig S. Tucker & John A. Hargreaves eds., 2008).

bed.<sup>211</sup> If the site contains either of those features, it will not be considered suitable for a lease.<sup>212</sup>

### *C. Maine*

The aquaculture industry in Maine is largely regulated at the state level through the Maine Department of Marine Resources (“DMR”). Maine has undertaken a significant, iterative effort to create a regulatory framework that is not prohibitively restrictive to offshore aquaculture while including meaningful opportunities for environmental protection. Maine’s comparatively clear regulatory and permitting framework and its engagement with environmental stewardship makes it one of the more balanced and functional frameworks in the country.

Maine experiences warm, humid summers and cold, snowy winters, at which point inland waters will freeze over.<sup>213</sup> This climate, along with regulatory provisions, affects the variety of aquaculture businesses in Maine.<sup>214</sup> Within Maine aquaculture, salmon is by far the most frequently farmed fish, followed by cod and halibut.<sup>215</sup> Although acreage dedicated to finfish versus shellfish is split about evenly at about 650 acres each, finfish bring in about 85% of the aquaculture production value in Maine and shellfish comprise about 15% of the production value.<sup>216</sup>

#### *1. Leasing and Permitting*

Contrary to the nationwide trend, the prevalence of marine aquaculture dominates over land-based aquaculture in Maine.<sup>217</sup> Maine recognizes three different types of offshore aquaculture leases: a

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<sup>211</sup> Email from Craig Hardy, N.C. Div. of Marine Fisheries, to author (Dec. 19, 2012, 13:25 PST) (on file with author). North Carolina defines a natural shellfish bed as a site that houses up to ten bushels of shellfish or more per acre. Standards for Shellfish Bottom and Water Column Leases, 15A N.C. ADMIN. CODE 030 .0201(a)(1) (2011).

<sup>212</sup> See Standards for Shellfish Bottom and Water Column Leases, 15A N.C. ADMIN. CODE 030 .0201(a)(1) (2011).

<sup>213</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass’n (Dec. 4, 2012).

<sup>214</sup> Id.

<sup>215</sup> Id.

<sup>216</sup> Id.

<sup>217</sup> Id.

standard lease, an experimental lease, and a limited-purpose aquaculture license.<sup>218</sup> The standard lease has the most intensive and extensive permitting process. It requires a full review of the aquaculture site including a dive inspection, a scoping session, and a public hearing.<sup>219</sup> Approval of the lease usually takes between ten and fourteen months, and the application fee is either \$1500 or \$2000 depending on the species that will be cultivated.<sup>220</sup> In exchange, the aquaculturalist will be permitted to develop a farm up to 100 acres in size, the largest marine farm that is allowed in Maine, and the lease is valid for up to ten years.<sup>221</sup>

An experimental lease can be used to determine whether a particular area will be a good site for an aquaculture operation.<sup>222</sup> The leasing process is less intensive than the standard lease as the application fee is only \$100, a dive inspection is not required, and a scoping session and public hearing are not required, although must be held if five or more people request one.<sup>223</sup> However, the maximum lease is four acres in size and three years in duration.<sup>224</sup>

Application fees for leases must be renewed and repaid at the end of every lease if the operation wishes to continue.<sup>225</sup> In addition, Maine charges \$100 per acre per year to lease marine space to an aquaculture operation.<sup>226</sup>

A limited-purpose aquaculture license is only available for the cultivation of blue mussels, marine algae, and certain clams and oysters.<sup>227</sup> The license does not require scoping, public review, or a site visit and only costs \$50 per year.<sup>228</sup> Limited-purpose licenses can only last one year and can be a maximum size of four-hundred square feet.<sup>229</sup>

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<sup>218</sup> *Conducting Aquaculture in Maine*, ME. DEP'T OF MARINE RES. 1 (Feb. 16, 2012), available at

<http://www.maine.gov/dmr/aquaculture/documents/conductingaquacultureinmaine.pdf>.

<sup>219</sup> *Id.* at 1-2.

<sup>220</sup> *Id.*

<sup>221</sup> *Id.*

<sup>222</sup> *Id.* at 1.

<sup>223</sup> *Id.* at 1-2.

<sup>224</sup> *Id.*

<sup>225</sup> *Id.*

<sup>226</sup> *Id.*

<sup>227</sup> *Id.*

<sup>228</sup> *Id.*

<sup>229</sup> *Id.*

Offering these three different types of leases is Maine's innovative solution to allow new aquaculture producers to become introduced to the industry and try out their business before investing in a longer, more expensive lease. This leasing structure has been successful in breaking down some of the barriers to entering the aquaculture business.<sup>230</sup> Unfortunately, in practice, the experimental leasing process is now almost identical to the standard leasing process.<sup>231</sup> Because Maine only requires five people to request a public hearing before a public hearing must be granted, it is easy for opponents to challenge and delay aquaculture operations through the public hearing process.<sup>232</sup> Thus, there is currently less incentive to pursue an experimental lease in Maine.

Another issue with Maine's aquaculture leasing program is that every lease must address twelve criteria, including determining whether the operation would impede navigation or significant fishing.<sup>233</sup> These criteria create an order of prioritized uses, in which aquaculture is the last in line.<sup>234</sup> For example, if someone can demonstrate that the lease site is a preexisting fishery, even if the wild fishery is dormant or overexploited, the prospective aquaculture lessee will be denied the lease.<sup>235</sup>

Maine is authorized to issue Clean Water Act NPDES permits through its Department of Environmental Protection.<sup>236</sup> Maine considers shellfish to have no discharge, so shellfish operations are not required to obtain an NPDES permit from the state.<sup>237</sup> An operation must also obtain a stocking permit from the DMR by showing that its fish are free from disease in order to stock the operation.<sup>238</sup> The fish

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<sup>230</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass'n (Dec. 4, 2012).

<sup>231</sup> *Id.*

<sup>232</sup> *Id.* Many of Maine's snowbirds (who live in Maine during summer months only) and retirees live on the waterfront and do not want to see, hear, or smell a commercial aquaculture operation from their homes. *Id.* Many of the objections to aquaculture leases come from this population, in conflict with local, year-round residents interested in working Maine's active waterfront. *Id.*

<sup>233</sup> *Id.*

<sup>234</sup> *Id.*

<sup>235</sup> *Id.*

<sup>236</sup> *Water: General Materials*, ME. DEP'T OF ENVT'L PROTECTION,

<http://www.maine.gov/dep/water/wd/general.html> (last visited Dec. 4, 2012).

<sup>237</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass'n (Dec. 4, 2012).

<sup>238</sup> *Id.*

health inspection is different between land-based and marine aquaculture because marine aquaculture is located in public waters.<sup>239</sup>

Very little land-based aquaculture currently exists in Maine due to regulations and the climate. Maine's freshwater discharge permit regulations include strict nitrogen and phosphorous limits.<sup>240</sup> Because the freshwater that would be used for land-based aquaculture usually does not meet the nitrogen and phosphorous limits, the limits essentially require that the operation's discharges are cleaner than the water that goes into the operation.<sup>241</sup> These rules effectively force land-based aquaculture operations to double as water treatment plants.

Land-based aquaculture operations in Maine freeze in the winter, limiting the types of fish that can be raised in a land-based operation.<sup>242</sup> A significant pond-based industry, for example, would not be possible in Maine. However, baitfish farms are growing in Maine because the demand from the winter ice-fishing sector is large and importing baitfish into Maine is illegal.<sup>243</sup> Despite harsh winter conditions for fish, if freshwater discharge permit regulations were relaxed, land-based aquaculture in Maine may grow significantly to include more baitfish farms as well as other types of operations that can shut down during the winter.<sup>244</sup>

## 2. Environmental Monitoring and Protection

In addition to its comparatively clear regulatory and permitting structure, Maine also includes significant efforts to document, monitor, and regulate the effects of aquaculture on the surrounding environment. Producers seeking a standard lease with no discharge, typically a shellfish operation, must provide documentation in the form of an environmental characterization that describes "bottom characteristics, resident flora and fauna, tide levels, and current speed and direction."<sup>245</sup> If there will be a discharge from the standard lease aquaculture operation, typically a finfish operation, the applicant must

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<sup>239</sup> *Id.*

<sup>240</sup> *Id.*

<sup>241</sup> *Id.*

<sup>242</sup> *Id.*

<sup>243</sup> *Id.*

<sup>244</sup> *Id.* (noting that Maine is home to one small trout farm that sells trout for small private pond stocking purposes and just sells all its trout at the end of summer so that it can shut down for winter).

<sup>245</sup> 13-188 ME. CODE R. Ch. 2, § 10(3)(C)(1) (West 2014).

prepare a sediment and benthic characterization, including a description of bottom types, sediment cores from those bottom types, and benthic samples to determine which species are present, and a water quality characterization, determining “water temperature, dissolved oxygen concentrations, and salinity . . . .”<sup>246</sup>

These baseline measurements will be used to describe “the physical and ecological impact of the project on existing and potential uses of the site as a result of the operation.”<sup>247</sup> In making a decision on the lease application, the Commissioner of the DMR considers, among other factors, the effect on wildlife and marine habitat and the ability of the affected areas “to support ecologically significant flora and fauna” and the intensity of other aquaculture operations in the surrounding area.<sup>248</sup> The Commissioner can require environmental monitoring of a lease site.<sup>249</sup>

Likewise, experimental lease applications require a report of the general biological and shoreline characteristics of the aquaculture operation location.<sup>250</sup> The Commissioner can revoke an experimental lease during the annual review if the lease activities were “injurious to the environment or marine organisms[.]”<sup>251</sup> Even the limited-purpose aquaculture license requires a brief description of the environmental characteristics of the proposed license site.<sup>252</sup>

Once the farm on the lease site is in operation, DMR conducts annual environmental monitoring surveys.<sup>253</sup> The results of the surveys are compared to the baseline survey.<sup>254</sup> Some impacts are allowed, but there is a series of constraints and quantitative indicators determining whether the impacts are acceptable.<sup>255</sup> If the operation exceeds acceptable impacts, DMR issues a warning, then a letter of violation requiring the operation to create an environmental management plan to

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<sup>246</sup> *Id.* § 10(3)(C)(2).

<sup>247</sup> *Id.* § 10(3)(C)(1) & (2).

<sup>248</sup> 13-188 ME. CODE R. Ch. 2, § 37(1)(A)(4) & (5) (West 2014).

<sup>249</sup> 13-188 ME. CODE R. Ch. 2, § 40(7) (West 2014).

<sup>250</sup> 13-188 ME. CODE R. Ch. 2, § 64(2)(C)(7) (West 2014).

<sup>251</sup> *Id.* § 64(13)(B).

<sup>252</sup> 13-188 ME. CODE R. Ch. 2, § 90(2)(C)(2) (West 2014).

<sup>253</sup> 13-188 ME. CODE R. Ch. 2, § 42(1) (West 2014).

<sup>254</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass’n (Dec. 4, 2012).

<sup>255</sup> *Id.*

return to compliance levels.<sup>256</sup> If the operation does not come into compliance, its lease can be revoked.<sup>257</sup>

This annual, iterative process is tedious but allows more environmentally protective results. The farmers learn about and can mitigate the environmental effects of their operation while maintaining regular contact with their overseeing agency. Over the past thirty years, this process has been successful in significantly reducing the environmental impacts and improving best management practices in aquaculture operations.<sup>258</sup>

#### IV. UTILIZING THE BEST STATE POLICIES TO BUILD A MORE ROBUST AQUACULTURE INDUSTRY

While federal regulatory reform is necessary, state regulatory frameworks also influence aquaculture's success and can be crafted to promote the industry. The federal regulatory framework for aquaculture is more stagnant and difficult for states to influence than state-level regulations. States can implement changes that are within the current federal framework and do not require federal-level reform. Federal reform, especially in the long-term, will be crucial to induce more effective industry growth, but state-level policies can be effective for quicker, on-the-ground improvements.

California, North Carolina, and Maine have developed some practices that a state can adopt in order to balance environmental protection with the aquaculture industry. An ideal state-level aquaculture framework would provide for environmental protection while allowing room for the domestic aquaculture industry to grow without those interests stifling each other.

As aquaculture industries and regulations vary greatly by state, this Article's suggestions might not be practical for every state. These suggestions are but one model that may work well for some states in balancing aquaculture industry growth and environmental protection.

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<sup>256</sup> *Id.*

<sup>257</sup> 13-188 ME. CODE R. Ch. 2, § 42(1).

<sup>258</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass'n (Dec. 4, 2012).

*A. Oversight Administration and Coordination Considerations*

A preliminary step that a state can take towards promoting a more robust aquaculture industry is to ensure that the state has a designated department and specialized staff to support the state's aquaculture industry.<sup>259</sup> The department should hire staff with aquaculture expertise and knowledge to work specifically on the state's aquaculture matters.<sup>260</sup> Specialized staff can negotiate more effectively with state and federal agencies regarding programmatic permits or partner with them to address specific issues.<sup>261</sup> Having specialized state support can help centralize the state aquaculture industry and give it an identity for national level discussions.

A point for states to consider is whether the aquaculture department and administrators should be housed in the state's agricultural department or natural/marine resources department. There are strong arguments for housing aquaculture oversight in the agricultural department.<sup>262</sup> However, this may be a moot consideration in most states as the aquaculture department may be securely housed elsewhere. For example, the Aquaculture Program in California is housed in the DFW.<sup>263</sup> Aquaculture regulations are in the California Fish and Game Code rather than the California Food and Agricultural Code.<sup>264</sup> The State Aquaculture Coordinator and Marine Aquaculture Coordinator are DFW employees.<sup>265</sup> In that case, a state might better spend its time and resources on developing the strength of the existing aquaculture department rather than battling to change the aquaculture department's parent agency.

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<sup>259</sup> Email from Gary Jensen, Chair of the Joint Subcommittee on Aquaculture, U.S. Dep't of Agric., to author (Nov. 21, 2012, 18:11 PST) (on file with author).

<sup>260</sup> Id.

<sup>261</sup> Id.

<sup>262</sup> Agriculture departments are accustomed to overseeing industries and operations with the purpose of producing food for human consumption. Part of its goal is to expand production when fit and be a government-side representative for the industry. This department will have greater insight on the finances behind running a farm as well as production cycles of animals and crops. Aquaculture, despite involving some of the same species, is significantly different from recreational, sport, and commercial fishing.

<sup>263</sup> *Private Aquaculture Information and Registration*, CAL. DEP'T OF FISH & WILDLIFE, <http://www.dfg.ca.gov/Aquaculture/> (last visited Oct. 14, 2013); *Aquaculture*, CAL. DEP'T OF FISH & WILDLIFE, *supra* note 125.

<sup>264</sup> See, e.g., CAL. FISH & GAME CODE §§ 15,000-15,703 (West 2014).

<sup>265</sup> See *Aquaculture*, CAL. DEP'T OF FISH & WILDLIFE, *supra* note 125.

If the state is coastal, it will also have to decide whether it is best to house aquaculture in two agencies, as in North Carolina, or if aquaculture oversight will be consolidated under one agency, as in California and Maine. This is also a decision that most, if not all, coastal states have already made. However, it is a decision that should be contemplated by states that just recently authorized marine aquaculture, such as Delaware.<sup>266</sup> Additionally, separating or consolidating marine and freshwater oversight may be a change that can help streamline the aquaculture regulatory framework in some states.

Additionally, states should consider wastewater treatment requirements for aquaculture facilities. While it is crucial that an aquaculture operation cleans its discharge to meet state water quality standards, it seems unfair to require them to make the water cleaner than the water they received. In order to strike a fairer balance, a state might consider subsidizing part of an operation's water treatment system. Otherwise, water treatment can just be seen as a cost of doing business in a state with dirtier waters.

### *B. Suggestions for Leasing and Permitting*

The regulatory framework for leasing and permitting can be one of the most burdensome aspects of aquaculture production.<sup>267</sup> Some of this burden is necessary regulation of the industry, but some of it can be attributed to lack of bureaucratic coordination. To decrease the inefficiencies in the regulatory framework, states should consider streamlining the application process for producers through a lead agency, offering different types of leases and permits to fit producers of different goals and capacities, and prioritize aquaculture as a beneficial use where appropriate.

#### *1. Streamline the Application Process for Producers*

State-level aquaculture leasing and permitting should aim to require as few separate application processes as necessary. A state can do this

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<sup>266</sup> Delaware was the last coastal state to enact a law allowing shellfish farming. Shana O'Malley, *Delaware Becomes Final East Coast State to Allow Shellfish Farming*, NEWSWORKS (Aug. 28, 2013), <http://www.newsworks.org/index.php/local//item/59113-delaware-becomes-the-last-east-coast-state-to-allow-shellfish-aquaculture/>.

<sup>267</sup> See DeVoe, *supra* note 15, at 3-4.

by streamlining the applications that a producer must go through for various state agencies and regulations. The lead aquaculture agency should act as a coordinator to consolidate the required information into as few applications as possible to collect the information necessary to comply with all applicable state laws. The lead agency should then be responsible for communicating with and coordinating other interested agencies, and act as a point person for communications with the producer. Consolidating the applications as much as possible creates a simpler application process for the producer while still complying with all applicable state laws.

Some states are already undertaking this kind of streamlining. For example, North Carolina's DACS will request WRC's approval for culture of a new species on the producer's behalf.<sup>268</sup> It may not seem like much, but when compounded, this type of process can help producers avoid bureaucratic confusion and duplicative processes.

## *2. Offer a Variety of Leases and Permits*

Lengthy and expensive leasing and permitting processes are barriers to entry into the aquaculture business, especially those that are new or small. Part of the length and expense of the leasing and permitting process stems from environmental review requirements. The intention of environmental review—environmental protection—should not be sacrificed. But requiring the same level of environmental review for every operation without considering relevant variations such as size, duration, and species cultivated has the unintended consequence of selecting for big farms that can afford the environmental review requirements but likely have higher environmental impacts. Thus, size-appropriate leasing and permitting options should be available to those running smaller operations.

The leasing or licensing process should not be too onerous to undertake or too relaxed on environmental standards. Options for multiple types of leases or permits with varying costs, duration, and permitted acreage can create an appropriate balance. For example, Maine's leasing regulations provide options for various levels of aquaculture producers.<sup>269</sup> Maine's leases typically apply to marine aquaculture, but the same concept can be applied to land-based

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<sup>268</sup> Parker, *supra* note 189.

<sup>269</sup> *Conducting Aquaculture in Maine*, ME. DEP'T OF MARINE RES., *supra* note 218, at 1-2.

licensing. The limited purpose aquaculture license is a quick, cheap, and easy license for small acreage cultivation of particular species for a year. This option may work well for a hobbyist or someone who is interested in maintaining a very small operation. The only species permitted under this permit are native shellfish or aquatic plants, which are typically biological net positives, or benefits, on the environment.<sup>270</sup> The experimental lease is for medium acreage and time period. It is mostly used to determine whether a particular site is appropriate for a longer-term lease. An experimental leasing option is one way to effectively decrease barriers of entry for new commercial-level aquaculturalists. It is also an environmental safeguard for the state because at the end of the experimental lease, a standard lease need not be issued if the farm had a more detrimental impact than expected or allowed. The standard lease can have much larger acreage and is the longest of all leases. Approval requires a full environmental review process, complete with dive-inspection by a biologist with the lead state agency. Maine's standard lease holders must seek renewal after ten years.<sup>271</sup>

The differences between types of leases should be meaningful in practice and require serious opposition to manipulate. For example, in practice, Maine's experimental leasing process is beginning to resemble the standard lease in time and money spent.<sup>272</sup> The experimental lease requires only five people to request a public hearing.<sup>273</sup> Once a public hearing is required on an experimental lease, the application procedure almost exactly mirrors that of a standard lease. This disincentivizes producers from taking advantage of the experimental lease option.<sup>274</sup> This problem could be fixed, and the purpose of an experimental lease would be better served, by increasing

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<sup>270</sup> Shellfish are net positives because they filter more nutrients and particulate than they excrete. Creswell & McNevin, *supra* note 210, at 427-29. However, criticisms of shellfish aquaculture include "displacement of benthic aquatic vegetation; discarded nets and equipment; displeasing aesthetics associated with plot markers, working vessels, and platforms; and increased turbidity and disruption of sediments during harvesting." *Id.* Some of these problems can be ameliorated by careful siting, regulations, and best management practices.

<sup>271</sup> *Conducting Aquaculture in Maine*, ME. DEP'T OF MARINE RES., *supra* note 218, at 2.

<sup>272</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass'n (Dec. 4, 2012).

<sup>273</sup> *Id.*

<sup>274</sup> *Id.*

the number of people who must request a public hearing before one will be held. Similar problems that decrease the practical differences between different types of leases should be identified and avoided. Otherwise, states will not ameliorate barriers to entry.

When a state is setting a time frame for leases or licenses, it should take into account the longer production cycle that is typical for many fish species.<sup>275</sup> Whereas terrestrial animals and crops have relatively short production cycles,<sup>276</sup> the shortest production cycle for a fish species is about one year for longline culture mussels.<sup>277</sup> The typical production cycle for oysters, cod, and salmon is about three years.<sup>278</sup> Thus, an experimental lease for a time period shorter than three years will not be useful for certain types of operations. A ten-year lease means an aquaculturalist will only produce three cycles, assuming quick turnover, before the lease or license is in jeopardy due to renewal. Allowing for a longer lease or license period increases certainty for producers and operations, which is essential to growing a strong and lucrative industry.<sup>279</sup>

### 3. Prioritize Aquaculture Operations

When setting use priorities, states should not allow expired uses to override aquaculture for an otherwise appropriate leasing site. For example, in Maine, an overexploited or dormant fishery has use priority over aquaculture, so if an aquaculturalist applies for a lease in that area, it can be rejected because of an irrelevant use.<sup>280</sup> Of course, there will be legitimate uses that a state can decide to prioritize over aquaculture, such as protection of environmentally sensitive areas or an active fishery. These will vary by state. However, a state can assist the growth of the aquaculture industry by considering it a serious and beneficial use and prioritize it over uses that have been abused or no longer exist or serve the public. This notion was adopted by the Humboldt Bay Harbor Board of Commissioners in California, who

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<sup>275</sup> A production cycle refers to the time from when an animal or crop is born or planted to the time it is slaughtered or harvested.

<sup>276</sup> For example, the production cycle for industrial commercial chicken is 45 days.

<sup>277</sup> Creswell & McNevin, *supra* note 210, at 440.

<sup>278</sup> *Id.* at 437.

<sup>279</sup> For example, the special use permit that the federal government granted to Johnson Oyster Company in Drakes Estero was for forty years.

<sup>280</sup> Telephone Interview with Sebastian Belle, Executive Director, Me. Aquaculture Ass'n (Dec. 4, 2012).

listed funding aquaculture water intake and discharge permitting as a priority in their most recent federal and state legislative priorities resolution.<sup>281</sup>

### *C. Environmental Protection in Leasing and Permitting*

The domestic aquaculture industry must grow with a consciousness for minimizing environmental impacts. The public values protection of freshwater and marine resources, and the aquaculture industry will not gain public support if it cannot balance its productivity with environmental considerations. At the same time, environmental interests must be willing to work with a new industry in order to allow the public to benefit from domestically raised fish, rather than relying on imports. The goal should be to minimize impacts, keep the compromises fair and realistic, and to provide for an iterative process in order to continuously develop protocols as technologies improve and interested groups learn what works in practice.

#### *1. Siting*

Environmental problems can be most effectively minimized by preventing them rather than post-hoc remediation. Properly siting aquaculture operations can prevent many environmental impacts. Siting considerations will vary greatly depending on the type of operation.

To provide for basic environmental protection, operations should not be sited over sensitive or naturally rich environments. This is even true of shellfish operations, the byproducts of which can affect benthic conditions if sited in a location where the seawater does not adequately flush through.<sup>282</sup> North Carolina's regulations provide for this by

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<sup>281</sup> Resolution Establishing Federal and State Legislative Priorities for the Humboldt Bay Harbor, Recreation and Conservation District During the 2013 Legislative Session, Res. 2013-03, HUMBOLDT BAY HARBOR, RECREATION AND CONSERVATION DISTRICT (2013), <http://www.caaquaculture.org/wp-content/uploads/2013/03/Humboldt-Resolution-2013-03.pdf>.

<sup>282</sup> Jon Lewis & Marcy Nelson, *Investigation of Benthic Conditions Under Mussel-Raft Farms*, DEP'T OF MARINE RES. AQUACULTURE ENVT'L SECTION 7 (2008), available at <http://www.maine.gov/dmr/aquaculture/reports/musselrafts.pdf> (suggesting that mussel rafts should not be placed over sensitive aquatic environments); *Ass'n to Protect Hammersley, Eld, and Totten Inlets v. Taylor Res., Inc.*, 299 F.3d 1007, 1010-11 (9th Cir. 2002) (noting that although farmed mussels

prohibiting a producer from siting a shellfish farm on a natural shellfish bed.<sup>283</sup>

Maine provides an apt addition, which is to map and sample the lease area during the siting process to determine appropriateness of the siting location and the operation's effects on the surrounding area.<sup>284</sup> Maine's requirements are flexible to accommodate different types of aquaculture operations by requiring a less intensive siting process for operations that are considered to have no discharge. For example, an operation without discharge must prepare an environmental characterization but need not prepare sediment cores, benthic samples, and water quality characteristics, while a discharging operation must undertake these requirements. This variation in responsibility is an important characteristic of Maine's program that maintains environmental evaluation requirements while decreasing a barrier to entry.

## 2. *During the Lease or Permit*

States should consider an iterative environmental protection process during the course of an operation's lease or permit in order to allow for greater experimentation with aquaculture. For the process to be iterative, it will require monitoring and reporting beyond the initial siting. State authorities should continue checking the environmental effects of an operation during the duration of the lease or permit, as it is possible that an operation will have unanticipated effects. For example, the Maine DMR conducts annual environmental monitoring surveys and compares the results to the baseline survey.<sup>285</sup> This allows authorities to know whether changes should be made to the lease or permit conditions to result in the best outcome for the affected environment and the producer.

If an operation is causing environmental effects beyond what was anticipated or permitted, rather than automatically revoking the lease or permit, the department with oversight should consider implementing a process to make new recommendations or

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act as natural water filters, they also drop shells and produce feces, pseudofeces, ammonium, and inorganic phosphate).

<sup>283</sup> See *supra* Part II.B.ii.

<sup>284</sup> See 13-188 ME. CODE R. Ch. 2, §§ 10(3)(C)(1), 10(3)(C)(2), 64(2)(C)(7), 42(1) (West 2014).

<sup>285</sup> *Id.* § 42(1).

requirements to mitigate or eliminate the harms. Within this process, the department should facilitate information sharing for producers who want to comply but might not have the requisite knowledge or experience. If those new requirements do not work because of the characteristics of the operation's location, the department should have a process for discussing re-siting the operation in a more suitable location, if possible for that type of lease or permit. The department should maintain the authority to revoke the lease or permit, but this power should be reserved for more egregious or irremediable cases or cases that exhausted less harsh options.

States should consider implementing a reward system for operations that comply with or exceed the state's environmental protection requirements. This system could include a streamlined extension of the size or duration of the lease or permit.

### *3. Technology, Research, and Development*

Technological and scientific advances in aquaculture will be crucial in continuing to diminish the environmental effects of aquaculture. California, North Carolina, Maine, and many other states have university research centers and programs dedicated to aquaculture.<sup>286</sup> Research centers, groups, and associations also support aquaculture development and information sharing.<sup>287</sup> These entities have made many advances in decreasing the environmental effects of aquaculture.<sup>288</sup> There is much room for continued progress, and these

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<sup>286</sup> See, e.g., *Aquaculture Research Institute*, UNIV. OF ME., *supra* note 13; *Aquaculture Extension*, N.C. STATE UNIV., <http://www.ces.ncsu.edu/nreos/wild/aquaculture/> (last visited Dec. 12, 2013); *Welcome to California Aquaculture*, UNIV. OF CAL. DAVIS, <http://aqua.ucdavis.edu/> (last visited Dec. 12, 2013).

<sup>287</sup> See, e.g., *Harry K. Dupree Stuttgart National Aquaculture Research Center*, AGRIC. RESEARCH CTR., U.S. DEP'T OF AGRIC., [http://www.ars.usda.gov/main/site\\_main.htm?modecode=62-25-10-00](http://www.ars.usda.gov/main/site_main.htm?modecode=62-25-10-00) (last visited Dec. 12, 2013); N.C. AQUACULTURE ASS'N, <http://www.ncagr.gov/markets/aquaculture/ncaa.html> (last visited Dec. 12, 2013); CAL. AQUACULTURE ASS'N, <http://www.caaquaculture.org/> (last visited Dec. 12, 2013); ME. AQUACULTURE ASS'N, <http://www.maineaquaculture.com/Welcome/welcome.html> (last visited Dec. 12, 2013).

<sup>288</sup> See, for example, *Research Programs and Projects at This Location*, AGRIC. RESEARCH SERV., U.S. DEP'T OF AGRIC., *supra* note 13 for a sample of latest research at the Stuttgart National Aquaculture Research Center that decreases

groups should be supported so they can continue to make aquaculture a cleaner and less environmentally intensive industry.

## V. CONCLUSION

The current state of fish production and consumption in the United States is unsustainable and unsafe. Most of the fish that is consumed in the United States is imported.<sup>289</sup> Most of these imports come from Asian countries, mainly China.<sup>290</sup> The conditions that Asian-raised fish are raised in are far below the standards required in the United States.<sup>291</sup> This results in much of the imported fish being tainted with residues of drugs that are illegal to use in fish production in the United States.<sup>292</sup> Unfortunately, the FDA is only able to inspect a small fraction of the fish that is imported, and thus, much of the fish that is consumed in the United States is likely tainted with a drug that was banned in the United States due to its carcinogenic, allergenic, or antibiotic-resistant nature.<sup>293</sup> Seafood imports have also created a \$11.2 billion trade deficit and threaten the health of the domestic seafood industry.<sup>294</sup>

Increasing domestic aquaculture production is an important part of the solution to the problems with importing seafood, as wild fisheries cannot fully support the United States' seafood demand. However, aquaculture's regulatory framework in the United States is overly onerous. Federal regulations are numerous and sometimes inappropriately prohibitive for marine and land-based aquaculture. On top of federal regulations, each state has its own leasing and/or permitting process.

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aquaculture's negative environmental effects. Other research institutes have programs with a direct focus on sustainable aquaculture. ARI Research – Sustainable Aquaculture Research Program, Univ. of Me.,

<http://umaine.edu/aquaculture/aquaculture-research-institute-projects/sustainable-aquaculture-research-program/> (last visited Dec. 12, 2013).

<sup>289</sup> Aquaculture in the United States, NOAA Fisheries Serv., *supra* note 8.

<sup>290</sup> U.S. Food Imports: Value of U.S. Food Imports: Fish and Shellfish, Econ. Research Serv., U.S. Dep't of Agric., *supra* note 16.

<sup>291</sup> Food & Water Watch, *supra* note 9; Liu, *supra* note 9, at 300-03.

<sup>292</sup> U.S. Gov't Accountability Office, *supra* note 10, at 21; Estabrook, *supra* note 40, at 3; State Seafood Testing Programs, SOUTHERN SHRIMP ALLIANCE, *supra* note 52.

<sup>293</sup> U.S. Gov't Accountability Office, *supra* note 10, at 10.

<sup>294</sup> *Aquaculture in the United States*, NOAA FISHERIES SERV., *supra* note 8; Estabrook, *supra* note 40, at 3.

Because of aquaculture's potentially detrimental effects on the environment, it will be important for states to balance environmental protection with aquaculture business interests when building the aquaculture industry in the United States. Practices in some states have shown that this balance is possible, and the key may be to offer a variety of lease or permit types, create a process for appropriately siting aquaculture operations, and implement an iterative process for evaluating the environmental effects of an operation during the lease or permit.

These reforms and building an industry certainly will not be easy. However, as long as seafood consumption trends in the United States stay stable or increase, enabling reforms are necessary to decrease our dependence on unsafe imports and support a domestic industry.

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