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CENTER *for* A LIVABLE FUTURE

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Senator Roger Wicker
555 Dirksen Senate Office Building
Washington, DC 20510

Senator Marco Rubio
284 Russell Senate Office Building
Washington, DC 20510

Disclaimer: The opinions expressed herein are our own and do not necessarily reflect the views of The Johns Hopkins University.

RE: Senate Bill 3138: The "Advancing the Quality and Understanding of American Aquaculture Act" or "AQUAA Act"

Dear Senators Wicker and Rubio,

We are researchers at The Johns Hopkins Center for a Livable Future, based at the Bloomberg School of Public Health in the Department of Environmental Health and Engineering. The Center engages in research, policy analysis, education, and other activities guided by an ecologic perspective that diet, food production, the environment, and public health are interwoven elements of a complex system.

We are writing to share our concerns and provide pertinent information regarding Senate Bill 3138, the "Advancing the Quality and Understanding of American Aquaculture Act" or the "AQUAA Act." Aquaculture, or farmed seafood, plays an important and growing role in our global food system, providing more than half of the seafood consumed globally,[1] and there are potential economic opportunities and benefits for nutrition and sustainability associated with expansion of some types of aquaculture. At the same time, robust oversight of aquaculture operations is needed to minimize negative impacts on ecosystems and public health.

The AQUAA Act aims to establish a regulatory system and permitting process for offshore aquaculture in the Exclusive Economic Zone (i.e., federal waters) and fund research and development to advance the aquaculture industry. Offshore aquaculture operations may produce molluscan shellfish (e.g., oysters, mussels, clams, and scallops), seaweed (e.g., kelp, nori), and/or fish. Molluscan shellfish and aquatic plants have fewer potential environmental impacts compared to fish because they do not require feed inputs or receive disease treatments in open water. They also take up nutrients, such as nitrogen and carbon, from the water column.

Fish production in coastal or nearshore waters poses additional challenges compared to seaweed and molluscan aquaculture, and moving fish production to an offshore setting involves a developing type of

aquaculture that is not fully characterized. Although over half of the seafood consumed globally is farmed, fish farmed in marine settings contributes 8% of farmed seafood (excluding plants) and almost all of this production currently takes place in coastal settings.[1] Ongoing challenges in coastal fish production include fish escapes, disease transfer among farmed and wild fish, use of veterinary drugs to treat infectious dieseases in farmed fish, and release of fish waste into the environment; additional details on these problems are provided below. The environmental and public health risks associated with coastal fish production are likely transferable in some ways to offshore aquaculture. It is critical that expansion of the aquaculture industry to offshore waters be accompanied by comprehensive, robust, and transparent oversight to address uncertainty and prepare for unforseen challenges that will need to be addressed by regulators and the industry.

Coastal Fish Production: Ongoing Challenges

The following section provides information about pressing challenges in coastal fish production that are highly relevant to the emerging offshore fish aquaculture industry. For a full summary of these issues, please refer to our 2018 Science Brief: *Ecosystem and Public Health Risks from Nearshore and Offshore Finfish Aquaculture*.[2] We provided similar information in a comment submitted to the National Oceanic and Atmospheric Administration (NOAA) in 2014 regarding the proposed Fishery Management Plan for Regulating Offshore Marine Aquaculture in the Gulf of Mexico.[3]

Occupational Health and Safety

Working in the near- or offshore aquaculture industry (including molluscan shellfish and seaweed production) incorporates elements from multiple occupational fields, including agriculture, commercial fishing, and commercial diving, all of which have high rates of injury, illness, and death for workers.[4,5] In general, occupational risks for aquaculture workers in various settings include electrical shock; drowning; slips; trips; falls; sprains and strains; machinery-related accidents; fires; explosions; and exposure to chemicals, infectious pathogens, and veterinary drugs.[4,5] Offshore aquaculture workers may face increased risk for accidents resulting in injuries or deaths compared to onshore aquaculture workers due to the challenging setting. Recent research in Norway and Australia found elevated rates of injuries among aquaculture workers compared to other industries.[6,7] Despite the unique combination of risks these workers face, countries, including the United States (U.S.), continue to rely on existing laws that do not adequately protect aquaculture workers rather than passing new regulations specific to these challenges.[8,9] In a 2014 analysis of U.S. policies, we identified a critical regulatory gap for occupational safety and health for aquaculture workers in federal waters. We found that the federal Occupational Safety and Health Act does not apply to offshore aquaculture operations in federal waters due to limitations in jurisdictional authority.[10]

Fish Escapes

Farmed fish escapes remain a perpetual issue for coastal fish aquaculture in the U.S. and abroad. Several million farmed fish escape net pens across the globe every year, with significant economic losses to producers.[11] Large escapes have been documented in recent years in Europe and Canada,[11,12] and in August 2017, approximately 160,000 farmed Atlantic salmon escaped from net pens in Washington State.[13] The success rate of catching escaped fish and returning them to the farm are very low, averaging around 8% according to one study.[14] These farm escapes can pose ecological risks in the short- and long-term when escaped fish compete for food or resources with wild populations, and/or establish a population in the wild on their own or by breeding with wild fish.[15,16]

Disease Pressures and Treatments

Disease burden associated with parasites, bacteria, and viruses is a significant consideration for the aquaculture industry, with the associated economic losses related to disease treatment and the culling of sick or dead fish, and also for wild fish populations. Diease outbreaks on near- and offshore aquaculture operations can spread to wild fish populations, and vice-versa.[17] Veterinary drugs, including antibiotics and antiparasitics, and their residues have been found in surrounding ecosystems.[18,19] Many producers have used vaccines to prevent specific diseases and reduce the need for antibiotics. Norway, the world's largest producer of farmed salmon, is an example of a country that has utilized vaccines and other methods to reduce their use of antibiotics. At the same time, the salmon industry in Norway and other countries have a significant and ongoing problem with sea lice, a parasite.[20,21] Sea lice infestations have resulted in rising production costs due to mortalities and the cost of antiparasitic treatments, and treatments have led to wide-spread resistance among sea lice. In 2016, the Norwegian salmon industry experienced a 19% mortality rate in net-pens, mostly due to sea lice and other diseases.[22]

Fish Waste

There is no system for collecting and managing animal waste from net-pens and cages in near- and offshore fish aquaculture. Instead, farms are ideally sited in areas with water flow that disperses fish waste. In some cases, fish waste accumulates in sediment below net pens and cages. Fish waste contributes nutrients into the surrounding environment; in 2010, marine fish aquaculture waste was estimated to contain 345 million kg of nitrogen and 50 million kg of phosphorus.[23] If concentrated in a water body, this nutrient loading can cause algal blooms, which lead to low oxygen levels and a 'dead zone' that kills fish and other marine animals.

These public health and environmental risks must be taken into account when considering establishment of this industry, and any development must be pursued in a careful manner with a high level of oversight and transparency.

The AQUAA Act places lead regulatory authority of offshore aquaculture with NOAA, within the U.S. Department of Commerce. Importantly, NOAA and the Commerce Department have explicitly stated goals to establish and grow marine aquaculture (i.e., coastal and offshore).[*24,25] This regulatory structure could result in prioritization of industry expansion over protection of the environment and public health. The appearance of conflict of interest presented by these stated goals highlights the need to assign lead regulatory authority to another agency.

We should learn from experiences in other countries. Canada is the fourth largest producer of farmed salmon, and the Canadian Department of Fisheries and Oceans (DFO) has regulated aquaculture and also worked to support industry growth. A commission examined the country's aquaculture industry in recent years as part of an inquiry into a decades-long decline of sockeye salmon in the Fraser River, and the final recommendations included 13 focused on aquaculture. One recommendation called for a complete separation of industry regulation and promotion,[26] and DFO has begun to meet the directive.[27]

[*] NOAA has the specific goal of growing marine aquaculture 50% by 2020, and the Department of Commerce's 2018-2020 Strategic Plan includes a specific objective, Strategic Objective 2.1, to increase aquaculture production with a focus on marine aquaculture.

Recommendations for the AQUAA Act

As written, the AQUAA Act lacks an appropriate framework or regulatory structure needed to prevent, monitor, and respond to the issues we describe above. Below, we offer recommendations for strengthening the proposed regulatory system for the offshore aquaculture industry in the U.S.

- Identify an agency to oversee safety and health for offshore aquaculture workers, and provide adequate resources to support efforts to i) monitor safety and health and ii) develop and deliver safety training for the industry. Develop a robust set of requirements for reporting of injuries, illnesses, and deaths to support surveillance. Data should also be reported to the Occupational Safety and Health Administration, and information should be accessible to researchers, with aggregated reports released annually.
- Increase requirements for monitoring and reporting to include monthly reports of fish stocking, fish biomass, feed use, veterinary drug use, escapes, and diseases. All information should be posted by regulatory agencies on a website accessible to the public.
- Require active environmental monitoring systems that test for fish pathogens, escaped farmed fish, nutrient loading, veterinary drugs, and drug resistant microorganisms in fish tissue and sediment samples. The monitoring system should be fulfilled by trained agency staff with cooperation from industry staff. This system should also incorporate assessments of specific regional impacts and pathways for remediation if all individual permitted sites are in compliance but problems are still present.
- Set limits in each category of environmental impact that, if exceeded, result in increased monitoring, penalties, and termination of permits.
- Develop specific requirements for adoption of new best management practices that will be developed while the operation is permitted. This is especially critical if the proposed permit duration of 25 years in the AQUAA Act is retained. Best management practices can include technology, equipment, husbandry practices, disease treatments, and other production practices.
- For fish, limit acceptable species to native, non-genetically engineered species to reduce negative impacts resulting from fish escapes.
- Separate federal regulatory efforts from aquaculture industry promotion to reduce potential conflicts of interest. Identify and charge another regulatory body with oversight responsibility and authority.

Thank you for considering our comments. Our oceans are a critical, shared resource and must be protected. To set the parameters for an offshore aquaculture industry in U.S. ocean waters that is highly sustainable and accountable, the AQUAA Act should set high standards at this important stage. We welcome the opportunity to discuss this further and answer any questions you many have. Please contact us at (410) 223-1811 or by emailing Dr. Jillian Fry, Director, Seafood, Public Health & Food Systems Project, at JFry3@jhu.edu.

Sincerely,

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