U.S. Senate Committee on Commerce, Science and Transportation
Growing the future: opportunities to support domestic seafood through aquaculture
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Mr. Chairman and members of the Committee, thank you for inviting me to testify before you today. For the record, I am Dr. Kelly Lucas – Director of the Thad Cochran Marine Aquaculture Center (TCMAC)-University of Southern Mississippi – Ocean Springs. The Center includes approximately 100,000 square feet of culture space devoted to environmentally responsible and economically feasible marine aquaculture. Our research focuses on alleviating the bottlenecks that constrain the production of marine species. We work with government and industry to address research that will advance sustainable aquaculture on land and in coastal and marine environments. Prior to my appointment at USM, I was chief scientific officer for the Mississippi Department of Marine Resources, the state agency with regulatory authority for managing and conserving coastal and marine resources. My testimony will provide both a science and management perspective.

The United States imports over 90% of our seafood and half the imports are aquaculture products. We have a $14 billion-dollar seafood trade deficit. With a growing demand for seafood and static wild capture fisheries since the 1990s, aquaculture must continue to grow to meet increasing demand. While the United States has seen an increase in aquaculture production, mostly in land-based operations or in sheltered nearshore waters, we remain a minor producer. Nevertheless, we are a major supplier and exporter of equipment, feed and advanced technology. We have a choice. We can continue to source new seafood supply from abroad or we can use our expertise to develop the domestic capacity to supply our needs. There is a risk in continuing to source aquaculture products from abroad. Several of the major producer countries do not have the environmental standards we have in the United States and they do not have robust disease management regulations. Further, they tend to lack transparency which creates easy avenues for fraud and quality issues. New supply is also often from countries with political uncertainty or geopolitical instability that can threaten the supply chain and create food insecurity. Importantly, sourcing from other countries means the United States misses out on the opportunity to create jobs that generate wealth in our communities and provide safe, local, sustainable, seafood products.

Opportunities:
There is growing consensus among scientists, resource managers and industry that diversification of aquaculture to include offshore farming could expand our capacity for local, safe, seafood production. Even some environmental groups have expressed interest in the potential for aquaculture to supply a healthier protein with less impact than that from other animal sources. This is not to say that there is no opposition to aquaculture. However, public engagement and outreach on advances in aquaculture can help educate consumers and address concerns. By siting aquaculture farms away from sensitive habitats in deep waters with adequate currents the potential for pollution is reduced. Improved materials

for containment and remote sensing technology has decreased the likelihood of fish escapement. Remotely controlled feeding and observation systems have helped create a mechanism for reducing over-feeding and improved feeds have reduced the reliance on forage fish.

The economic success of sustainable commercial operations abroad and in Hawaii, Maine and New Hampshire have created a renewed optimism for offshore commercial development. Coastal communities are recognizing that aquaculture presents a sustainable business alternative. These communities have the infrastructure such as boats, processing plants, seafood markets and working waterfronts to help support operations and aquaculture can consistently supply products to keep these businesses operating. Other businesses, such a feed suppliers, equipment companies and repair shops also grow in these communities. Several offshore aquaculture operations use advanced remote sensing, unmanned systems and artificial intelligence. This sector of the blue economy would also expand to meet industry needs.

Businesses need regulatory certainty to reduce the risk of investment. Regulatory uncertainty has been widely mentioned as a major barrier to offshore aquaculture. The Gulf of Mexico Fishery Management Plan for Aquaculture in the Gulf of Mexico (Gulf Rule) published in January of 2016. The plan established a regional permitting process to manage offshore aquaculture in an environmentally sustainable manner and NOAA worked with federal permitting agencies to create a coordinated permit process. The estimated cost for engineering, siting and environmental assessment to permit a commercial structure under the Gulf rule has been estimated at $1 million dollars. However, investors expressed concerns regarding the time, actual cost and uncertainty of permit approval. Additional industry concerns of the Gulf Rule relate to permit duration, size of restricted zones around permitted areas and community acceptance. The day the Gulf Rule was announced several groups filed a lawsuit challenging NOAA's authority for permitting aquaculture under the 2007 Magnuson-Stevens Act. There is a concern that the Magnuson-Stevens Act is not the right tool to regulate aquaculture. Offshore aquaculture legislation could provide more certainty for permitting and management of aquaculture operations.

Opportunities also exist for the growth of land-based and near-shore aquaculture. Land-based aquaculture in recirculating closed loop systems is advantageous for numerous reasons. Land-based, recirculating systems provide a controlled environment that allows year round production, increased biosecurity that reduces the occurrence and spread of disease, and the capability for reusing and recycling water to decrease the waste and increase sustainability. Because such systems are self-contained and decoupled from a water source, they can be located almost anywhere near the markets they serve where they create local jobs and supply safe, fresh, local, seafood for consumers. Near-shore aquaculture in the United States also has been increasing. Shellfish aquaculture has expanded into new geographic areas and production has increased significantly along coastal shorelines. Seaweed aquaculture has been increasing in several regions of the United States. Growth of near-shore finfish operations also has occurred in regions with nearshore water-depths sufficient to support the structures. Diversification of seafood products through systems, species and location will help build a more resilient industry and will help increase production to meet demand.

Challenges and Needs:

For the aquaculture industry to be successful on a scale necessary to meet demand, there are things that still need to be addressed. Although we have made advancements in fish feed and have reduced reliance on forage fish, we should continue to identify alternative sustainable feeds for large-scale aquaculture. Improvements in net and cage technology have decreased chances of escapes; however, we can continue to improve containment systems with new materials and remote monitoring technology. Unmanned systems and artificial intelligence can aid operators in tasks such as cleaning cages, feeding fish and detecting potential problems. This technology decreases reliance on divers and helps improve safety of operations. Continued use of these systems could further improve safety, provide for more timely and accurate assessments, and potentially decrease cost. The development of hatchery capacity and refinement of culture techniques is vital to industry development. Commercial operators need a reliable and consistent source of disease-free larval fish from documented broodstock. Whereas some larval fish species can be reliably supplied, many other species that are high value and fast-growing lack sufficient research development. Other challenges for hatcheries include a shortage of customers to purchase fish and keep the hatchery operating while waiting on domestic industry development. The use of selective breeding as a tool to increase production is far behind the plant and farm animal industries. Selective breeding of fish with higher growth rates can generally be completed in less time than breeding of farm animals. Fish convert feed to meat more efficiently than terrestrial animals and the ability to produce a steady fish supply can meet the increasing demand for protein. Fish health management is also critical to increasing aquaculture production. For some species raised in re-circulating systems or pond culture disease has been well studied and management for prevention has been important for success. Domestication of new species and offshore culture will require monitoring and adaptive health management plans to reduce disease and outbreaks.

Supporting aquaculture development by mechanisms similar to those used to support agriculture can help industry grow. The agriculture industry grew vastly from public support of research occurring at universities, state and federal laboratories and research stations spread across the nation to bring techniques directly to farmers. Aquaculture can benefit from a similar approach of competitive peer-reviewed based research funding and extension funding to advance research and development. Advancement of aquaculture, especially selective breeding, health management and culture techniques can take multiple years for significant gains and long-term funding programs will be critical to success. Public and private partnerships also will be important to help address industry needs, promote industry growth and successfully transfer technology and techniques.

Concluding Remarks:

I appreciate the opportunity to testify before this Committee regarding aquaculture. I believe the time is now for the United States to become more self-reliant in the production of seafood. We can create jobs and reduce the seafood trade deficit while supplying safe, local, sustainable, seafood. Diversification of aquaculture production in addition to commercial fishing can help supply seafood to help meet the growing demand. Government, universities and industry working together can help create regulatory certainty, address research needs and advance sustainable aquaculture.