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**LEGISLATIVE HEARING ON OFFSHORE AQUACULTURE
BEFORE THE
NATIONAL OCEAN POLICY STUDY SUBCOMMITTEE OF THE
COMMERCE, SCIENCE AND TRANSPORTATION COMMITTEE
U.S. SENATE**

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Chairman Sununu and members of the Subcommittee, good morning and thank you for the invitation to testify on behalf of the Administration on S. 1195, the *National Offshore Aquaculture Act of 2005*. My name is Tim Keeney, and I am the Deputy Assistant Secretary for Oceans and Atmosphere at the National Oceanic and Atmospheric Administration (NOAA), within the Department of Commerce.

My testimony today will address the opportunities and challenges posed by offshore aquaculture and the Federal Government's role in setting the stage for more robust commercial production of cultured seafood. We believe the development of the domestic marine aquaculture industry in the United States is essential to meet the growing demand for seafood.

Right now, the United States imports over 70 percent of our seafood and half of those imports are products of aquaculture. This bill presents a rare opportunity for the United States to become more self-sufficient in the production of healthy seafood by growing more of it here at home. This bill will also lay the foundation for creating more jobs in coastal communities, and for reducing our nearly \$8 billion seafood trade deficit. The United States must develop aquaculture as a complement to commercial fishing because both are needed to produce seafood to meet the growing demand. Now is the time for us to be bold and decisive, to look to the future and to develop offshore aquaculture.

The National Offshore Aquaculture Act is a Starting Point

On April 6th, Dr. Bill Hogarth, the Assistant Administrator for Fisheries at NOAA, testified before this Subcommittee and emphasized that NOAA considers S. 1195 to be a starting point. I want to underscore that point again today. The Administration believes that S. 1195 maps out a careful and inclusive process to establish a regulatory structure for offshore aquaculture. NOAA would like to work with the Committee to address the amendments and concerns about the bill. We want to help clarify language regarding environmental requirements, including the need to provide for public comment and to consider risks and impacts, including cumulative impacts. Our goal is to work with you and our stakeholders to create an opportunity for aquaculture in federal waters so we can ensure that the industry develops in a predictable, environmentally compatible, and sustainable manner in conjunction with our wild harvest. We also want to ensure other top priorities, including the protection of the marine environment, the rights of other users of marine resources, and human health and safety.

Of the many challenges faced, regulatory uncertainty is widely acknowledged as the major barrier to the development of offshore aquaculture in the United States. S. 1195 will provide regulatory certainty, which is important to the offshore aquaculture industry as well as to those who are concerned about the potential impacts of offshore aquaculture. Business needs regulatory certainty to make sound investment decisions and obtain financing. Those concerned about the impacts of offshore aquaculture need to know the industry will be held to strict environmental standards.

Enactment of S. 1195 would authorize the Department of Commerce to directly regulate aquaculture in federal waters, and to establish a coordinated permitting process among federal agencies. We envision a one-stop regulatory shop, coordinated by NOAA, and integrated into NOAA's environmental stewardship responsibilities. Action on S. 1195 will allow us to begin a public rulemaking process to produce a comprehensive, environmentally sound permitting and regulatory program for aquaculture in federal waters, as we committed to do as part of the *U.S. Ocean Action Plan*.

S. 1195 will:

- Authorize the Secretary of Commerce to issue offshore aquaculture permits and to establish environmental requirements where existing requirements under current law are inadequate;
- Stipulate that aquaculture will not be subject to fishing regulations that restrict size, season, and harvest methods;
- Require the Secretary of Commerce to work with other federal agencies to develop and implement a coordinated permitting process for aquaculture in federal waters. This includes the authority to require that development proceeds in an environmentally responsible manner that protects wild stocks and the quality of offshore ecosystems and is compatible with other uses;
- Establish a research and development program in support of offshore aquaculture; and
- Provide for enforcement of the Act, its implementing regulations, and the terms and conditions of any permits issued under the Act.

The bill will not supersede existing laws such as those concerning navigation, offshore structures, management of fisheries, environmental quality, protected resources, and coastal zone management. The implementation of the offshore aquaculture bill will complement NOAA's management and research responsibilities over wild fisheries and resolve some of the challenges the agency has faced trying to manage existing aquaculture under laws, regulations, and fishery management plans written for wild harvest fisheries.

Once a bill is enacted, NOAA envisions that a substantial role for the Regional Fishery Management Councils will evolve as part of the rulemaking process. A well-defined

consultation process for the Councils will be integral to the success of the permitting process for aquaculture in federal waters.

Under S. 1195, NOAA would consult with the Councils in the development of regulations, in the establishment of environmental and other requirements (especially as they relate to interactions with wild stocks managed by the Councils), and in the review of individual permit applications. Councils may also help identify areas of the U.S. Exclusive Economic Zone (EEZ) where offshore aquaculture would be least likely to interfere with known fishing activities and other managed areas offshore.

Aquaculture is an Important Opportunity for U.S. Coastal Communities

By enacting legislation to allow the development of an offshore aquaculture industry in the United States, we are creating opportunities for coastal communities struggling with issues of overcapitalization and limited harvests in commercial fishing. With a more robust domestic aquaculture industry, boats used for fishing could also service aquaculture operations. Similarly, seafood industry infrastructure could process and distribute both cultured and wild harvest fishery products. Domestic aquaculture could provide a steady, year-round source of product and, in some locations, it could prevent processing facilities from closing down altogether due to insufficient harvest from wild fisheries.

Aquaculture, like agriculture, requires inputs of goods and services from many sources, while its outputs are processed into value-added offerings. Beneficiaries include owners and employees of aquaculture businesses, equipment suppliers, boat owners and operators, feed ingredient suppliers (e.g., soybean farmers and fishermen who supply fishmeal), feed manufacturers, seafood processors, and transportation and distribution companies. Other opportunities include sales, marketing, and accounting services. In turn, these activities benefit the coastal communities in which these businesses operate. And, of course, the public will eat seafood and benefit from its health attributes.

The successes of aquaculture-related businesses to date have demonstrated direct economic benefits from an increase in domestic aquaculture production, including offshore. More and more communities are recognizing that aquaculture presents a sustainable alternative for areas hit hard by job losses, natural disasters, or other challenges. As interest grows, these communities are beginning to integrate aquaculture into their economies. For example, NOAA research and technology on the culture of oysters, mussels, clams, hybrid striped bass, offshore shrimp, abalone, moi, cobia, salmon, and crayfish has helped build annual aquaculture production in the United States to an industry worth over \$150 million a year. One highlight is the Hawaiian Islands, where Sea Grant estimates the number of aquaculture enterprises is up to 126 farms valued at \$25.2 million supporting approximately 630 jobs.

Preliminary NOAA economic assessments indicate that the development and expansion of offshore aquaculture in the United States federal waters could also significantly contribute to job creation. Preliminary production estimates indicate that domestic aquaculture production of all species could increase to 1 million tons per year by 2025. The additional production could include 760,000 tons from finfish aquaculture, 47,000 tons from crustacean production, and

245,000 tons from mollusk production. Of the 760,000 tons of finfish aquaculture, 590,000 tons could come from marine finfish aquaculture.

Aquaculture and Commercial and Recreational Marine Fisheries

NOAA is currently studying the economics of offshore aquaculture as it relates to commercial and sport fishing, market opportunities, global trends, underused processing capabilities, value-added niche markets, and coastal job development. The report, which will be available in late 2006, is the next step toward anticipating and then designing a strategy to address the socioeconomic questions associated with aquaculture production.

Although NOAA is certain benefits will result from the bill, the agency must consider its potential impacts as well, including the impact on our nation's commercial fisheries. Some have expressed concern that offshore aquaculture will hurt wild harvest in the United States. If aquaculture is managed correctly, we do not believe wild harvest will be affected.

Aquaculture products, whether imported or domestic, compete with wild-caught fisheries. And this competition will exist with or without domestic aquaculture. We live in a global market and demand for seafood products is growing. The United States cannot meet that demand through wild-caught fishing activities alone. Seafood imports and other forms of protein, such as beef and chicken, already provide significant competition. Over 70 percent of the seafood Americans consume annually is imported, and half of those imports come from foreign aquaculture operations. The challenge is to integrate aquaculture into domestic seafood production so that our boat owners, fishermen, processors, and marketing companies can benefit directly.

Recreational and commercial fishing will also benefit from hatcheries and stock enhancement techniques developed for offshore aquaculture. Currently, U.S. hatcheries grow finfish and shellfish to enhance recreational and commercial fishing stocks with great success. For example, recreational fishermen in Southern California and the Hubbs–SeaWorld Research Institute are cooperating on a white seabass restocking program. This excellent program helped rebuild and sustain the valuable recreational fishery for seabass in California.

The United States needs a strong commercial fishing industry and a robust aquaculture industry to meet projected seafood demand and supply the nation's stock enhancement needs. While we look for aquaculture to help meet demand, NOAA will continue to assist wild-capture fisheries with management programs, stock enhancement, and marketing to channel wild-capture products to high-valued premium market outlets. But we also need to supply that vast middle market that demands a year-round supply of affordable, healthy, and safe seafood. We can do this through domestic aquaculture.

Preparing for Offshore Aquaculture in the United States

The socioeconomic issues and environmental impacts associated with aquaculture are not new. NOAA and other federal agency partners have been working to address them for the past 30 years by funding cutting-edge research and technology development. In addition to this work, NOAA has been preparing for offshore aquaculture for the past 10 years. NOAA is currently:

- Designing environmental risk management guidelines for aquaculture, as highlighted in a recently published NOAA technical memo (Guidelines for Ecological Risk Assessment of Offshore Fish Aquaculture [NOAA Technical Memorandum NMFS-NWFSC-71]);
- Analyzing the economics of offshore aquaculture;
- Outlining regulatory steps to be taken if legislation is passed;
- Consulting with communities and businesses; and
- Examining aquaculture's role in ecosystem management with an international group of experts.

With leadership and foresight provided by NOAA through the National Marine Aquaculture Initiative's competitive grants program, the United States has invested over \$10 million in offshore aquaculture research. The resulting technology is in use in commercial applications in Hawaii, Puerto Rico, and New Hampshire. All of these operations involve some combination of U.S. investors, including coastal fishermen, university scientists, and local processing, hatchery, feed, and equipment supply companies.

Environmental Standards

Also central to the *National Offshore Aquaculture Act* is the authority to establish rigorous environmental standards. For example, S. 1195 authorizes regulations or permit conditions to avoid, minimize, or mitigate unacceptable impacts. The bill also authorizes emergency actions to address unanticipated impacts in a timely manner. S. 1195 does not override or preempt existing laws to protect the offshore environment, wild stocks, endangered species, marine mammals, and habitat.

Thirty years of improvements to marine finfish aquaculture practices in the United States and abroad have shown that many problems can be prevented by continuous technological innovation, best management practices, careful species selection, and proper site selection. Today's aquaculture cages, pens, and anchoring systems are more durable and have dramatically reduced the number of escaped fish. We expect these types of technological innovations will continue to develop.

Best Management Practices

Best management practices have also been developed and refined over time to ensure that aquaculture operations minimize risk and operate safely and securely. Some standard management practices used today to reduce or mitigate the risks associated with aquaculture include:

- Regular inspections by divers to ensure the integrity of nets and net infrastructure;
- Cameras and surveillance to monitor efficient use of feed, which reduces discharges of uneaten feed into the marine environment;
- Regular health inspections to prevent disease; and
- Comprehensive sanitary and bio-security programs to prevent the introduction and/or spread of pests or diseases from one farm site or cage to another or into the marine environment.

Species Selection

Another key environmental safeguard is species selection, which is one of the most effective techniques available to reduce the impact of escapes. NOAA and other agencies have over 30 years of experience in stock enhancement research and programs to support commercial and recreational fisheries. The knowledge gained from these programs will allow managers to design safeguards for conserving wild stocks.

All of the open ocean aquaculture efforts currently in the United States involve species native to the region in which the demonstration project or commercial operation is located. For example, the University of New Hampshire's Open Ocean Aquaculture project raises blue mussels, cod, haddock, and halibut—all native to the Northeast. The open ocean operations in Hawaii raise Pacific threadfin and yellowtail, both native to the islands. With careful broodstock management, selective breeding protocols and technologies, and good management practices to prevent escapes, the culture of indigenous species should present few, if any, risks to wild stocks. Scientific protocols for considering and testing the use of non-native species are also well-established.

Aquaculture operations in coastal waters in the United States have never raised genetically modified fish—another concern often raised in the context of non-native species. The knowledge NOAA and other agencies have gained from existing stock enhancement programs for commercial and recreational fishing—which include deliberate releases of finfish, oysters, and crabs for replenishment—will allow managers to design appropriate safeguards for conserving wild stocks.

Aquatic Animal Health

Comprehensive aquatic animal health programs that include health experts administering vaccines and monitoring aquatic species are also well-established. These programs further reduce the possibility of negative impacts on wild resources by cultured aquatic animals. Because aquatic animal pathogens occur naturally in open waters, and wild marine organisms serve as natural reservoirs for these disease-causing agents, disease outbreaks may occur in both wild and cultured aquatic animals. There is little scientific evidence to link disease episodes in wild populations of fish, caused by endemic pathogens, to cultured animals.

In its work with the U.S. Departments of Agriculture and the Interior and with other federal agencies, NOAA is developing a National Aquatic Animal Health Plan that will provide for safe national and international commerce of aquatic animals and the protection of cultured and wild aquatic animals from foreign pests and diseases. Technological and scientific advances also continue to refine aquatic animal health practices. For example, as a result of scientific advances, the offshore aquaculture industry has largely replaced antibiotics with vaccinations administered before fish are stocked into cages.

Site Selection

NOAA continues to advocate careful site selection as one of the keys to minimizing environmental risk and maximizing environmental benefits of aquaculture—no matter what organism is under culture. Local site characteristics will dictate the proper organism or mix for that site, as all areas do not have the same environmental conditions and concerns. In some

cases, it may be important to encourage a mix of organism types, including cultured finfish, filter feeding mollusks, marine algae, and other species. Applicants and NOAA will seek to provide the maximum benefit with the smallest ecological footprint.

Alternatives to Fishmeal and Fish Oil Developing Quickly

Another area of aquaculture where advancements are being made is in developing alternatives to fishmeal and fish oil for feeds. From a purely economic perspective, feed is a major component of the cost of production in an aquaculture operation. Typically, the cost of feed accounts for over 60 percent of operating costs, so there are strong economic incentives for the industry to help develop suitable alternative ingredients for feed formulas, and to become more efficient in converting feed into product.

Overall, the reliance on fishmeal and fish oil for aquaculture has been significantly reduced based on research advances using plant-based alternatives to fishmeal and fish oil. NOAA plays a vital role in that research. For example, scientists at NOAA's Northwest Fisheries Science Center, along with scientists from other agencies and industry, are developing alternative feed ingredients for cultured species, including finfish. This groundbreaking research—using soybeans, barley, rice, peas, and other crops as alternatives—is expanding in the United States and across the globe.

Other meals such as canola, lupine, wheat gluten, corn gluten, and various plant protein concentrates—many of them grown in the United States—have already been shown to be highly palatable and digestible for fish. As the price of alternative ingredients drops below that of fishmeal, those ingredients will be substituted for fishmeal and fish oil.

Further development of plant-based feeds also represents a huge opportunity for American agriculture, as the United States produces an abundance of high-quality proteins and fats that could be used in fish production. Increased production of high-protein by-products from bio-diesel production, and high-protein and high-fat by-products from ethanol and bio-plastics production, are likely in the future. Feed experts believe these by-product meals will be ideal for fish production.

Although the amount of fishmeal and fish oil in feeds will be reduced as alternative ingredients come online and the cost drops, they likely will not disappear from feed altogether. Research on plant-based oils has found that maintaining some fish oil in fish feed is important to maintain the health benefits to humans of eating marine fish, including the long-chain Omega-3 fatty acids.

Scientists are most concerned about two healthy fatty acids—docosahexinoic acid (DHA) and eicosapentaenoic acid (EPA). These fatty acids are not produced by fish, but fish concentrate them in their fats from the prey they eat. DHA and EPA are made by algae and microorganisms and are passed up the food chain. These organisms can be cultured directly to produce concentrated DHA and EPA. In fact, all the DHA currently used in baby formula in the United States comes from production of micro-algae, not from fish oil. Although it is costly, experiments have shown that a small amount of this concentrated algae oil can be added to vegetable oil to restore the healthy fatty acids in the final product. In addition, other healthy fats, such as the shorter chain Omega 3 fatty acids found in olive and flax oil, can also be incorporated into the cultured fish.

NOAA and other federal agencies are working with industry on research to develop lipid substitutes, such as marine micro-algae production, to reduce reliance on fish and fish oil. The agencies, research institutions, and others will continue to work with grain and feed companies and with feed researchers to find suitable alternatives for fishmeal and fish oil.

Seafood and Human Health

A vexing issue related to seafood, both wild and cultured, is the misinformation related to the health and safety of seafood products. NOAA's mission includes a focus on human health and safety, and NOAA seeks to maintain a positive connection between human health and seafood. Misinformation about the safety of our seafood supply includes published research that has been shown to be inadequate, flawed, or biased. This research continues to be cited, especially by critics of aquaculture. NOAA will take every opportunity to address seafood safety based on the latest, fact-based information from leading scientists, nutritionists, and medical and healthcare professionals.

Peer-reviewed studies, including those presented at the international Seafood & Health Conference co-sponsored by NOAA in December 2005, link seafood consumption to higher intelligence in babies and children, lower heart rates in adults, lower cholesterol, lower blood pressure, and lower body weight. It is clear, based on the facts, that the health benefits of eating seafood far outweigh the risks due to trace-level contaminant exposure. Seafood has been scientifically shown to fight cardiovascular disease, cancer, Alzheimer's disease, and other major illnesses.

Conclusion

Mr. Chairman and members of the Subcommittee, the Department is looking forward to working with you, the public, the fishing and aquaculture industries, and the environmental community to craft a regulatory framework for offshore aquaculture. The U.S. Exclusive Economic Zone is 3.4 million square miles and NOAA is confident there are appropriate sites where aquaculture facilities could operate without compromising the protection of wild stocks, environmental quality, or people's livelihoods. In the long run, U.S. fishing communities will be harmed more by foreign competition than by a robust domestic aquaculture industry. The challenge is to find ways for our domestic fishing industry to benefit from the use of aquaculture technologies to produce additional seafood—as fishermen are doing in some parts of the United States and in other countries.

Offshore aquaculture has great potential to make a significant contribution to our seafood supply and the economy, but this potential will be realized in the United States only if we can provide the regulatory certainty for businesses to make sound investment decisions. S. 1195 will give NOAA the authority it needs to provide that regulatory certainty. I appreciate the opportunity to present the *National Offshore Aquaculture Act of 2005* to you today, and I will be happy to answer any questions.