Changing Tides: Aquaculture

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Message from the Regional Administrator

The current and future role of aquaculture in the U.S. has been a topic at the forefront of many fisheries management conversations this year. With the introduction of the Administration's National Offshore Aquaculture Act of 2007 and increasing attention on seafood quality and sustainability, NOAA Fisheries Service's Northeast Region decided to release a special edition of its external newsletter devoted soley to aquaculture.

Inside, you will find brief discussions on the current state of U.S. aquaculture, the proposed National Offshore Aquaculture Act of 2007, aquaculture and the environment, economic impacts of aquaculture and current aquaculture activities in the Northeast Region.

This special edition newsletter is meant to be an overview of the subject and answer some of your questions about NOAA's activities. If you have additional questions about aquaculture or NOAA's activities, please contact the NOAA Aquaculture Program at 301.713.9079 or visit the website at http://aquaculture.noaa.gov.

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Regional Administrator
NOAA Fisheries Service

Aquaculture: The Basics

What is Aquaculture?

Aquaculture is the propogation and rearing of aquatic organisms in controlled or selected environments for any commercial, recreational or public purpose. Aquaculture, which is commonly referred to as fish and shellfish farming, can take place in raceways, tanks or ponds onshore, in coastal waters and in the open ocean. Different kinds of aquaculture require different equipment, species, techniques and expertise.

What is Offshore Aquaculture?

Offshore aquaculture is aquaculture that would occur in the federally managed area of the ocean off of the coasts of the United States and its territories. This area begins where the state jurisdiction ends (typically 3 nautical miles from the coast) and extends all of the way out to the limit of the U.S. Exclusive Economic Zone (typically 200 nautical miles). The U.S. EEZ is about 3.4 million square miles. Currently, there is no offshore aquculture in the U.S.

Why Do We Need Aquaculture?

As understanding of the health benefits of seafood has increased, demand for seafood for human consumption has increased and is projected to keep growing. To meet that demand, the U.S. currently imports 80% of its seafood, nearly half of which is farmed. With capture fisheries stable or static, any increase in seafood supply will most likely come from aquaculture, either imported or domestic. If that demand is met through increased domestic aquaculture, it will reduce reliance on imports, provide jobs for economically depressed coastal communities and increase regional food supply and security. There is also a continuing need to replenish and restore wild populations of marine shellfish and finfish in the U.S. through hatchery programs, which also use aquaculture techniques to hatch and grow fish and shellfish for release into the wild.

The U.S. needs a strong commerical fishing industry and a robust aquaculture industry that ensures protection of the marine environment and wild stocks while allowing expanded U.S. production of sustainable farmed seafood.

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NOAA Fisheries Service's Activities in the Northeast Region

The Northeast is a major center for research and development for marine finfish and shellfish. Coastal shellfish aquaculture (e.g., clams, mussels and oysters) continues to be viable in the region. Many activities in the region emphaize collaboration and local expertise to assist with technology development which will spur innovation in everything from cage design, to formulation of new effective feeds, to selection of species optimal for farming. Expansion of marine finfish culture will build on lessons learned and best practices.

Aquaculture Activities in Northeast Region States			
State	Number of Farms	Sales ($1000)	Top Species (by value)
Connecticut	30	12,902	hard clam
Delaware	3	1,870	tilapia
Illinois	47	3,176	largemouth bass
Indiana	18	-	striped bass
Maine	50	25,580	Atlantic salmon
Maryland	86	7,292	crab
Massachusetts	157	9,342	oyster
Michigan	34	2,398	trout
Minnesota	77	8,412	baitfish
New Hampshire	10	1,054	trout
New Jersey	87	3,714	hard clam
New York	54	8,913	oyster
Ohio	55	3,185	yellow perch
Pennsylvania	56	8,915	trout
Rhode Island	12	840	oyster
Vermont	9	80	trout
Virginia	147	40,939	hard clam
West Virginia	21	1,145	trout
Wisconsin	84	7,025	baitfish
Total	**1,037**	**146,782**	

NOAA Fisheries Service's Northeast Regional Office Activities

When funds are available, NERO administers grants to support aquaculture related research, management and development. Past projects focused on enhacing oyster and American shad fisheries, restoring overfished stocks through hatchery programs and developing vaccines and medication for cultured Atlantic salmon to control disease outbreaks.

Aquaculture research in federal waters that meets the criteria for scientific research is granted a letter of acknowledgement (LOA) from NOAA Fisheries Service. The LOA indicates this activity can proceed without enforcement action provided it follows a NOAA Fisheries Service approved scientific research plan.

Aquaculture facilities in state waters are permitted through the Army Corps of Engineers (ACOE). NERO is a cooperating federal agency in the ACOE permit process; it comments on habitat impacts of potential ACOE permits. Since the majority of past aquaculture attention has focused on activities in nearshore waters managed by state jurisdictional authorities, NOAA Fisheries Service's increasing role in aquaculture development is especially reliant on learning from past experiences and partnering with state fishery agencies.

Get Involved

The public has a strong role to play in this national effort to expand aquaculture production and in the implementation of the 2007 National Offshore Aquaculture Act (see page 3). For example, if enacted, the regulatory design process will include a strong role for states, fishery management councils, industry, conservation organizations and other interested stakeholders and will focus on specific issues of concern to these groups and others.

The Act will be implemented in a transparent public process. Key stakeholders will have opportunities to provide input in the development of environmental analyses and rulemaking, and there will be public notices of permit applications.

Now Available: The NOAA 10-Year Aquaculture Plan for Marine Aquaculture

The plan's goals are:

- A comprehensive regulatory program for environmentally sustainable marine aquaculture;
- Development of commercial marine aquaculture and replenishment of wild stocks;
- Public understanding of marine aquaculture; and
- Increased collaboration and cooperation with international partners.

To read the plan or learn more about aquaculture, please visit: http://aquaculture.noaa.gov.

The National Offshore Aquaculture Act of 2007

As detailed in other articles in this newsletter, the U.S. needs all types of additional domestic aquaculture production as a complement to commercial fishery production in order to help meet the increasing demand for seafood, reduce the Nation's seafood trade deficit of over $9 billion, and provide jobs and other economic opportunities for coastal communities.

Currently, most domestic aquaculture production is from freshwater species, including catfish, tilapia, and trout. Farmed marine species, such as oysters, clams, and mussels, are about 20% of U.S. farmed production and 1.5% of the overall U.S. seafood supply. The annual seafood consumption in the U.S. is 6 to 7 million tons (wild and farmed species), and experts estimate that the U.S. will need 2 to 4 million tons of additional seafood by 2025 in order to meet demand.

Looking to the future, an important and promising component of additional U.S. seafood production could be aquaculture in federal waters, from 3 to 200 miles from shore. This area of the ocean, also known as the offshore, has great potential for sustainable marine aquaculture for two main reasons – first, there are fewer competing uses further from shore and, second, the deeper water and stronger water flows make it a desirable location for environmental reasons. However, current U.S. law does not provide clear mechanisms to allow commercial aquaculture operations in federal waters. In order to address that uncertainty, the Administration transmitted the National Offshore Aquaculture Act of 2007 (Act) to Congress. The draft bill has since been introduced in the Senate (S. 1609) and in the House of Representatives (H.R. 2010). If enacted, the bill would create a regulatory framework that allows for safe and sustainable aquaculture operations for aquaculture in U.S. federal waters while protecting the marine environment and wild stocks.

Will this type of aquaculture work? While there are no aquaculture facilities currently operating in federal waters, early results from commercial and demonstration farms operating in open ocean conditions in state waters are proving this type of aquaculture will work. Ongoing open ocean operations for finfish in Hawaii and Puerto Rico and a demonstration project for finfish and shellfish in New Hampshire are all showing good results from an environmental and production standpoint.

As mentioned above, the barrier to establishing aquaculture in federal waters is regulatory uncertainty. Currently, there is no clear mechanism for permitting marine aquaculture in federal waters. Without regulatory certainty – one that provides a clear set of operating rules – businesses interested in investing in offshore aquaculture will likely choose to locate their operations outside the U.S.

So, while some existing U.S. laws would apply to an offshore aquaculture operation, they do not address comprehensively all of the issues that need to be considered. If enacted, the Act will establish an overall regulatory structure for offshore aquaculture in the U.S., including the legal framework regarding permits, enforcement, and monitoring of aquaculture in federal waters. The bill would require the Secretary of Commerce (Secretary) to work with other federal agencies to develop and implement a coordinated permitting process for offshore aquaculture. It would authorize the Secretary to issue offshore aquaculture permits and to establish environmental requirements. In addition, the Act would exempt permitted offshore aquaculture from fishing regulations that restrict size, season and harvest methods; authorize a research and development program for all types of marine aquaculture; authorize funding to carry out the Act; and provide for enforcement of the Act.

State Involvement

The Act will complement, not supersede, existing resource management authorities, so it specifically provides for coordination and consultation with other federal agencies, fishery management councils and coastal states. The Act requires coordination with states as part of the permit process and consultations with states in establishing environmental requirements. It does not supercede any other laws, such as the Coastal Zone Management Act, that include a role for states with repect to activities in federal offshore waters. Aquaculture facilities will require support facilities on land, the construction and operation of which will be subject to state and local approvals. The Act specifically includes a provision on the need to consult with state agencies as part of the coordinated

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The National Offshore Aquaculture Act of 2007 will:

Authorize the Secretary of Commerce to issue offshore aquaculture permits.

Require the Secretary to establish environmental requirements.

Require the Secretary to work with other federal agencies to develop and implement a streamlined and coordinated permitting process for offshore aquaculture.

Exempt permitted offshore aquaculture from fishing regulations that restrict size, season and harvest methods.

Authorize the establishment of a research and development program for marine aquaculture.

Authorize funding to carry out the Act and provide for enforcement of the Act.

Aquaculture: The Numbers

When it comes to discussions on aquaculture, it's all about the numbers. How much fish does the U.S. consume each year? Do we have enough fish for people to eat? If not, where will we get it? How much fish will we need in the future as the population grows? Will we have enough fish in the future? What is the economic impact of aquaculture?

Presently, Americans eat an average of 16 pounds of seafood per person, per year. The average per capita consumption varies by country, but globally, the current state of wild stocks is not able to support current demand. To meet that demand, fish are farmed. To meet that demand in the U.S., we import fish, both farmed and wild caught. Of all of the fish consumed in the U.S., 81% are imported and about half of those imports are farmed.

Aquaculture Quick Facts

Present global aquaculture production is nearly 60 million tons, valued at $70 billion.

- o 70% of this is produced in China
- o 22% is from the rest of Asia
- o 2.3% is from Latin America and the Caribbean
- o 1.3% is from North America

U.S. marine aquaculture is 1.5% of U.S. seafood supply.

Global wild harvest is 95 million tons and likely cannot be sustained.

To meet increased demand for seafood, the world will need 40 million tons of aquaculture by 2030.

U.S. marine aquaculture has a $200 million farm-gate or landed value.

Annual U.S. seafood consumption (wild and farmed) is 6-7 million tons.

The U.S. has a $9 billion annual seafood trade deficit.

Seafood Demand Will Increase

Due to the health benefits of seafood, experts recommend an increase in the amount of seafood consumed. If that increase occurs, the demand for fish will increase. As the years pass and the population increases, the seafood demand will grow even more. Based on increased demand and population growth projections in the U.S., we will need to supply an additional 4-6 million metric tons of all types of seafood, wild and farmed, in the year 2025 above and beyond the current 6-7 million tons the U.S. currently consumes annually.

Aquaculture & the Economy

In 2003, the U.S. produced .4 million tons of marine aquaculture. U.S. marine aquaculture production is 20% of a $1 billion U.S. aquaculture industry. If the U.S. can make room for additional aquaculture right here at home, the benefits would include additional economic opportunities, local businesses and job opportunities for boat owners, processors, cold storage, marketing, transport, feed and technology suppliers, and equipment manufacturing. Additional supplies of U.S. farmed seafood will provide a year-round supply of products that meet U.S. standards for safety and environmental quality. The increased business activity will help to maintain working waterfronts and seafood jobs and complement commercial fishing.

The U.S. Seafood Trade Deficit

The U.S. has a $9 billion annual seafood trade deficit. Aside from the economic implications in terms of overall trade balance, there are food security implications related to our dependence on imported seafood. If the U.S. can expand all domestic aquaculture production, including production from offshore waters, the trade deficit could decrease.

The National Offshore Aquaculture Act of 2007 continued...

and streamlined permit process for offshore aquaculture, so states will have a say in decision-making relative to offshore aquaculture permits as well.

Permits

The Act requires a public process of consultations with states, federal agencies, tribes and the public in offshore aquaculture permitting decisions. Other federal agencies will continue to issue permits under applicable laws. Permits issued for offshore aquaculture will last for a discrete amount of time that allows time for an operation to develop, while requiring it to recertify itself through a permit re-application process upon a permit's expiration. Permits will last long enough to provide a return on investment for the permit holder, however, permits may be suspended or revoked.

The Regulatory Design Process

If the Act is passed by Congress, NOAA will follow formal rulemaking procedures to implement the legislation. The process involves public notices, solicitation of public input and public meetings. Announcements will be published in the *Federal Register*. The overall process is projected to take approximately two years. During that time, NOAA will undertake a programmatic environmental impact statement to fulfill its National Environmental Policy Act requirements. No permits will be issued until the regulatory process is completed.

Aquaculture: Environmental Issues

The National Offshore Aquaculture Act of 2007 (Act) includes specific requirements to ensure that offshore aquaculture proceeds in an environmentally responsible manner that protects wild stocks and marine ecosystem quality, and is compatible with other uses of the marine environment. These mandatory environmental requirements are similar to those of U.S. coastal states and other countries including Canada, the European Union and Australia. These requirements must be addressed through rulemaking before any offshore aquaculture permits are issued.

The Act does not list requirements or standards that are already covered by other federal agencies under existing laws (e.g., effluents; use of drugs, chemicals and pesticides; endangered species; marine sanctuaries; and marine mammals). Existing laws will not be superseded by the proposed Act. For example, even though the Act would exempt offshore aquaculture operations from definitions of fishing under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), requirements under MSA relating to essential fish habitat and taking broodstock or juveniles from the wild would continue to apply. Once the Act is passed into law, the Secretary of Commerce (Secretary) is required to consult with other federal agencies and coastal states to identify requirements that are not covered by existing laws and to address these gaps through rulemaking.

In addition to mandatory environmental requirements, the Act requires monitoring of operations, allows the Secretary to modify, suspend or revoke permits, and authorizes emergency action in response to unanticipated impacts.

Monitoring

The Secretary is required to monitor the effects of aquaculture on marine ecosystems and to implement measures necessary to protect the environment including, but not limited to, a temporary or permanent relocation of sites or a moratorium on sites within a prescribed area. Permits may also be suspended or revoked.

Environmental Requirements Must Address:

1. Risks to, and impacts on, natural fish stocks and fisheries, including safeguards to:
   - Conserve genetic resources
   - Prevent or minimize transmission of disease or parasites to wild stocks
   - Prevent escape of marine species that may cause significant environmental harm
2. Risks to, and impacts on, marine ecosystems, water quality, habitat, marine species
3. Cumulative effects
4. Monitoring and reporting
5. Requirement to use species native to the geographic region unless a scientific risk analysis of non-indigenous or genetically modified species shows risk of harm is negligible or can be effectively mitigated.
6. Requirement for record systems to track inventory and movement of farmed fish and, if necessary, for tagging, marking, or otherwise identifying farmed fish.

Research & Technology

Many types of potential impacts can be avoided or minimized through good siting and the use of best management practices in the aquaculture operation. Over the last decade, there has been significant innovation in aquaculture technology, which has led to improvements in equipment and environmental safeguards. The rigorous environmental standards for offshore aquaculture that the Act requires will allow companies to take advantage of technological innovations. In addition, they will provide international leadership by setting good examples of properly sited and sustainably managed aquaculture facilities, while leveling the playing field for U.S. fishery products.

The Act requires the Secretary to conduct collaborative research with the Department of Agriculture to reduce the use of wild fish in aquaculture feeds. The Act also provides authority to the Secretary to take emergency actions to address unanticipated environmental impacts in a timely manner.

The Secretary is authorized to establish a research program on technologies that are compatible with the protection of marine ecosystems. This complements NOAA's work under U.S. and international fishery management laws to ensure wild harvest fisheries are managed sustainably.

The environmental requirements in the Act are consistent with existing federal and state laws, and the recommendations of leading experts. Taken together, the provisions in the Act constitute a cautious approach to the expansion of aquaculture into offshore federal waters.