

# Offshore Aquaculture

In recent years, as more questions have been raised about the sustainability of some forms of coastal fish farming, the aquaculture industry and government agencies in the United States and elsewhere have begun looking to develop aquaculture operations in open ocean waters, including exposed state waters and those of the Exclusive Economic Zone (EEZ), a region of federal waters from the state boundary (usually 3 miles) out to 200 nautical miles offshore. In the United States, no regulatory regime exists for aquaculture in the EEZ and there is much confusion about the permitting, site selection, monitoring, and impacts of offshore aquaculture.

## The Problem

Depending on how it's done and what species are farmed, offshore aquaculture development has the potential to cause many of the same problems as have been caused by some forms of nearshore aquaculture development. These include:

- Pollution from wastes such as particulate matter from fecal material and uneaten food, nutrients, and chemicals and drugs, such as pesticides, disinfectants, and antibiotics.
- Negative impacts on wild populations of fish through escapes of farmed fish and transfer of disease and parasites, as well as negative impacts on other wildlife through entanglements and harassment.
- Dependence on wild fisheries for feed inputs.
- Privatization of the oceans and negative interactions with other stakeholders.

## The Causes

Offshore aquaculture operations are largely following the same model as nearshore fish farming, one of open feedlot style netpen or cage systems. In this type of aquaculture there is no effective barrier between the farmed fish and the natural environment. As a result, waste materials are discharged directly into the surrounding environment and there is potential for escapes of farmed fish as well as negative interactions with wild populations of fish and other wildlife.

Farming carnivorous species of fish can result in a net loss of fish protein since they require a protein-rich, high-energy diet. Commercially prepared feeds are given to these farmed fish, with much of the protein coming from fishmeal and much of the fat coming from fish oil, both obtained from wild fish, such as anchovy, sardine, and mackerel. To produce one ton of farmed carnivorous fish requires several tons of wild fish for feed.

Offshore aquaculture will involve the leasing of sections of the oceans - a public resource - to individuals or corporations, as has happened with offshore oil and gas development. This could potentially lead to further erosion of the public trust in ocean resources and result in conflicts with other stakeholder groups, such as fishers, recreational boaters, and shipping traffic.

## The Context

Under its marine aquaculture initiative, the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) has set targets of \$5 billion worth of aquaculture production, 600,000 jobs, and \$2.5 billion in goods and services by the year 2025. Much of the increased production is expected to come from offshore aquaculture, which has been touted by NOAA as having the potential to provide many benefits, including: stabilization of the trade deficit, creation of employment and economic development, and reduction of pressure on wild fish populations.

The effect of offshore aquaculture development on coastal communities has not been researched, leading to questions about the government's claims of aquaculture as a jobs creator, especially since it will likely be a highly automated industry. In fact, in some areas with salmon farming, while production has increased greatly, employment actually has declined. There is also fear

that an offshore aquaculture industry could have negative impacts on traditional commercial fisheries and the local communities they support.

NOAA has been drafting legislation to promote the development of offshore aquaculture. Among other things, the proposed National Offshore Aquaculture Act will provide streamlined permitting, long-term leases for offshore aquaculture development, and exemption from the Magnuson-Stevens Act, which will allow for foreign investment and leasing of U.S. waters as well as a weakening of fisheries management protections. Congressional introduction of the legislation, which has had little public input, is expected in 2004.

Offshore finfish aquaculture operations most likely will include moored, surface operated systems with semi-submersible and fully submersible cages that are anchored to the bottom, but are accessible from the surface. Offshore farming of shellfish with rafts and longlines has not received much attention from government or industry, though it is potentially more environmentally friendly than raising carnivorous finfish.

In the United States, there are currently no commercial aquaculture operations in the EEZ, though several small-scale research projects are investigating the feasibility of offshore aquaculture. Government and industry research collaborations are developing the technology needed for the industry to expand to open ocean areas including off the coast of the Northeast U.S. and the Gulf of Mexico. Commercial facilities are currently in operation off the coast of Hawaii and Puerto Rico, though neither is located in federal waters.

Industry advocates have promoted offshore aquaculture as a solution to environmental problems in and of itself and claim that strong currents in offshore waters could help dilute pollution. Other than a few studies on small-scale or pilot sites, however, very little research has been conducted on the environmental impacts of offshore aquaculture and little is known about the possible impacts from large-scale commercial facilities.

## Recommendations

Given the lack of understanding of the potential environmental, social, and economic impacts, a precautionary approach is an appropriate guiding principle for future decisions regarding offshore aquaculture.

Many issues should be addressed before offshore aquaculture proceeds, including: discharge of wastes, the amount of wild-caught fish used in feeds for farmed fish, escapement of farmed fish, disease transfer, use of non-native species, marine mammal conflicts, habitat loss, use of chemicals, and conflicts with other uses.

With the potential for expanded development of the EEZ, public participation in policy and regulatory decision making is needed to ensure that environmental, social, and economic impacts are adequately addressed in an open and transparent manner. Comprehensive public input is critical to developing a strong policy and regulatory framework for offshore aquaculture.

## Further Reading

SeaWeb Aquaculture Issues: Offshore Aquaculture

[www.seaweb.org/resources/aquaculturecenter/issue\\_offshore.php](http://www.seaweb.org/resources/aquaculturecenter/issue_offshore.php)