Overview of Offshore Aquaculture

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I would like to welcome you all on behalf of the conference sponsors: the Maine/Portland Sea Grant College Program, UNH Cooperative Extension, the New Hampshire Sea Grant College Program, and the Massachusetts Institute of Technology Sea Grant College Program. We are especially pleased to welcome presenters and participants from so many countries (Norway, Canada, Sweden, Russia, Ireland, Israel, New Zealand, Italy, England and the U.S.) and representing so many disciplines (including engineers, economists, biologists, state and federal resource managers, regulatory agents and leaders, lawyers and entrepreneurs). Common ground is key.

Progression of Aquaculture

Aquaculture was reconsidered in China 4000 years ago. Chinese aquaculture is now valued at $186 billion dollars (FAO 1992). Chinese freshwater carp culture has evolved into well-balanced pond ecosystem management with several feeding levels and stocking levels contributing to overall production. The carrying capacity of the system is maximized and nutrient recycling is practiced. The system is sustainable because of this wise management of carrying capacity.

Progression from extensive to intensive culture has been marked. Extensive pond culture, which relied upon natural productivity without fertilizer or supplemental feeding, produced an average carrying capacity of 300-600 kg per hectare. Semi-intensive pond culture using fertilization, aeration, surface and waste exchange has a carrying capacity of 600 kg per hectare. Intensive culture -- in raceways, tanks, cages and
pens — makes use of oxygenation, sump filtration, UV sterilization, biological filters, foam fractionators, aeration, computer monitoring, and large volumes of clean water with strong currents to achieve a carrying capacity of 5000 kg to 50,000 kg per hectare.

Exceeding these carrying capacities results in 1) nutrient and disease contamination of the overall ecosystem and 2) collapse of pond production due to disease and poor water quality, resulting in significant economic losses. Taiwan, China, and Korea have experienced these effects.

Reasons for Going Offshore

Among our reasons for turning to offshore aquaculture, we note the need to: 1) reduce conflicts with other users of the water resource; 2) reduce objections of adjacent land owners for esthetic reasons; 3) make use of large volumes of high-quality water to decrease stress on cultured organisms; 4) access large volumes of clean water for production of self-filter-feeding mollusks; 5) reduce the regulatory and permit requirements; and 6) permit culture of high value, open ocean species at the 70 million metric ton seafood deficit and create profit.

Constraints

We must note, among the constraints to offshore aquaculture, the extremely hostile environment requiring new engineering and a larger, more expensive scale of operations; increased regulatory, lease and permit requirements; the incomplete state of life history control for many candidate species; lack of financing and government assistance; difficulty in maintenance, harvesting, feeding, and harvesting; lack of established government policy regarding offshore aquaculture; and uncertainties about liability.

What We Envision

The types of offshore aquaculture we envision and are developing include:

- Surface cages and pens with fixed and flexible moorings (marine fish)
- Submersible cages and pens with fixed and flexible moorings (marine fish)
- Juvenile culture of algae, seaweed, and mussels
- Lantern culture of scallops
- Enhancement of stocks of scallops, mariculture fish, and crustaceans. Japan stocked 65 marine species in 1992 and
- Further out in the future, even more fixed and floating facilities.

The Government Role

The government role in offshore aquaculture is and will be to:

- Establish clear regulations and policies;
- Subsidize research costs in developing the new technology needed;
- Continuity of support is important. Most new technologies take 20 years to implement;
- Provide outreach and education support;
- Provide coordination of research and extension effort;
- Provide international coordination mechanisms;
- Establish lease programs for bottom and water-column sites.

Present U.S. Government activities in offshore aquaculture coordination efforts include a joint subcommittee on aquaculture (USA) that consists of 23 federal agency representatives and that exists to coordinate federal efforts.

The JSU developed the first national aquaculture plan in 1983 and is in the process of revising the plan...
tional plan. The revision will deal primarily with how governmental agencies will coordinate and conduct business related to aquaculture.

The JSA will convene regional meetings in the Northwest, Northeast, Southwest, Southeast, Midwest, and Gulf Coast regions this summer to encourage input into national planning. At least three of these gatherings will be focused on offshore aquaculture and will be merged into the national plan. The main players for offshore aquaculture in the JSA are Sea Grant, NMFS, and USDA, but the U.S. Army Corps of Engineers, EPA, and other federal agencies will become involved.

NOAA has developed a strategic plan that includes offshore aquaculture development through both the National Sea Grant Program and the NMFS.

The National Sea Grant Program has completed its strategic plan and is already funding several projects at a level of $500,000 per year related to offshore aquaculture. A new competition will be held in fiscal year '96 for new proposals in this area.

The NMFS has funded several projects for offshore fish culture and scallop culture through both Salton Sea-Kennedy grants and Fishing Industry Grants (FIG) — $500,000 and five projects.

The USDA's regional aquaculture centers have supported some offshore-related projects.

What are the main U.S. international activities in offshore aquaculture?

The JSA, in the fall of 1996, is sponsoring a workshop in cooperation with Canada and Norway on alternative species for coastal fish culture.

NOAA initiated an international cooperation program on aquaculture with Japan through the U.S./Japan Natural Resource Panel on Aquaculture. Preliminary work is being done to conduct a collaborative project on pollution abatement and to analyze the environmental, economic, and social impacts of marine fish enhancement (MFH).

NOAA maintains an international cooperation program with China through the U.S./China protocol in science and technology. The U.S. and China have joint projects on marine algae and scallop culture in offshore locations.

Our Future Directions

What are our future directions?

Development of offshore aquaculture involves a multi-disciplinary, multi-agency, and even multinational approach. The goal is similar in complexity to a NASA space program. The scale is greater than anything attempted in the past and the environment involved is every bit as difficult to work in as an outer space.

There is very little new money to develop the advanced technology and we are going to have to form partnerships, both nationally and internationally if we wish to advance at a good pace.

Everybody in this room who is dealing with developing this new economic sector is a pioneer serving to accomplish feats worthy of the dreams of a Jules Verne. The titles of many of the talks include reference to "Blue Frontier," "Frontier," and "Challenger." This is certainly the case.

It is important to remember that we are still dealing with the carrying capacity of whatever ecosystem we are dealing with. There will be optimum levels of development that are appropriate to any specific location. The environmental groups will make sure that we conform to the carrying capacity of the environment.

We must keep in mind the genetic consequences of offshore aquaculture and fish farms in such systems must have genetic diversity equal to the wild stocks that will share the water mass with them. The wild stocks should be the genetic reservoirs for this industry.

Your various governmental partners will continue to provide the research support to develop the near-futur
Defining the Federal Role in Offshore Aquaculture: Should It Feature Delegation to the States?

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Abstract

In this paper, I describe some of the important attributes of an effective legal framework for ocean aquaculture and discuss the ability of federal agencies to provide these attributes under current law. I review key provisions of proposed federal legislation for management of aquaculture in the 200 mile Exclusive Economic Zone and sketch out an alternative system of state-based management with federal oversight and coordination.

Overview of the Issues

Communications have noted the legal and regulatory barriers to aquaculture development in the U.S. for at least the past 20 years. The constraints generally attributed to legal and institutional factors include costs, time, expense of applications, and uncertainties all of which may discourage entrepreneurs and scare off investors and banks (e.g., Mass. OCEZM, 1995).

The National Research Council (NRC) found in 1978, for example, that the procedures required to obtain permits and licenses "have been a severe deterrent to aquaculture" (NRC, 1978). The major problems related to the lack of uniformity of laws in different states, the difficulty of obtaining concise lists of the legal requirements within a given state, and the difficulty in obtaining the many permits and licenses.

The NRC study also concluded, however, that while some laws and regulations may reduce aquaculture's economic potential, aquaculture development...
may also be constrained by the absence of laws. It is noted that laws provide many forms of government safeguards against many things, but not against features in the resources as coastal and water quality, public health, public safety, or the relationship between these two levels of government. Federal, state, and local. What appears to be the most likely in any multi-level system is the fact that American governments are not organized in a hierarchy. In the case of the federal government, the states, and the local, each level plays a role in the development and implementation of coastal and water quality policies. The federal government has primary responsibility for the development of national policies and programs, which are then implemented by the state and local governments. The states, in turn, are responsible for implementing federal policies and programs in their respective jurisdictions.

Security of Tenure

Security of tenure is a major concern for those engaged in aquaculture. It is important to note that the legal framework governing aquaculture in many states is often unclear. In some states, the leasehold interest of the sea farmer is protected by law, while in others, the leasehold interest is subject to governmental review and approval. In cases where the leasehold interest is subject to governmental review, the sea farmer may be required to demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility. In cases where the leasehold interest is not protected by law, the sea farmer may be at risk of losing the leasehold interest if the governmental authority decides to revoke it. In such cases, the sea farmer may be required to demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility. In cases where the leasehold interest is not protected by law, the sea farmer may be at risk of losing the leasehold interest if the governmental authority decides to revoke it. In such cases, the sea farmer may be required to demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility.

On the other hand, when the government seeks to create private interests in land or water, through an exclusive lease or license, special legal principles designed to protect public uses in the public trust can come into play. These public trust principles may include the requirement that the holder of the lease or license must demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility. In cases where the leasehold interest is subject to governmental review, the sea farmer may be required to demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility. In cases where the leasehold interest is not protected by law, the sea farmer may be at risk of losing the leasehold interest if the governmental authority decides to revoke it. In such cases, the sea farmer may be required to demonstrate that the leasehold interest is necessary for the development and operation of the aquaculture facility.

In Massachusetts, for example, where the state and local governments issue licenses for marine aquaculture instead of leases, court decisions suggest that when the above features are not present in a license, the land of public trust becomes vested under current Massachusetts law do not convey sufficient interest to create a property right that the holder can defend in court or use to recover damages. Compare County v. Metropolitan District Commission, 298 Mass. 106 (1949), with Bay State Lobster Co. v. Perkin Corp., 355 Mass. 793 (1969).

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use subject to public and private riparian rights and to government oversight. To improve the security of this interest, governments can provide for criminal sanctions and a civil right of action against individuals who violate the sea farmer's rights as lessee of the seabed and water column (Wildsmith, 1987). The public rights of navigation and fishing must be protected in the leasing system, and this brings us to consider the process by which the government conveys an interest to the sea farmer.

Use Conflicts

Even when the sea farmer's lease or license is backed by criminal sanctions against persons damaging or interfering with the farm, this alone cannot ensure peaceful co-existence among all users of the marine environment. It is crucial, therefore, that the government's process for issuing the lease or license itself protect the sea farmer from conflicts with other marine uses. The statute authorizing the conveyance of a lease of public waters or submerged lands for aquaculture should identify other public and private uses of the marine environment and provide a fast but efficient process for information to be brought forward about those uses so that the leasing agency can make an appropriate decision and to avoid suits alleging that the lease or license should be amended to ensure the lessee's peaceful co-existence with other uses. A pattern of court decisions on water rights and permits to use water, for example, indicate that the sea farmer may have to litigate to protect itself from damaging interference from other uses, which may even be in direct conflict with the lease or license (Wildsmith, 1987). This pattern of litigation is likely to delay the sea farmer's development of the lease or license, which may contribute to the public perception that leasing is a slow process.

The New England Fishery Management Council's recent decision to delay implementation of a lease for sea farming operations, subject to public comment and review, may help to address these concerns. The Council's decision to delay implementation of the lease until after the public comment period demonstrates that the agency is willing to consider the concerns of the public and other stakeholders. This decision provides an example of how the leasing process can be designed to ensure that the sea farmer's interests are protected from conflicts with other marine uses.

Agency Coordination

The new framework for leasing sea farming operations provides a more consistent and transparent process for managing these operations. It provides a mechanism for ensuring that the agency responds to public concerns and that the leasing process is fair and equitable. It also provides a mechanism for ensuring that the lease or license is not rushed through without adequate public input or review. This new framework for leasing sea farming operations is a significant improvement over the previous system and provides a model for other agencies that are managing marine resources.

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pressure exists. It would be especially inappropriate if the waivers had to be approved by a marine fisheries advisory council, as marine fishery plans are likely to support spawning that may produce competition for the sardine market. This consideration should be weighed very heavily in decisions whether to encourage the expanded role of the regional fishery management councils in EEZ aquaculture decisions, manifesting the probable legal jurisdiction of NOAA to consider proposed sea farms under the Magnuson Act (Johnson and Hayes, 1993).

Elements of an Improved Government Framework for Aquaculture

In a series of reports prepared for the National Council on Aquaculture and the Northeast Regional Aquaculture Center, the Marine Law Institute (1992a,b) developed a set of recommendations for improving the security of tenure and the coordination of state and federal regulatory frameworks to facilitate the development of sea farming operations. These recommendations include the following:

- The responsible government agency should identify marine areas favorable to sea farming and consist of desired environmental conditions and potential use conflicts.
- All state and federal permits and licenses should share a common application procedure, siting criteria, site evaluation and monitoring protocols.
- Aquaculture leases (or licenses) should convey an exclusive property interest in the cultured species as well as to the right to harvest it from the leased area, as far as in possession with public rights of navigation and fishing, to secure the sea farmer's investment against negligence, theft, and vandalism, and to allow for civil causes of action against persons who interfere with or damage aquaculture facilities.
- State and federal agencies should adopt memoranda of understanding on coordinating enforcement, research and technical assistance.

- Maximum average limitations should not apply to contracts, joint ventures, or partnerships between small-scale sea farmers and larger aquaculture companies on that cooperative arrangements can be implemented.
- Government agencies should provide priorities in licensing or leasing to site facilities, displaced by conservation restrictions on the capture fisheries, in an appropriate non-discriminatory manner of promoting local economic and benefits from sea farming.
- Private agreements between sea farmers and local municipalities or organizations of co-operatives and community groups may resolve the conflicts and promote local economic benefits and acceptance of sea farms.
- Agency public hearings procedures should balance the due process rights of sea farm leaseholders with the public right of participation in decisions affecting public resources, and should be set to exclude interventions not relevant to the licensing decision but not so formal that small-scale sea farm applicants are faced with prohibitive application costs.
- Public and private efforts should work to ensure an insurance pool to compensate sea farmers for losses due to predation destruction or water impoundment orders to protect public health.
- State and local licensing authorities should adopt license-by-rule procedures for small-scale and experimental farming, with reduced application requirements and expedited procedures.

Implications for the Federal Role in Offshore Aquaculture

In 1992, the National Research Council's Marine Board recommended the federal government take a more active role in assisting the development of offshore aquaculture to avoid the many conflicts encountered.
used by sea farms operating in international waters (NRC, 1993). The report noted that some of the many problems with the move offshore was the lack of federal regulations in the EEZ (NRC, 1992; Stedman, 1990).

When American Aquaculture Inc. proposed a large-scale net-pen fish farm in a permit application to the U.S. Army Corps of Engineers for a site 27 miles east of Gloucester, Massachusetts, a new balance became apparent. Federal agencies and others interested in the marine environment quickly realized that people were in fact waiting to see the facilities further offshore. With the federal legal framework, however, was not prepared for the number of concerns that such facilities presented (Stedman, 1995). The project consisted of three floating salmon pens, attached to groups of six to 10 lines of 20-meter-long length bars, anchored to the continental shelf at a single anchoring point. The facility was designed to swing with the tides and currents around the anchor point. NOAA estimated that it would require exclusive use of an area of about 50 square nautical miles in the EEZ.

A committee convened at the time by the Office of Technology Assessment to consider policy options for EEZ aquaculture concluded that a simple leasing program without royalty payments was appropriate given the limited profits that could be expected. The committee also suggested that Congress consider working collaboratively with the states in developing a program to promote orderly development in the EEZ. They recommended that some facilities be likely to be used in places where federal and state jurisdiction meet (Stedman, 1995). At the same time, the NRC’s Marine Board concluded similarly that the federal government should create an orderly framework for the development of EEZ aquaculture and should encourage coastal states to adopt and implement state aquaculture development and management plans (NRC, 1992).

An orderly framework was not created, however, nor was a federal-state partnership formed in time to deal with this first major offshore proposal. What followed, unfortunately, was yet another failure by federal agencies to determine their proper roles and responsibilities to guide the development of the EEZ. The Army Corps issued a permit and then withdrew it because the Corps felt that the information presented by the applicant was insufficient to determine the environmental impact statement for a project of this scale. The Corps concluded that the project would have a significant effect on international trade, the marine environment, and the outer continental shelf. The Corps felt that the information presented by the applicant was insufficient to determine the environmental impact statement for a project of this scale.

NOAA, Office of General Counsel, concluded that the proposed farm would constitute “fishing” under the Magnuson Act because it would involve harvesting fish from the EEZ by vessels of the U.S. The regional fishery management councils therefore had the authority to manage aquaculture in the EEZ and would need to assess existing fishery management plans to prevent overharvesting of depleted species. NOAA, Office of General Counsel, concluded that it had a strong statutory basis for enforcement of its jurisdiction. The service also has a strong statutory basis for the promotion and regulation of marine aquaculture, supported by a history of public and private sector research and development, and is thus the federal agency best suited to regulate and oversee aquaculture activities that affect marine ecosystems (NOAA, 1995).

NOAA is not at present the lead or even the major federal presence in aquaculture regulation. Federal authority centers largely around the U.S. Army Corps of Engineers permit decision under section 309 of the Rivers and Harbors Act, 28 U.S.C. Code § 409, as amended by the Outer Continental Shelf Lands Act, 43 U.S.C. Code § 1361 et seq., and the Corps’ “public interest review” under 13 Code of Federal Regulations section 320.4(a)(1), which contains a balancing of all the reasonably expected benefits and detriments to the public interest, including environmental, economic, aesthetic, navigational, property rights, and international interests. The EPA also asserts regulatory authority under the Clean Water Act over discharges from aquaculture facilities as “concentrated aquatic animal production facilities.” Other federal
agencies, including NOAA's National Marine Fisheries Service, the Coast Guard, and the Fish and Wildlife Service, have an opportunity to review and comment on any permit required by the Corps of Engineers, the Corps of Engineers, for permits on navigation and marine wildlife habitats (Goldberg et al., 1996).

States also play a role in the federal permit process. In addition to water quality certifications of proposed federal discharge permits under the Clean Water Act, the Coastal Zone Management Act itates any federal permit for activities that affect land, water, or natural resources of the coastal zone subject to review for consistency with approved state coastal zone management programs. A state can report a federal applicant's consistency certification if the proposed activity meets with an enforceable law or policy included within the state's approved program. 33 U.S.C. §1386(c)(6)(A). If a state objects, the permit or issuance may not be issued, unless the Secretary of Commerce reverses the decision. New states in present have enforceable laws and policies concerning aquaculture within their approval management programs necessary to take full advantage of this process. Massachusetts, however, uses the federal consistency requirements as an opportunity to encourage the development of marine aquaculture and to streamline the efficiency of the regulatory process. In its recent Strategic Plan for Aquaculture, the Commonwealth notes that it is in the best interest to review proposed aquaculture projects (Mass.-OECA, 1995).

While the process for obtaining an individual permit from the principal federal agencies is lengthy and uncertain, both the Army Corps and the EPA have the authority to issue a general permit under their respective regulatory agencies. The general permit is a mechanism for granting authority to a class of regulated activities that eliminates the need for an individual permit for each activity. Provided the activities are below specified size or degree of impact thresholds, both the EPA and the Corps could in theory issue a general permit for ocean aquaculture facilities that comply with certain cultural practices, design features, and other factors, and subject them to the conditions of permit conditions and monitoring protocols. The Army Corps uses a State Programmatic General Permit for approving small-scale sea farms in Massachusetts, in essence "playing back" on state permit approvals, and the Commonwealth has plans to increase the coverage of the general permits to allow even further regulatory efficiency (Mass.-OECA, 1995).

The EPA has yet to issue a general permit for marine aquaculture. It has used the mechanism for the purpose of marine activities, issuing in the 1980s a "common permit" to all offshore exploratory drilling rights, after the agency finally accepted the regulatory authority under the Clean Water Act applied (Brennan, 1995a).

The case of ocean aquaculture is different from the OCS drilling permit, however, because the EPA was faced with hundreds of existing discharges from drilling operations in the Gulf of Mexico and elsewhere. Open ocean aquaculture operations are only in the planning stages. The EPA does not face the same permit burden and thus does not have the same incentive for adopting a general permit to facilitate EEZ aquaculture. While agencies like the Army Corps are under some pressure to reduce regulatory burdens and to streamline their operations, it is not clear whether they are willing to reduce their authority in deference to another federal agency, such as the National Marine Fisheries Service.

Judicial review over aquaculture seems to be a sore point with some federal agencies at present. The memorandum of agencies' jurisdiction with respect to the time of the American Norwegian Fish Farm, Inc. project (Brennan, 1995a), as well as the more recent debates over the Department of Agriculture versus the Department of Commerce to the appropriate federal agency, suggest that a "turf battle" among agencies may be well underway. While not unusual in environmental and natural resources policy, these battles will not end and tend to work against the public interest in the long run.
Proposed Federal Legislation on EEZ Aquaculture

Many of the above essays are reprinted but not effectively reprinted in the Senate bill S. 1192, introduced on behalf of NOAA in 1995 by Senators John Kerry, Pat, and Inouye. For example, the Congressional findings state that the current "utility industry has not invested in industrial" (EEZ) aquaculture facilities within the U.S. in part because "overseas waters are not capable of private ownership and because they also support other public uses, including navigation, fishing, recreation, and national defense." Because marine aquaculture presents "several environmental challenges requiring specialized scientific research and regulatory programs," the bill finds that "incorporating environmental concerns in the development of marine aquaculture will enhance the prospects for an economically and environmentally sustainable industry."

The bill would declare that federal policy to ensure that the placement of any new marine aquaculture facility within a state coastal zone, the territorial seas, or the EEZ is environmentally and commercially practical and does not pose unreasonable conflict with other public uses of marine waters, such as navigation, fishing, recreation, and national defense. The following discussion considers the bill in light of the three major considerations identified above.

Security of Tenure

Section 6 of the offshore marine aquaculture permitting creates a new federal permit requirement for permits to establish, operate, or maintain an offshore marine aquaculture facility, except under a permit issued by the Secretary of Commerce. The Secretary is authorized to issue permits allowing the ownership, construction, or operation of an offshore marine aquaculture facility for a term of up to 25 years, renewable upon expiration. The section makes clear that once the facility obtains a permit, the physical structure, the organisms stocked within it, and any business interests in the offshore facility can be privately owned by the permittees, but the area of ocean used remains in public ownership, with only a reasonable use permit being granted. The permits may be revoked for substantial violations of either the permit conditions or the Secretary's regulations. The Secretary can transfer and permit fees are limited to the costs of administering the permit program.

The bill defines "offshore marine aquaculture facility" as a facility that is located in whole or in part in the EEZ, the purpose of which is to raise, breed, grow, or hold in a living state any marine or aquatic organism. It states that any vessel or other floating craft used as an offshore facility or for discharging any material into an offshore facility is not a vessel for purposes of the Clean Water Act, and any discharge of material directly into the waters of the facility or from the facility into the surrounding waters shall be considered a point source. The bill also requires any discharge to be in compliance with federal, state, and local laws and regulations, and that the Secretary shall make a study of the potential impacts of such activities on the marine environment, including the effects on the species and habitats involved.

Does the proposed permit offer sufficient security of tenure for the sea farmer?

The permit is transferable, renewable, and revocable only for cause, and provides some of the same security features as those in the existing federal permits. A sea farmer, however, needs an interest that can be defended against damage or interference with the permit. A reasonable permit or license is best conveyed only to a seawater interest. An interest is from Roman civil law and is the right of using and occupying all the advantages and profits of the property of another without altering or damaging the substance.

The alternative to a permit is a lease, the mechanism used as the Outer Continental Shelf Lands Act.
convey to private companies rights to explore for and develop oil and gas resources from the seabed, and by the State of Maine for aquaculture in state waters. Leases can be terminated by a lease holder a lease is not likely to provide a legal basis for a set farmer to bring an action in federal court for interference. The choice of a permit over a lease may have more to do with the public relations of aquaculture than with administrative convenience. Leases are better for the sea farmer, but they may be viewed with more suspicion by the traditional fisheries who feel threatened by just about every new use or activity on the ocean. If a permit is to be used, the bill should support the sea farmer's interests through federal prohibitions and sanctions against interference. At least one of the bills considered by the 106th Congress to reauthorize the Magnuson Fishery Conservation and Management Act would make it a federal offense to interfere with marine aquaculture in the EEZ.

Agency Coordination

Before the Secretary may issue the permit, many other agencies have an opportunity to add conditions to it. The Coast Guard, the EPA, the Secretary of the Interior, the appropriate regional fishery management council, the Defense Department, and the Governor of each state adjacent to the proposed facility site (or which would be ecologically affected by permit activities) may add conditions on the permit. Each of these activities must certify that the activities they permit would comply with the law they administer. If they conclude that they cannot certify the Secretary must add conditions to the permit which the agency or Governor submits would ensure compliance. This review process allows agencies like the Corps and the EPA to attach conditions that would allow compliance with the Rivers and Harbors Act and the Clean Water Act. The bill, however, does not exempt sea farms in the EEZ from the need to get separate permits under these laws.

The Secretary's own opinion for issuing the permit should include a determination that the activities would comply with the Secretary's environmental standards, which the Secretary is given two years to develop, and must address a host of considerations, including genetic mixing of cultured and wild stocks, the introduction of non-indigenous species, the enhancement of diseases, federal water quality standards, ecological soundness, pollution control measures, and other measures to protect the marine environments. The Secretary is then required to conduct a public hearing and use information from it to review these environmental standards if significant new information is obtained on the environmental impacts.

Given that the Corps and EPA also have responsibility for these environmental considerations, the bill appears to create a redundant role for NOAA unless the intent is to eliminate the need for permits under the EPA and Corps. That intent, however, is not apparent from the text of the bill. The bill is not intended for the Corps to go further in streamlining the federal regulatory requirements. The permit is sea farmer's interests under section 6, even though it is reviewed and conditioned by other agencies, does not eliminate the need for a permit under either the Rivers and Harbors Act or the Clean Water Act or any other state regulations by the regional management councils.

In section 7, for Model Environmental Conditions, the bill further hope to influence environmental regulations. They fail, however, to take advantage of the ability of states to conduct regulatory oversight of marine and coastal activities. Some states have become more effective in this regard, probably due in large measures to the federal funding of coastal management programs. Section 7 would require the Secretary of Commerce to prepare model guidelines in consultation with other appropriate federal and state agencies for activities facilities located within State waters. The guidelines are to include "Best Manage-
nal Practices to minimize the potential damage to marine ecosystems, minimize "visual pollution" and other interference with public usage of the ocean, and ensure that pollution control efforts for cultivated plants are ecologically sound. The Secretary is directed to develop a program to encourage voluntary compliance with the guidelines by the marine aquaculture industry. After development, the Secretary is to submit the guidelines to the state coastal zone management agencies and other federal and state agencies involved in either marine aquaculture or coastal and marine resource management for possible incorporation into state aquaculture policies or permitting processes.

This section aims to improve state regulatory decisions through recommended standards and guidelines. No incentive, however, is provided for states to adopt such measures, although the ability to offer a streamlined regulatory process, focused on state reviews following federal standards, could be a powerful one and a very attractive prospect for potential sea farmers. Sea farms are going to have a body of operations somewhere. It stands to reason that the site in which this body is located can exercise oversight of the sea farm's effluent activities, following certain federal guidelines and minimum standards.

Use Conflicts

To prevent use conflicts the bill relies on criteria for the federal permit that the project will not significantly interfere with "other" public uses of the ocean defined as including commercial and recreational fishing, navigation, conservation, and aesthetic enjoyment. The federal agency now involved in a facility's review for federal permit will review the project's potential for interference with "other" public uses. The bill relies on the standard site and environmental process and review by other agencies. The bill does not take advantage of the many new regional, consultative and oversight procedures that are in use in federal marine sanctuaries and under state and provincial marine resource laws. These regional committees and advisory councils involve appropriate users early in the process and would give sea farmers a greater chance to address potential opposition and resistance from other users and interests. In Nova Scotia, for example, regional aquaculture boards are charged with bringing together many points of view and stakeholders in a process often called a "co-operative dialog process." The Senate bill would allow creation of marine aquaculture advisory and review panels but use them only in assessing the administration of research and development grant programs the bill would create.

Also, the bill makes no mention of whether priority is to be given to existing uses regardless of their nature or impact on the ocean, nor provide standards by which to judge claims of potentially significant interference.

Finally, what is most interesting about the Kerry bill is that it conveys no sense of the current climate in Washington, D.C., or elsewhere about federal regulation. The reduction in federal involvement is already apparent in the marine resources field in the 1990s as a result of federal agencies' withdrawal of existing federal fisheries management plans for fisheries that NOAA believes can be better managed by states or international commissions, including American lobster, spiny lobster, mako shark and high seas Pacific salmon.

With these criticisms in mind, we turn now to an alternative model for regulating open ocean aquaculture.
A Proposal for State-Based Regional Management of Aquaculture in the EEZ

An alternative to the Kerry bill approach would essentially reverse the roles of federal and state agencies, with federal agencies taking a consistency review to prevent navigational conflicts and possible national security problems in permits or leases issued by a coastal state instead of NOAA issuing the permit and receiving consistency certifications of proposed conditions. A state with a federally approved aquaculture management program would do so. The idea is to delegate federal review and approval of offshore aquaculture facilities to the adjacent coastal state, if that state has adopted a comprehensive program for the management and oversight of marine aquaculture.

Each federal agency that presently asserts regulatory jurisdiction has some capacity to delegate its powers to a state agency, either through express provisions like the Clean Water Act's section 404(b) (although limited to navigable waters within the state's jurisdiction) or through administrative measures such as the Corps' state programmatic general permit. The full delegation may require amendments to the federal laws to make clear under what conditions federal delegation would be acceptable. Absent such amendments, the details of the delegation could be worked out by interagency agreement among the principal federal agencies, the Corps, the EPA, the Coast Guard, and NOAA, on the coordination and delegation of their responsibilities to the state.

Generally, in the past, these voluntary delegations of federal responsibility have been difficult to carry out. For example, states have not had much success in achieving a return of management responsibility for marine mammals under Section 109 of the Marine Mammal Protection Act. What may be more feasible would be a partnership for management, much like the more recent national marine sanctuary programs that involve both federal and state waters, e.g., the Florida Keys and Monterey Bay (Sunfish, in review).

A memorandum of understanding or interagency agreement could be the vehicle for coordinating these federal delegations. This test should provide guidelines for state programs that are very general rather than include a level of detail like that under the Clean Water Act's section 404(b) or the Marine Mammal Protection Act's section 109 for cities, but with sufficient detail to ensure that the states are going to meet the public trust obligations and protect other uses. The state program would undergo review by the agencies before it was operational in the EEZ. This could occur through the submission of an amendment to the state's approved coastal zone management program. Permit applications are currently under the 1976 revision of the Coastal Zone Management Act for states to develop strategic plans for marine aquaculture. These handbooks could be used to develop a state-based EEZ management framework as well as one for state waters.

The development of these programs changes could be guided by new criteria agreed to by the freestanding agencies and published by NOAA. The criteria could include many of the terms identified in §1192, section 7 of the Clean Water Act. Interagency agreements, or interagency agreements, or interagency agreements, or would have a very limited time to come forward with very specific criteria. The federal responsibilities to protect public rights and environmental quality would be handled out by the states. The interagency agreements to establish a federal program, once the Secretary approves the state's program change, the state could then use the federal consistency program to ensure federal agencies have the coordinated regulatory process contained in the program.

Any Senate proposal for delegating offshore regulatory jurisdiction to coastal states must consider where one would draw the boundaries between the states, particularly in New England where several states have fisheries that share the same offshore...
states. While a full treatment of this question is beyond the scope of this paper, it should be noted that the issue of establishing lateral seaward boundaries is not new in the history of U.S. coastal management. The 1976 amendments to the federal Coastal Zone Management Act (PL 94-295) included provisions designed to increase the incentives of states to accept new exploratory and development drilling for oil and gas. Part of the legislation created a coastal energy impact fund and grants programs that were to be allocated to the states based, in part, on the amount of outer continental shelf acreage that is adjacent to the state. Adjacency was defined as lying on the state's side of the "extended lateral seaward boundaries" of the state, such boundaries to be based on existing or new inter-state compacts, judicial decision, or by application of the boundary delimitation principles of the 1958 Law of the Sea Convention on the Territorial Sea and Contiguous Zone.

The above is merely a brief sketch of a possible approach. Further thought must be given to the proposed framework. It is clear, however, that much of the enthusiasm and opportunity for developing an effective framework is at the state level, in state and local governments, fishermen, and conservation groups look for ways to redirect marine resource development activities away from overexploited species and provide an environmentally sound and sustainable source of seafood and coastal community economic benefits (Rieser, 1995).

References


INTRODUCTION

Aquaculture varies from the short term holding of captive organisms to control over the entire life cycle of an aquatic life form. Mobile organisms must be contained in net pens or cages to control movement while allowing adequate water exchange with the surrounding aquatic environment. Natural bottom currents frequently result in dramatic water circulation and changes in internal water quality. Cages, having taut bottoms, offer improved water circulation, although this may be accentuated if too many cages are nested in a large system.

During the development of waterculture techniques, substantial reliance was placed on existing engineering knowledge. Recently, ocean physics has produced highly sophisticated modelling software that is a powerful adjunct [Banchero, 1991]. To coordinate the requirements of a modern fish cage, the efforts of physicists, structural, mechanical, and ocean engineering are required. More than a little yin and yang is also needed to design a structure that can remain intact in a persistent state of balance with the opposing forces of nature. This is even more so in the case once cages are expected to survive in the constantly hostile environment of the "exposed" coastal ocean, i.e., a seven mile front of water produces about one million cycles per month of wave induced tension, compression and torsion loads on a cage structure; 12 million cycles per year.