

Economic Impacts of Gulf Aquaculture Amendment

HISTORY OF U.S. OFFSHORE FINFISH AQUACULTURE

FEDERAL MANAGEMENT

National Aquaculture Policy

In 1980, the National Aquaculture Act (NAA) was passed, which established a national aquaculture policy. The NAA “declares that aquaculture has the potential for augmenting existing commercial and recreational fisheries and for producing other renewable resources, thereby assisting the United States (U.S.) in meeting its future food needs and contributing to the solution of world resource problems. It is, therefore, in the national interest, and it is the national policy, to encourage the development of aquaculture in the United States.”

The NAA required the Secretaries of Commerce, Interior, and Agriculture to prepare a National Aquaculture Development Plan (NADP) within 18 months of enactment. The NADP was to identify potential species for commercial aquaculture development, and to discuss public and private actions and research necessary to carry out the objectives of the act. The act also called for creation of the Joint Subcommittee on Aquaculture (JSA) in the Federal Coordinating Council on Science, Engineering, and Technology (Coordinating Council). The JSA’s responsibility was to increase the productivity of federal aquaculture research, technology transfer, and economic assistance programs through study and assessment, coordination, planning, collection, and dissemination of information, and provision of advice to the Coordinating Council.

The NAA provided an important statement of policy; however, it did not address continuing federal, state, and local barriers to domestic aquaculture. Those barriers were recognized in the NADP of 1984; however, because the administration’s policy was that the primary responsibility for the development of commercial aquaculture rested with the private sector, there were no recommendations to increase federal funding.

In 1985, the NAA was reauthorized and renamed The National Aquaculture Improvement Act (NAIA). The NAIA enacted two major amendments. First, the United States Department of Agriculture (USDA) was designated as the lead federal agency with respect to the coordination and dissemination of national aquaculture information. Second, two new studies were commissioned and to be reported to Congress by December 31, 1987. The Secretary of Commerce was required to study and report to Congress whether existing capture fisheries could be adversely affected by competition from commercial aquaculture enterprises; and the Secretary of Interior was required to study and report to Congress the extent and impacts of the introduction of exotic species into U.S. waters as a result of aquaculture activities.

In April 1988, Commerce's study was completed and presented in the report, *Aquaculture and Capture Fisheries: Impacts in U.S. Seafood Markets*. The report focused exclusively on the effects of farm raised shrimp and salmon on capture shrimp and salmon fisheries. The report considered potential effects of increased supplies of domestically cultured shrimp and salmon on domestic prices of the two products; however, it did not consider potential adverse impacts of lower domestic market prices on long-run revenues and/or profits of salmon and shrimp fishermen and structural changes in the domestic industries that result from increased domestic aquaculture production.

One of the report's findings was that while domestic demand for shrimp would continue to grow, domestic production of wild shrimp was at its biological limit and domestic cultured shrimp production was limited. Another finding was that while domestic and foreign demand for salmon would continue to grow through the 1990s, U.S. salmon fishermen and salmon farmers were at a competitive disadvantage because both foreign imports of cultured salmon entered the U.S. duty free and U.S. seafood export opportunities were hindered by foreign trade barriers.¹ Thus, it was predicted that foreign producers of cultured shrimp would have an increasing share of the domestic market.

On June 8, 2005, Senators Stevens and Inouye introduced a bill (S. 1195), hereby cited as the National Offshore Aquaculture Act of 2005, to provide the necessary authority to the Secretary of Commerce (Secretary) for the establishment and implementation of a regulatory system for offshore aquaculture in the U.S. Exclusive Economic Zone (EEZ), and for other purposes. Specifically, the bill would authorize the Secretary to establish a process to make areas of the EEZ available to eligible persons for the development and operation of offshore aquaculture facilities, which would include:

- a permitting process;
- 10-year permits for offshore aquaculture located on leases or easements authorized or for which a permit has been issued under the Outer Continental Shelf Lands Act (OCSLA) or within 1 miles of any other facility for which a permit has been issued under the OCSLA;
- the requirement that an offshore aquaculture permit holder must: i) be a resident of the U.S., ii) be a corporation, partnership, or other entity organized and existing under the laws of a State or the United States, or iii) to the extent required by the Secretary of Commerce by regulation after coordination with the Secretary of State, waive any immunity, and consent to the jurisdiction of the U.S. and its courts, for matters arising in relation to such permit and appoint and maintain agents within the U.S. who are authorized to receive and respond to any legal process issued in the U.S. with respect to such permit holder; and

¹ According to the 1992 National Academy of Sciences report, *Marine Aquaculture: Opportunities for Growth*, foreign salmon producers, especially those who received subsidies from their governments, dumped salmon in the U.S. market by selling less than the cost of production. The below-cost prices caused domestic companies to undergo financial difficulties, and for some, the difficulties were so severe that the companies were purchased by foreign entities. For example, Ocean Products, Inc., of Eastport, Maine, is now 100 percent Canadian owned. Most salmon farms in the U.S. are currently owned under some degree of foreign ownership (NAS; 1992).

- an exemption from the requirement of vessel documentation or a fishery endorsement for so long as the vessel is owned or used in support of activities under the offshore aquaculture permit.

As written, the bill would permit foreign entities to lease U.S. waters with no requirement to process seafood in this country. Thus, a foreign business could farm fish in the EEZ, process the harvest in its home country, and then export it to the U.S. where the U.S. would be importing its own fish (Fraser; 2005). In response to this possibility and other potential problems, Senators Inouye and Stevens submitted amendments (SA 766, 767, 768, and 769) to the above bill. One of the amendments requires an offshore aquaculture permit holder be: a) a citizen or resident of the United States or b) a corporation, partnership, or other entity organized and existing under the laws of a State or the United States. Another amendment gives each coastal State the power to exclude the provisions of the Act from applying to the State's seaward portion of the EEZ.

National Marine Fisheries Service

Under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the National Marine Fisheries Service (NMFS) has responsibilities for regulating and managing commercial fishing operations, and because marine aquaculture operations are commercial fishing operations, NMFS has the authority to regulate and manage them as well. Therefore, any aquaculture activity conducted in the EEZ is subject to all applicable FMP regulatory requirements, such as size limits, bag limits, and permit requirements.

Currently, the only legal avenue for EEZ finfish aquaculture is under an Exempted Fishing Permit (EFP), as provided for under 50 CFR 600.745. However, this permit is for scientific research activity and experimental commercial production of fish.

NMFS also has authority under the Fish and Wildlife Coordination Act, the Endangered Species Act, and the Marine Mammal Protection Act to comment on any project under review by the Army Corps of Engineers or other agency, such as aquaculture, if there is federal involvement in the project (i.e., permitting, licensing, funding, etc.).

Other Federal Regulatory Agencies

Numerous federal agencies in addition to NMFS regulate aquaculture operations in state waters and the Exclusive Economic Zone (EEZ). First, the Army Corps of Engineers (Corps) has a primary review responsibility through its permit process under section 10 of the Rivers and Harbors Act of 1898 (RHA), and as extended by the Outer Continental Shelf Lands Act. Specifically, the Corps requires a Section 10 Permit for the creation of any obstruction in state waters or the EEZ to preserve unhindered navigational access to the nation's waters. Second, under section 318 of the Clean Water Act, the Environmental Protection Agency (EPA) requires point-source-discharge permits for aquaculture projects in state and federal waters (40 CFR 122.24), and under the Ocean Dumping Act (33 USC 1412, 1999), the EPA is authorized to permit the dumping of

material into U.S. waters when such dumping will not unreasonably degrade or endanger human health or the marine environment, ecological systems, or economic potentialities. Third, under authority of the Fish and Wildlife Coordination Act, the Endangered Species Act, the Migratory Birds Act, and the Marine Mammal Protection Act, the U.S. Fish and Wildlife Service has the authority to review and comment on the effects on fish and wildlife of activities proposed to be undertaken or permitted by the Corps. Fourth, under the Outer Continental Shelf Lands Act, the Minerals Management Service of the Department of Interior may review and comment on permit applications submitted to the Corps or other federal agency. Fifth, the Food and Drug Administration regulates therapeutic agents allowed for treating fish diseases and regulates the sale of meats treated with or contaminated by therapeutic agents, including fish imported into the United States, by setting minimum tolerance levels allowed for human consumption. Finally, the Coast Guard is responsible for regulations and enforcement of various activities, such as offshore aquaculture, in navigable waters of the U.S. and requires aquaculture-related structures to be marked with lights and signals in order to ensure safe passage of vessels. The aquaculturist must install and maintain the markers as long as the structure is located in navigable waters. The requirements for marking structures are often included as prerequisites to getting permit approval with the Corps or EPA.

Federal Regulatory Management in the Gulf of Mexico

The history of federal regulatory management of aquaculture in the Gulf of Mexico is brief. In 1994 and 1995, the Gulf of Mexico Fishery Management Council (Gulf Council) and South Atlantic Fishery Management Council (South Atlantic Council) developed and NMFS implemented a regulatory regime for the culture of live rock (GMFMC; 1994, 1995). Wild live rock is coral-reef rubble that has been populated by attached organisms including anemones, sponges, tubeworms, sea squirts, bryozoans, algae, etc., as well as by mobile organisms. Because “wild” live rock is habitat and harvest reached levels exceeding 500,000 pounds annually in the early 1990s, NMFS phased out harvest of wild live rock and required persons in the industry to shift to aquaculture of live rock. Aquaculture of live rock consists of placing substrate, such as calcareous rock geologically or otherwise distinguishable from naturally occurring substrate, on permitted bottom sites for several years until attached organisms populate it. Site selection is regulated by certain criteria, as are the operations, including notifying enforcement agents when harvesting or placing of substrate are to occur (see GMFMC 1994, 1995 for details of these criteria). The state or Corps requires permits for a site. An aquaculture permit and reporting of landings are required by NMFS. In 2004, there were 155 live rock operations permitted in the Gulf.

GULF STATE MANAGEMENT AND AQUACULTURE

The history of Gulf state management of aquaculture involves management of both freshwater and saltwater aquaculture in Alabama, Florida, Louisiana, Mississippi, and Texas. Whereas freshwater operations involve ponds, tanks, and vats, saltwater operations involve tanks and open water. The subsequent discussion on state management of aquaculture will focus solely on marine aquaculture in state waters.

Alabama

Alabama offers bottom leases, but does not offer water column leases, in state waters.

Florida

Chapter 253 of the Florida Statutes provides the authority and conditions for leasing sovereign submerged lands and the water column for the purpose of aquaculture.

The Bureau of Aquaculture Development (Bureau), which is within the Division of Aquaculture (Division), is responsible for the aquaculture leasing program. Aquacultural activities on state submerged lands consist almost entirely of growing hard clams, oysters, and live rock. According to the Department of Agriculture and Consumer Services' document, *Florida's Aquaculture Lease Program*, the Bureau administers more than 600 aquaculture leases containing 1,700 acres. The Division identifies tracts of submerged lands throughout the state that are suitable for aquacultural development.

According to the Florida Agricultural Statistics Service, in 2003, there were 544 active aquaculture operations, and in 2001, 684. Altogether, Florida aquaculture producers reported sales of \$95.5 million in 2003 and \$99.5 million in 2001. They produced tropical fish, aquatic plants, clams (including clam seed), oysters, shrimp, other fish (hybrid striped bass, koi, largemouth bass, bream, and carp), alligators, catfish, tilapia, other aquatics (crawfish, eels, snails, turtles, crabs, and frogs), and live rock.

Tropical fish are produced in ponds and tanks, and the more prominent species include ornamental favorites, such as guppies, mollies, swordtails, variatus, platies, tetras, gouramies, goldfish, cichlids, barbs, and tropical catfish. Aquatic plants are produced in vats and water surface acres, and include plants for water gardens and aquariums, farm-produced plants used in wetlands restoration, and watercress. Clams, oysters, and live rock are grown in operations that lease state-owned sovereignty submerged land.

Louisiana

Louisiana offers bottom leases in state waters.

In January 2005, a group called the Platforms for Mariculture Task Force — consisting of representatives of the American Petroleum Institute (API); Minerals Management Service; Louisiana Department of Economic Development; Louisiana Office of Oil, Gas, and Energy Resources; Louisiana Legal Office, and Louisiana Governor's Executive Council — reported its findings to the Governor of Louisiana. Among the group's recommendations was for a comprehensive study to assess any impacts of a Louisiana platform-based mariculture industry on other segments of the state's economy such as existing commercial and recreational fisheries and support industries as well as the potential development of additional, new industries and the expansion of existing fish processing plants and others such as equipment manufacturers and suppliers. A copy of the group's January 2005 report, "Final Report of Findings and Recommendations to the

Louisiana Legislature and Governor,” can be found on the World Wide Web at http://www.dnr.state.la.us/mariculture/final_report.pdf.

Mississippi

Mississippi offers both bottom and water-column leases in state waters.

Texas

Texas offers bottom leases in state waters.

CURRENTLY OPERATING & PROPOSED OFFSHORE FINFISH FARMS IN U.S.

Currently Operating

At present, there are only four operating offshore finfish farms in the U.S.; however, none of them operate in federal waters and, therefore, have required an EFP. Furthermore, none of these farms operate in the Gulf of Mexico. These offshore finfish farms are: 1) Cates International Inc., which grows Pacific threadfin, also known as moi, in Hawaiian waters; 2) Kona Blue Water Farms, which grows amberjack, also known as kampachi or kahala, in Hawaiian waters; 3) Snapperfarm, Inc., which raises cobia and mutton snapper off the coast of Culebra, Puerto Rico; and 4) the University of New Hampshire Open Ocean Aquaculture demonstration project that raises halibut, haddock, summer flounder, and cod in New Hampshire waters.

Cates International Inc. (Cates) was formed in 1999 “to pursue commercial open ocean aquaculture in State marine waters” (Hawaii Department of Land and Natural Resources and Department of Agriculture; 2005, 11). In April 2000, the company submitted all Federal, State, and County permit applications for a four-cage project using 28 acres of ocean two miles off Ewa Beach, Oahu (ibid). On March 9, 2001, the State Board of Land and Natural Resources authorized a 15-year ocean leasing agreement between the State and Cates for the commercial production of fish in offshore sea cages. (Hawaii Dept. of Agriculture; 2001). The company signed the actual lease document in August 2002 and became the first in U.S. history to obtain an ocean lease for aquaculture (Hawaii DLNR & DA; 2003). In 2003, the company posted sales of moi of \$1.4 million, all of which was invested back into the company (Hedlund; 2004). The following year the company’s production of moi climbed from 6,000 pounds a week to 7,000 to 10,000 pounds a week (Hedlund 2004; Hawaii DLNR and DA). According to Gima in August 2005, Cates plans to expand production and export moi to the U.S. mainland and international markets.

According to Hedlund, one of the company’s biggest challenges involves an inconsistent supply of fingerlings. The company buys its fingerlings from the Oceanic Institute, which is a research institution not driven by sales of baby fish. Another problem is the location of Cates’ hatchery, which is on the opposite end of Oahu, which means it must truck its fingerlings across the island. In August 2005, Gima reported that the harvest

had dropped to “as little as 1,200 pounds of moi” due to several factors: First, the Oceanic Institute was unable to produce enough fingerlings; second, Cates’ main harvest boat had been in dry dock for maintenance; and third, the company is growing the fish to a larger size. However, Cates has invested in its hatchery in order to increase its production to about 4 million fry per year, which translates into 2.5 million to 3 million pounds of moi (Gima; 2005).

Kona Blue Water Farms (Kona) is a wholly owned subsidiary of Black Pearls Inc., the latter which consults and develops commercial pearl farms around the globe. Kona was formed in 2001. Since August 2002, it has been selling 500 to 1,000 pounds of tank-raised fish each week to local restaurants for sashimi, and also fillets to Pacific Rim countries (Command). In 2003, it received approval to lease 81 acres in Hawaiian waters 150 to 200 feet deep to raise mahi mahi and other fish in 8 cages (Gonser; 2003). In 2005 Kona completed installation of the moorings and first pair of submersible grow-out cages, and stocked them with 30,000 juvenile Kona kampachi (Associated Press; April 7, 2005). It expects to harvest its first crop in fall 2005 and to eventually produce 800 tons of fish each year (ibid).

Snapperfarm, Inc. raises cobia and mutton snapper in submerged cages 35 feet below the ocean surface off the coast of Culebra, Puerto Rico. In 2003, the company produced 50,000 pounds of fish, mostly cobia (Hedlund; 2005). A big challenge for the company has been acquiring fingerlings. Currently, the company buys fingerlings from the Aquaculture Center of the Florida Keys and the University of Miami, and transporting them to its site takes 30 hours and is expensive (ibid).

The University of New Hampshire (UNH) Open Ocean Aquaculture (OOA) demonstration project began in 1997. It raises fish in a 30-acre site in State waters approximately one mile south of White Island, and began to raise fish in offshore cages in 1999. UNH’s OOA project has grown out summer flounder in 1999 and 2000, Atlantic cod in 2001, and stocked Atlantic halibut in 2001 and harvested it in 2004, stocked haddock in 2002 and to be harvested it in 2004, and stocked cod again in 2003 (UNH OOA website).

Currently Applying for Permits Outside the Gulf

Three other Hawaiian companies are in the process of applying to operate finfish farms in Hawaiian waters. These companies are the Ahi Nui Tuna Farming Company (Ahi Nui), Ahi Farms Inc. (Ahi Farms, also known as Ahi Aquaculture Farms), and Pacific Ocean Ventures.

Both Ahi Nui and Ahi Farms plan to farm yellow fin and big eye tuna using surface cages. Ahi Nui submitted its Federal and State permit applications and State lease request, with Environmental Assessment, in July 2002 (Hawaii Dept. of Land and Natural Resources; 2003). The company initially proposed to place floating cages in a conservation area 4.5 miles northwest of Kawaihae Harbor in West Hawaii in approximately 170 feet of water (ibid). The total area of the site would have been 216

acres and the cages would have occupied 16 acres of surface water (ibid). However, the company dropped its plans for the original site because of public opposition. As of December 2004, the company was in the process of requesting a lease for another site located several miles offshore and in very deep water, and was preparing a new Environmental Assessment (Hawaii Dept. of Land and Natural Resources; 2004).

Ahi Farms applied to lease two sites a mile offshore Kepuhi Point and Maili Point in 2003. The company proposed to establish 2 sites of 80 acres each that can hold up to 18 cages about 660 feet in circumference and 50 to 60 feet wide in waters with a depth of approximately 100 feet. As of December 2004, it had submitted its Federal permit application with the Army Corps of Engineers and was waiting for approval of its State Conservation District Use Application, with attached Environmental Assessment (ibid).

Another company, Pacific Ocean Ventures, is preparing an offshore lease application to grow moi and kahala in cages off the coast of Maui (Hawaii Dept. of Land and Natural Resource and Dept. of Agriculture; 2004). The company's proposal includes placing a cage in the Hawaiian Islands Humpback Whale National Marine Sanctuary. As of December 2004, the company was in the final stages of preparing the necessary Federal and State permit applications and lease request, which include an Environmental Assessment (ibid). However, the final minutes of the March 17, 2005, meeting of the Advisory Council of the Hawaiian Islands Humpback Whale National Marine Sanctuary states the company's Environmental Assessment was not accepted. It further goes to say that the company had proposed to place a cage in the heart of the Sanctuary, which is a "dense whale area that tends to have more mothers and calves."

In August 2003, Hubbs-Sea World Research Institute (HSWRI) leased part of an oil platform in the EEZ 10.5 nautical miles off the coast of Ventura, California, in the eastern Santa Barbara Channel with the intent to conduct a 3-year project to test the feasibility of using offshore platforms for the sustainable development of marine aquaculture (www.gracemaricultureproject.org). The Grace Mariculture Project, so named because it would operate from Platform Grace, would raise up to 300 metric tons a year of white sea bass, striped bass, rockfish, California halibut, California yellowtail and bluefin tuna, and shellfish such as mussels and abalone (Miller; 2005). The aquaculture project would use 10,000 square feet of deck, which is one-third of the platform's four decks, and place 4 submerged cages, each measuring 125,000 cubic meters, off the platform (ibid). According to the *Project Description*, the permitting process was expected to take place between January 2004 and August 2004, and upon approval, the project was expected to begin with cage and tank equipment delivery and assembly between April 2004 and December 2004. Nursery and grow-out were expected to begin in October 2004 (Hubbs-Sea World Research Institute; 2003). However, as of October 25, 2005, RSWRI's Grace Mariculture Project has not been permitted. Complicating the process is the fact that Crystal Energy, which also leases Platform Grace, is seeking permits to use the platform as an LNG import and regasification facility at the same time. If both projects were

permitted, the Grace Mariculture Operation would stop when the Crystal Energy LNG project is constructed.²

Currently Applying for Permits in the Gulf

A review of permit applications submitted to the Corps Regional Offices as of October 13, 2005, has shown there are presently no permit applications seeking to construct offshore aquaculture operations in the Gulf.

Past and Proposed Operations in the Gulf of Mexico, State and Federal Waters

The first offshore finfish aquaculture operation in the Gulf of Mexico was an experimental operation in Texas waters in the late 1980s and early 1990s. Texas Sea Grant scientists used an Occidental Petroleum Corp. (Oxy) platform to grow redfish (Waldemar Nelson International Inc.; 2001). Severe storms damaged some of the cages and fish escaped (Burdeau; 2005). According to an aquaculture specialist at Texas A&M, the cost of growing out the fish exceeded the market value of the harvest: the ocean-raised redfish worked out to a cost of \$22 per pound, whereas the market price for redfish was only \$3.50 per pound (ibid).

The second entity to propose offshore aquaculture operations in the Gulf and to begin the permitting process was Sea Pride Industries (Sea Pride), which proposed in the late 1980s and early 1990s to develop and operate offshore finfish farms in Alabama, Florida, and Mississippi waters in the Gulf of Mexico. On February 24, 1992, the Mississippi Department of Wildlife, Fisheries and Park granted a permit to Sea Pride to set up an aquaculture operation on a 40-acre site 3 miles south of Horn Island (Leffler 1992). However, the company lacked the venture capital and funding to cover the approximately \$5 million in set-up costs (ibid). On November 3, 1993, the Corps, Mobile District, gave final approval to one of Sea Pride's projects; however, after receiving that approval, NMFS expressed objection that there had been insufficient opportunity for comment (Waldemar Nelson International Inc.; 2001). According to an October 23, 1995, article in *Forbes*, Sea Pride Industries, Inc., of Gulf Breeze, Florida, was planning to operate a finfish farm 4 miles southeast of Alabama's Fort Morgan peninsula (Flanagan 1995). However, Sea Pride's projects never materialized and its Corps permit expired November 3, 1996.³

² Platform Grace is owned by Venoco, Inc. (Venoco) and leased by both Crystal Energy (Crystal) and HSWRI. Crystal's project would require the installation of several new components on or adjacent to the platform, and consequently, there could be conflict among the users of the platform. If HSWRI were to receive its permits before Crystal gets its permits, then it is possible that HSWRI could begin operations before Crystal, but then would have to cease operations once Crystal's LNG project was constructed (U.S. Coast Guard et al.; 2004).

³ According to a 1995 article in the Lakeland, Florida, newspaper, *The Ledger*, the company was accused of selling unregistered securities in Mississippi and Alabama (Kaczor 1995).³ The same article reports that the company, at that time, was planning to place a \$16 million dome-topped platform in the Gulf EEZ four miles southeast of Mobile Bay in Alabama and raise red fish, mahi mahi, red snapper, and other species in 6 barrel-shaped cages, each 170 feet long and which would extend from an oil and gas platform (ibid). On November 9, 1996, the *Miami Herald* reported that Florida regulators had accused the company of scheming to defraud investors through the sale of securities to finance a proposed fish farm in the Gulf.

The third and fourth applicants to propose offshore finfish aquaculture operations in the Gulf were Watermark Corporation (Watermark) and Marine Artificial Habitats, Inc. (Marine Artificial), which submitted applications to the Corps, New Orleans District, in 1994 (Waldemar Nelson International Inc.; 2001). Watermark proposed to establish a platform-supported fishery in Grand Isle Blocks 75 and 76 off the coast of Louisiana. The Corps returned the application to the company on January 12, 1995. Marine Artificial proposed to establish a privately managed artificial reef and processing plant in South Timbalier 176. Its application was denied and then withdrawn by the applicant.

The previous applicants did not seek to establish offshore finfish operations in Federal waters. The first applicant to propose an offshore finfish aquaculture operation in the Gulf of Mexico EEZ was SeaFish Mariculture L.L.C. (SeaFish Mariculture), which received final approval from the Corps, Galveston District, on July 3, 1997 (Waldemar Nelson International Inc.; 2001). A week later, NMFS published in the *Federal Register* a notice of receipt of SeaFish Mariculture's application for an exempted fishing permit (EFP) and a request for public comments (62 *FR* 132). In its application for an EFP, SeaFish Mariculture stated its purpose was to study over a 26-month period whether it is feasible to grow commercial quantities of native fish species in the offshore environment of the Gulf of Mexico using aquaculture techniques. To do so, it would place hatchery-raised juvenile fish in 3 cages attached to working oil and gas platforms located approximately 48 nautical miles south-southwest of Freeport, Texas; feed them; allow them to grow for approximately 12 months; harvest them from the cages; land them in Texas; and sell them.

SeaFish Mariculture received the first EFP for a marine finfish aquaculture project in the Gulf of Mexico EEZ in October 1997. The EFP authorized SeaFish Mariculture to harvest, possess, and sell red drum (*Sciaenops ocellata*), greater amberjack (*Seriola dumerili*), and red snapper (*Lutjanus campechanus*) from Federal waters of the Gulf of Mexico, to possess or sell greater amberjack or red snapper below the minimum size limit, and to harvest or possess red snapper in excess of established trip limits and/or during a closed season. Although SeaFish Mariculture successfully raised red drum from 3-inch hatchery raised fingerlings to market-size fish in a growth cycle of less than 12 months, the project did not make the progress as projected in the permit application. The first group of red drum fingerlings was stocked on November 30, 1997 (Hendrix; April 1998). Operations were disrupted by tropical storms and hurricanes in 1998 (Hendrix; September 1998). In fact, fish were either killed or escaped when the first cage was damaged by two storms and later destroyed by a tropical storm (Hendrix; September 1998). Another unanticipated loss of fish occurred during an attempt to move the cage as requested by Shell Offshore Services, Inc., which operated the platform, and which needed the cage to be moved in order to give its work boats clear access to the platform (Hendrix; July 1999). In July 1999, SeaFish Mariculture notified NMFS that it planned to terminate the project as a result of increased gas production at the site.

In September 1998, the Gulf Marine Institute of Technology (GMIT) and its partner, BioMarine Technologies, Inc. (BioMarine), received approval from the Texas General

Land Commissioner to use a 500-acre, four-platform oil and gas complex 10 miles southeast of Matagorda Peninsula to develop techniques to grow finfish in Texas waters (Poruban 2000; *Dewhurst v. Gulf Marine Institute of Technology*).⁴ In June 1999, the Corps delivered GMIT's permit to acquire and convert an existing oil and gas platform to an offshore aquaculture operation (GMIT website at <http://www.gmitinfo.com>). However, in October 1999, the Texas General Land Commissioner ordered GMIT and BioMarine to dismantle the platform within 120 days of July 1999, which was the date that the former lease was terminated (ibid). In response, GMIT and BioMarine sued the Texas General Land Commissioner. In a September 4, 2005, press release, GMIT and BioMarine announced that they had won their lawsuit and intended to proceed with a sea farming research and development project using the platform. Currently, according to GMIT's website, it has all necessary federal and state permits to begin its aquaculture operation.⁵

NMFS and the Gulf Council received the second EFP request for marine finfish aquaculture in the Gulf EEZ in 2003. Florida Offshore Aquaculture, Inc. proposed using four submerged sea cages 33 statute miles WSW of Johns Pass, Florida, to grow cobia, red snapper, Florida pompano, cubera snapper, greater amberjack, and mahi mahi. The Gulf Council considered the EFP request at their September 2003 meeting and recommended the EFP application be denied. The Council, as well as environmental organizations and individuals, identified numerous issues of concern, which are described in a December 23, 2003, *Federal Register* Notice (68 FR 246). In summary, it was concluded the applicants lacked the experience to comply with EFP conditions and had submitted false information in the application.

At its November 2003 meeting, the Gulf Council adopted a mariculture policy for the Gulf of Mexico EEZ. The Gulf Council's policy encourages environmentally responsible mariculture (www.gulfcouncil.org/downloads/Mariculture_Policy_GMFMC.pdf). In 2004, the Gulf Council completed a series of public hearings to review management options for offshore marine aquaculture in the Gulf under the MSA.

Expected Types of Marine Aquaculture in Gulf EEZ

The principal type of marine aquaculture system for finfish likely to occur under this amendment is cage or net pen culture, although other technologies are under development. This type of system is commonly used in areas with offshore sites exposed to rough weather and deep water. Therefore, it seems unlikely, in the near term, that other systems would be proposed for use in the Gulf EEZ for finfish. Recent advances in cage and net pen systems were discussed in Bridger and Costa-Pierce (2003) and the use of floating net pens in the Mediterranean Sea may lead to applications that include designs

⁴ Devon Energy Corporation (formally Seagull Energy) donated the platform with a \$5 million value to GMIT. GMIT agreed to dismantle the platform at an estimated cost of \$2.5 million once it ceases its aquaculture operation.

⁵ According to a December 22, 2002, article in *The Houston Chronicle*, GMIT and BioMarine president, John Ericsson, said it planned to stock 5 heavy mesh cages with 100,000 fingerlings from Florida, the Carolinas, and Hawaii and have as many as 100 cages spread over 500 acres of open water. GMIT's website states that its products will be cobia, red drum, amberjack, and red porgy.

proven in the waterbody (See Stickney, 1997, and Tucker, 1998, for discussion of other systems).

Cages confine the fish in the water column with enclosures made of nylon mesh netting or wire covering or suspended from a support frame in the water column. Net pens are floating or suspended enclosures with circular, square or rectangular shaped frames of plastic or galvanized steel hung with synthetic netting. The enclosures may be closely linked with interconnected frames or moored in close patterns by lines and chains. Currently, cages or pens are anchored, but there are innovative designs that propose free floating cages placed in oceanic gyres and monitored via satellite uplinks or ship-like structures with an enclosure attached to its hull that would maintain position at sea or slowly navigate within a favorable current pattern.

Usually pelleted feed is introduced one or more times daily. Unconsumed feed, feces and other waste products from the fish drift through the cage netting down current where it may settle, dissolve, or be consumed by other marine organisms. As the fish grow larger, the amount of feed increases as does the amount of waste material produced daily. Using appropriate management practices and advanced technology, wastes are kept to a minimum to ensure appropriate environmental conditions are maintained for high fish health and to increase economic viability through minimal food wastage. Fate of excess feed and feces would include consumption by fish attracted to the structure, with the remainder eventually reaching the sea floor over a broad dispersal area created by offshore currents. Decomposition of this remaining organic matter occurs either in the water column or on the bottom. Cages are suspended above the bottom for feeding operations, but can also be lowered below the surface to reduce the possibility of damage from hurricanes and similar storms. They may also be lowered in the water column to stabilize the water temperatures as cold fronts move through, to prevent vandalism and reduce the effects of wind and waves during non-storm periods. (Stickney 1997).

Many researchers have indicated that offshore oil and gas platforms, in addition to being used for fish culture, could be used for culture of coral and live rock for the aquarium trade and certain sponges of importance to the pharmaceutical firms for extraction of medicine. The space under a platform could be used for coral and live rock culture. Sponges can be cut into many segments and attached to platform structures. Each segment would regenerate a whole sponge. None of these invertebrates would require feed, but feces and other organic detritus from feeding fish may enhance their growth (Dr. Sammarco and Mr. Kolian, 2003, Pers. Comm.).

Likely species to be targeted for offshore aquaculture in the Gulf EEZ are: cobia, red drum, red snapper, black seabass, mutton snapper, greater amberjack, vermilion snapper, Nassau grouper, red grouper, and black grouper.

Expected Economic Effects of Finfish Aquaculture in the Gulf EEZ

There is presently no finfish aquaculture in the Gulf EEZ. Consequently, the portion of the economic baseline attributable to existing finfish aquaculture in federal waters of the

Gulf of Mexico is zero: zero landings, revenues, profits, employment, and other economic benefits, and zero economic costs. However, there are commercial finfish aquaculture operations in state waters.

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