Sea Grant

Sea Grant Contributions to the Nation in

Marine Aquaculture

Assisting commercial development

The emergence of a U.S. marine aquaculture industry is constrained by its complex technology, diversity of species, multiple user conflicts, environmental and ecological concerns, and a fragmented institutional and regulatory system. Such constraints prevent traditional coastal aquaculture from expanding to reach its potential and block the application of new and innovative approaches to developing sustainable marine aquaculture.

The National Sea Grant College Program — a university-based, multidisciplinary research, education, and extension network committed to the balanced use and conservation of marine resources — is poised to help the U.S. marine aquaculture industry develop through an integrated program of research, education and technology transfer focused on key scientific, engineering, environmental, and socioeconomic issues and opportunities that currently inhibit this emerging industry.

Priority areas to be addressed by the national Sea Grant network include:

- **Culture System Technology Development:** Marine aquaculture operations will involve three distinct environments: the nearshore/coastal region; the Exclusive Economic Zone seafloor; and the open ocean surface and water column. Utilization of each environment presents unique system engineering, technological and security challenges.
- **Nutrition and Feeds:** Research and development efforts must evaluate feed components in relation to organism growth and final product quality, as well as the stability of formulated rations and alternate protein sources.
- **Genetics of Cultured Species:** Research must identify gene complexes responsible for reproduction, growth, disease resistance and other desirable traits so that state-of-the-art genetic manipulations can be applied to marine species.
- **Health and Disease:** We must better understand the immune systems of marine organisms and the potential for the production of vaccines in finfish and shellfish. A great need exists for improved diagnostic capabilities for aquatic pathogens and parasites, new therapeutants, and streamlining the approval process for applying therapeutants in aquaculture.
- **Stock Enhancement:** The potential for rebuilding collapsed wild fish stocks through the use of aquacultured fish must be fully explored, including a solid scientific understanding of the impacts of hatchery-produced fish.

Sea Grant Produces National Benefits

Within the past five years, Sea Grant aquaculture research, education and outreach activities have resulted in:

- pathbreaking studies that have enabled controlled spawning of fish species that could not be cultured previously, including hybrid striped bass, cobia, mutton snapper, red snapper, flounders and moi;
- larval culture techniques for flounders, cobia, snappers, sturgeon and other species, making commercial-scale production possible in several states;
- production of disease-free oyster spat for restoration efforts becoming a reality;
- trials with commercial collaborators that are producing vaccines against bacterial diseases in several fish species;
- negative impacts from wastewater discharges, which can be controlled through the use of improved feeds for shrimp and fish or by treatment using seaweeds;
- clam seed continuing to be shipped to northern locations, maintaining a seed industry valued at $500,000 in just one southern state;
- commercial-scale grow-out of cobia and moi in offshore cages, which is being accomplished with industry partners;
- filtration systems for recirculating culture systems that improve nutrient removal efficiencies to lessen the impact on receiving waters;
- the organization of fish and shellfish growers associations in several states and educational programs and technical assistance to improve business operations, profits and job opportunities;
- assistance for commercial shrimp and clam growers in obtaining USDA crop insurance for products valued in excess of $15 million;
- assistance in the development of the Pearl Research and Training Program and provision of technical assistance to the pearl culture industry;
- provision of training in business management, nursery techniques and seafood safety that resulted in a hard clam industry valued at nearly $55 million in one state;

- a series of International Recirculating Aquaculture Conferences attended by equipment manufacturers, commercial aquaculturists, academics, regulators and investors from 34 states and 10 foreign nations;
- demonstration of a commercial-scale shrimp farming system using zero water exchange technology to farmers, bankers and regulators;
- assessment of the impact of rapid salinity changes on hard clam seed, resulting in techniques that allow clam farmers to make improved planting and seed transfer to minimize losses;
- controlled reproduction of red abalone and identification of the chemical cues necessary for successful larval settlement;
- expanded market opportunities for freshwater crayfish by determining its potential use as saltwater angling bait;
- establishment of AquaNIC as a web-based national information resource pioneering the use of distance-learning technologies to deliver scientific information to aquaculturists. This site averages 31,000 hits per day from around the world

Building the Future on Successes of the Past

The complex nature of issues and problems facing the emerging aquaculture industry continues to impede development to its full economic potential. While progress has been made, continued support through Congressional action is necessary for the industry to approach the aquaculture policy goals stated by the Department of Commerce and NOAA. At least $5 million for each of the next ten years is necessary for the National Sea Grant College Program to conduct research, education and outreach activities that will result in fulfilling those goals.

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