



## Project Descriptions

### 2007 National Marine Aquaculture Initiative Grant Awards

#### **1. Developing marine stock enhancement and aquaculture technology for common snook**

The goal of this project is to advance aquaculture technology for common snook in order to demonstrate the economical effectiveness of stock enhancement using this highly prized recreational species. The major impediment to large-scale culture of snook is the lack of controlled maturation and spawning technology to produce large numbers of larvae and juvenile snook. Specifically, this project will develop a year round captive spawning protocol, develop induced spawning techniques, and provide eggs for pond trials. This research is a critical first-step towards achieving the capacity for a snook stock enhancement program.

#### **2. Pilot-scale tests of an ocean drifter**

This pilot study will assess the feasibility of an open-water drifter for farming fish offshore. The project will test the ocean drifter concept by installing a self-propulsion system on an Ocean Farm Technologies AquaPod™ 3500 cage, determining the effect of propulsor operation on fish behavior and oxygen levels, and conducting self-propelled sea trials to quantify energy requirements and determine control strategies. This research could provide insight and new direction for the future of offshore aquaculture projects.

#### **3. Cageless, open-ocean ranching of black sea bass**

This study aims to develop a program to condition black sea bass to respond to an acoustic signal when being fed in controlled environments so that after release into the wild, fish may be easily recaptured upon hearing the acoustic signal. The project will complete basic laboratory investigations necessary to develop an acoustic-conditioning paradigm, perform field tests to grow acoustically-conditioned black sea bass released in open waters without confinement, document growth and recapture rates of black sea bass, and develop an understanding of the economics associated with such a method for open ocean finfish ranching and stock enhancement.

#### **4. Development of a commercial United States sea urchin aquaculture facility**

This project will develop an economically viable and environmentally friendly sea urchin aquaculture farm. The study will determine optimum site selection criteria, develop the hatchery and demonstrate husbandry technologies, formulate least-cost pelleted diets, and develop a new raceway facility and demonstrate technology. The project will also demonstrate product quality, collect data for an economic model, and work with appropriate agencies to develop regulations for sea urchin culture and disseminate information on the role urchins play in the ecology of the ocean environment.

## **5. Developing new methods for successful geoduck clam farming**

The end product of this research is to develop recommendations and guidelines for production efficiency and yield improvements while addressing the environmental effects of geoduck aquaculture. To do so, the project will develop environmentally and economically effective methods to exclude predators and reduce juvenile geoduck mortalities, evaluate how to reduce and/or mitigate potential negative effects of farmed geoducks on wild stocks (if negative effects do occur), and compare benthic communities, sedimentation, and water column interactions to assess environmental effects of geoduck culture.

## **6. Metabolic and molecular responses of captive tunas to diets varying in caloric content**

The objective of this project is to examine the relationships between temperature, metabolism, diet and growth in captive Pacific bluefin tuna. Experiments will focus on measuring the metabolic responses of a captive population of adolescent tuna to ambient temperatures and diet regimes using both swim tunnel respirometry across temperatures and implantation of archival tags in captive fish in the land-based facility as well as in pens. At a molecular level, muscle differences will be examined between captive tuna fed different diets to establish gene expression profiles, and biopsies from penned tunas will be examined to correlate metabolic and androgen characteristics of muscle with market value. This research will provide valuable insight into the effects of different feeds on metabolism and ultimately value of bluefin tuna.

## **7. Improving the hatchery output of Hawaiian pink snapper to meet stock enhancement and open ocean aquaculture expectations**

This study aims to develop hatchery technologies for rearing larvae that result in juvenile pink snapper production suitable for managing the fishery as well as use for commercial-scale open ocean culture activities. The research will investigate the food value of various live food options, visualize the feeding mechanics of larval snapper, and define food/larvae ratios, tank conditions, and appropriate nutritional quality of feeds resulting in optimal growth and survival of larval snapper.

Additionally, this study will develop mass-cultivation methods of live food organisms for larval snapper and demonstrate a cost-effective means for vaccination of juvenile snapper. The results obtained in the laboratory will be validated at a pilot-scale facility and developed technologies will be transferred to agencies and industry.

## **8. Commercialization of Bait Shrimp Farming Based on Specific Pathogen-Free Stocks (funding continued from 2006)**

The goal of this project is to determine the economic feasibility of culturing two native species of shrimp used as bait by recreational fishermen throughout the southeast United States. Specifically, researchers will isolate and reproduce healthy broodstock from the wild, demonstrate commercial production for the two species, and conduct a market evaluation and financial feasibility analysis. The results will be transferred to the private sector through targeted outreach and demonstration projects. Ultimately, the results of this research could relieve pressure on wild shrimp stocks in the United States and provide an economic development opportunity for U.S. coastal communities.

### **9. Hawaii Offshore Aquaculture Research Project (funding continued from 2006)**

This project will identify and address the next steps in the successful demonstration of sustainable offshore aquaculture in the United States. Specifically, this phase of ongoing offshore aquaculture research will use existing open ocean aquaculture operations and research infrastructure in Hawaii to address critical scientific and regulatory issues in the genetic management of cultured stocks, examine disease transfer between wild and culture stocks, and advance the environmental modeling of cage effluents relative to the surrounding marine environment.

### **10. Assessment of Environmental Impacts of Offshore Cage Culture (funding continued from 2006)**

The goal of this project is to determine the best way to detect the impacts of nutrient levels from open ocean aquaculture at the earliest stages so that potential problems can be identified and steps taken to minimize impacts. Specifically, this project will determine the impacts of two submerged fish cages on the surrounding environment in the coastal waters of Culebra, Puerto Rico. This research is important because ecosystem susceptibility to nutrient loads from submerged fish cages varies by location.

### **11. Culture of California Yellowtail as a Model for Marine Aquaculture (funding continued from 2006)**

The goal of this project is to conduct a commercial-scale test on the feasibility of growing California yellowtail as a model for marine aquaculture. Specifically, the project will address the economic and production issues for yellowtail from egg to market size. California yellowtail is one of the prime candidates for the expansion of commercial aquaculture in the United States

### **12. Demonstrating Technological and Economic Feasibility of Cobia (funding continued from 2006)**

Although cobia is one of the prime candidates for expansion of aquaculture in the United States, there are critical issues that need to be resolved before commercial production of this species can move forward. Specifically, this project will examine several cobia production issues including hatchery techniques, disease control, production technology, and fingerling transfer. The project will emphasize technology transfer to industry.

### **13. Commercialization of Black Sea Bass Aquaculture (funding continued from 2006)**

This project will demonstrate black sea bass aquaculture in the United States. Specifically, the research will look at the feasibility of culturing black sea bass in land-based recirculating systems. Researchers will also conduct economic and market analyses as part of this study. Ultimately, the results of this research could bring another cultured species into the marketplace, creating jobs and economic opportunity for coastal communities.

#### **14. New Technologies for Cod Culture (funding continued from 2006)**

This project will leverage current research and the resources of industry partners to provide a road map for the establishment of sustainable Atlantic cod aquaculture throughout the northeast region of the United States. Specifically, the project will support hatchery technology development, develop improved organic feeds, and clarify the permit process for cod culture in nearshore and open ocean environments. Atlantic cod are one of the prime candidates for expansion of aquaculture in the United States.