2012-2013

Florida Aquaculture Plan

Aquaculture Review Council

Recommendations for Research and Development

Adam H. Putnam
Commissioner of Agriculture
Florida Department of Agriculture and Consumer Services

Dear Floridians:

It is my pleasure to present the *Florida Aquaculture Plan*, a summary of the current research and development priorities for Florida's aquaculture industry. Florida aquaculturists farm an estimated 1,500 aquatic species, from tropical fish to succulent clams, generating an estimated $250 million economic impact in Florida.

While there have been many successes through the years, there remains an array of challenges facing the industry. The *Florida Aquaculture Plan* provides a brief overview of Florida aquaculture and identifies areas where more work is needed to help our producers meet the challenges of today's global marketplace. These priorities cover a wide range of topics from the simple to the complex, much in keeping with the nature of an agricultural activity that has been a part of Florida's farmscape for more than a century.

This plan was crafted in cooperation with Florida's Aquaculture Review Council. The Council, created by statute in 1984 as an advisory committee to the Florida Department of Agriculture and Consumer Services, is comprised of working farmers representing the diversity of aquatic animals and plants grown in Florida. The Aquaculture Review Council has identified these priorities as industry recommendations that will help sustain and facilitate continued growth of Florida aquaculture.

Through the years, the Council's annual identification of impediments to aquaculture development has led to advances in the culture of new species, adoption of new technology, focused market promotion and development and increased state agency capacity to address science and regulatory issues. These successes have translated into employment opportunities and income for rural communities throughout Florida.

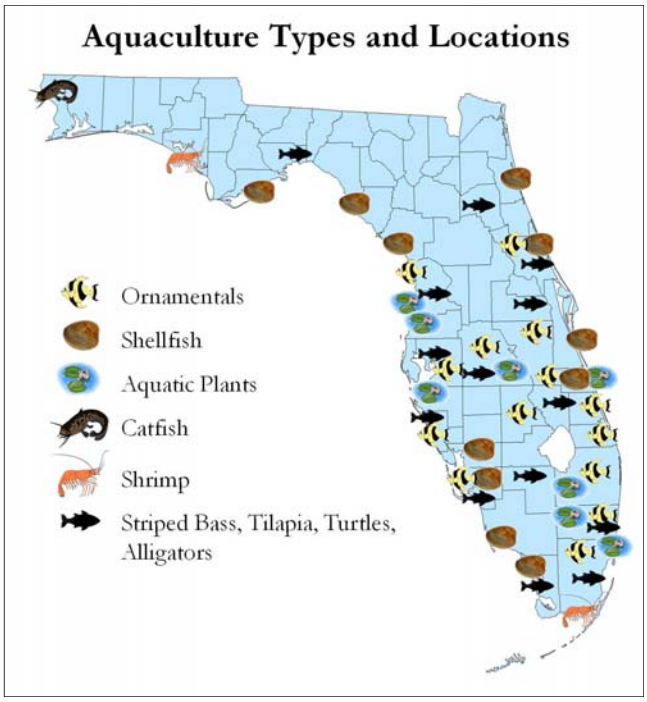
The Department of Agriculture and Consumer Services will work closely with the Aquaculture Review Council throughout the upcoming year on innovative ways to address these priorities.

I encourage all Floridians to learn more about this diverse industry at www.FloridaAquaculture.com or contact the Florida Department of Agriculture and Consumer Services, Division of Aquaculture at (850) 488-5471.

Adam H. Putnam
Commissioner of Agriculture

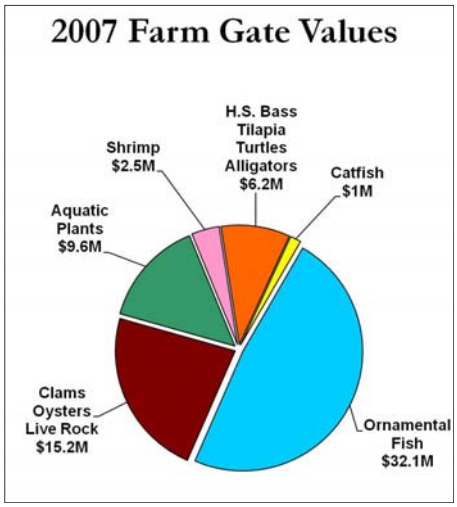
Overview of Florida Aquaculture

Florida's aquaculture industry produces the greatest variety of aquatic species of any state in the nation. Our aquaculture producers farm an estimated 1,500 aquatic species or varieties of fish, plants, molluscs, crustaceans, and reptiles. There are approximately 900 certified aquafarms in Florida, located in every region of the state. Every day, Floridians see the bounty of this industry…from admiring colorful tropical fish and aquatic plants in an aquarium to enjoying succulent clams on their dinner plate. More recently, aquacultured algae products are even being explored for their potential as a bio-fuel.



Florida's aquafarms are primarily small enterprises with owners and family members often serving as the primary operators of the facility. The most recent economic data shows that more than 50 percent of these operations had annual farm gate values of less than $50,000. Of the remaining operations, most had farm gate values of less than $250,000, yet all of these operations have one thing in common – they are important economic engines for the rural areas in which they are located.

The Florida Aquaculture Policy Act established that aquaculture is agriculture, consolidated state regulatory responsibilities into one agency, created the Aquaculture Review Council as an advisory council to the Department of Agriculture and Consumer Services, and provided a mechanism to invest public funds to address industry-identified research and development priorities. By adopting commonsense regulations and centralizing state expertise in one agency, the Legislature created a hospitable climate for aquaculture to not only grow but thrive in Florida.



Florida was the first state in the nation to develop a Certified Aquaculture Program. Certified facilities must implement environmentally-oriented best management practices and are inspected twice a year by Division of Aquaculture staff for compliance. Producers must include their Aquaculture Certificate of Registration number on all aquaculture products from harvest to point-of-sale. Aquaculture Certified products are considered agricultural products and as such, certified aquafarmers are exempt from certain regulatory and sales tax requirements as well as many commerce restrictions that apply to wild-harvested species.

The Aquaculture Review Council meets quarterly to discuss the challenges facing the industry as well as the opportunities for continued growth. Every major aquaculture farming sector is represented on the Council including alligator, aquatic plants, food fish, mollusc and tropical fish as well as commercial fishing. Annually, the Council identifies research and development issues that, if addressed, will increase the industry's competitiveness or facilitate continued growth. These issues become the basis for the annual *Florida Aquaculture Plan*.

Research is critical to the industry's continued ability to meet the challenges of today's global economy. Unfortunately, due to the relatively small size of the industry and thus a lower potential profit margin, research of this nature is not being conducted in the private sector. Annually, the Division of Aquaculture publishes a Request for Statements of Interest to solicit research projects from investigators across the state. The Council serves an invaluable role in reviewing submitted research proposals for their applicability to the *Florida Aquaculture Plan*. Because the Council is drawn from every sector of the industry, it can quickly identify areas where a small public investment will go a long way in moving the industry forward. Once approved by the Council, the Commissioner of Agriculture includes the research projects in the Department's annual budget submission to the Governor and Legislature. Results of funded research projects are provided to the industry and the public at large.

For 2012-2013, the Aquaculture Review Council has recommended to the Commissioner of Agriculture that the following projects be included in the Florida Department of Agriculture and Consumer Services budget request:

Commercialization of Florida Pompano Production in Inland Re-circulating Systems - Harbor Branch Oceanographic Institute at Florida Atlantic University

Pilot-scale Comparison of Three Methods for Controlling Off-Flavor in Re-circulating Aquaculture Systems for Food Fish Production - Harbor Branch Oceanographic Institute at Florida Atlantic University

Removal of Off-Flavor Compounds in Aquaculture Food Products: Optimizing New Techniques for Sustainable Aquaculture Systems – University of South Florida

Aquaculture in Action: Enhancing the *Teach Aquaculture* Curriculum for Novice Teachers – Harbor Branch Oceanographic Institute at Florida Atlantic University and University of Florida

Development and Evaluation of Goggle Eye Grow-out Methods and Feeds Using Re-circulating Aquaculture Systems to Service the Florida Sportfishing Industry – University of Miami, Rosenstiel School of Marine and Atmospheric Science

Integrated Aquaculture of Marine Fish and Plants for Food and Restoration Using High and Low Salinity Re-circulating Systems - Mote Marine Laboratory, Center for Aquaculture Research and Development

The creation of an annual *Florida Aquaculture Plan* was mandated in statute by the Legislature to ensure information regarding the current status and needs of Florida's aquaculture industry were effectively communicated to the Governor, Commissioner of Agriculture, Legislature, state agencies, farming community and the public. The *Florida Aquaculture Plan* describes research and development priorities which, if addressed, could lead to the creation of new agribusinesses, greater employment opportunities for Floridians and increased income for aquaculture producers.

The 2012-2013 *Florida Aquaculture Plan* divides the research and development priorities of the industry into three broad topic areas - Research, Marketing, and Regulatory. The Florida Department of Agriculture and Consumer Services' Division of Aquaculture will be working closely with the industry in the months ahead to address and, where feasible, resolve issues identified in the *Florida Aquaculture Plan*.

Research

Innovations in culturing new species, reducing the cost and refining the production of existing species and development of new technologies to manage operations with maximum efficiency will ensure Florida's aquaculture industry remains competitive in today's global marketplace.

Species

Small farms do not have the facilities or expertise to methodically determine species reproduction and grow-out characteristics to prove that any particular species can be spawned and grown in the farm environment.

Determine species reproduction and grow-out characteristics of the following species:

- Ornamental fish – Priority species as identified by the Florida Tropical Fish Farm Association
- Marine - Redfish, cobia, southern flounder, pompano and white shrimp
- Freshwater - Sturgeon (including Atlantic sturgeon) and hybrid striped bass
- Sport and gamefish – Redfish, spotted seatrout and snook
- Bait – Pinfish, goggle-eye, killifish and white shrimp
- Mollusc - Hard clam stock improvement, sunray venus, blood ark and eastern oyster
- Marine shrimp - Identify and test methods to improve growth rates in the latter half of the grow-out cycle in pond production systems

Nutrition

Nutritional needs evolve as aquatic species grow, mature and become sexually active. A competitive strength for Florida aquaculture is the large variety of species that are produced, but that strength also poses challenges in that commercially available diets for these species are not always readily available.

Develop:

- Specialized diets for ornamental fish to improve health, survival, growth and species coloration
- Algae-based fish feeds
- Live feed protocols for marine ornamental fish based on wild population diet data

Broodstock

Marine ornamental species consist primarily of small reef fish. The reproductive cues for these species are largely unknown, especially at the micro-scale. The ability to emulate those cues would provide significant benefits to Florida's aquaculture industry.

- Identify social/environmental cues necessary for marine ornamental fish to initiate and complete natural reproduction in captivity to produce viable larvae

Animal Health

Florida is the largest producer of ornamental species in the United States. An estimated 600 to 800 species or varieties have been or currently are grown in Florida. Aquarium hobbyists demand species variety, but not all species respond similarly to pathogens or disease treatments.

- Identify ornamental species emerging diseases including diagnostic tools and possible treatment options

Technologies

Lowering labor and production costs, including those related to energy usage, is a priority of Florida's aquaculture producers. Enhancing product value and developing alternative energy sources and energy storage options increases our industry's competitiveness globally.

Develop effective technology to:

- Improve pond aeration systems
- Improve water quality management in re-circulating systems
- Reduce operating costs of re-circulating systems
- Control microbial communities in marine ornamental fish hatcheries and larval rearing systems
- Eliminate or control off-flavor within food fish grown in intensive, re-circulating production systems
- Quantify larval densities in tank production systems
- Estimate mortality rates during shrimp grow out in pond production systems
- Determine phytoplankton levels on shellfish aquaculture submerged land lease sites
- Culture in a closed system the aquatic plant *Egeria densa*

Compare cost-effectiveness and efficacy of the following:

- Technologies for surveillance and security in shellfish aquaculture lease areas
- Alternative energy systems capable of heating and pumping water
- Energy storage options for aquafarms

Environmental Interactions/Risk Analysis

The aquaculture industry is capable of producing many different varieties of aquatic species. Unfortunately, government regulations prohibit some of this production. These regulations are often based on out-of-date or limited risk assessments where new information could justify removal of an existing prohibition. In addition, aquaculture exists in a dynamic marine environment which can present unique environmental challenges.

- Compile information on the environmental benefits of shellfish aquaculture
- Compare various techniques/methods to control bio-fouling (including pest and predator) of shellfish farming gear and products
- Compare effects of various types/designs of rearing tanks on marine ornamental fish production

- Test and improve survival of post-larval shrimp during the acclimation process from high salinity hatchery waters to low salinity waters used in pond production systems
- Determine the most important water quality parameters (i.e., mineral composition) for shrimp growth and survival in the low salinity water used in pond production systems

Information needed to inform updated risk analyses:
- Current literature on the ecological, economic and human health risks of tropical ornamental species including areas needing additional study for current risk assessments
- Methodologies for tropical ornamental species that distinguish between low-risk species and high-risk species
- Physiological tolerances of tropical ornamental fish
- Development of a conceptual model and escape scenarios that detail probabilities for non-native fish in a certified facility to survive and establish in the natural environment

Economics

Analyzing economic and market information is an important tool to inform public policy developments and private business decisions.

- Compile and analyze Florida aquaculture production statistics and associated economic impacts to the state including individual sector analysis
- Compare and contrast the cost of production between pond, cage, re-circulation and hybrid systems for aquaculture

Research Capabilities

The Aquaculture Review Council has identified a need for specific expertise in the following fields of study and the associated funding to increase research capacity at Florida-based research facilities.

- Fish Nutritionist
- Aquatic Botanist

Marketing

Small farms lack the capacity to effectively market their production. Every sector of aquaculture identified increased marketing efforts as a critical component to their continued growth.

Applies to all Florida aquaculture products:
- Increase demand
- Identify market opportunities and constraints
- Assess current marketing strategies to determine efficacy

Specific sector related issues:
- Develop a certification/marketing program with the Department featuring the sustainability impacts of Florida's molluscan shellfish aquaculture industry
- Regain Florida Alligator Marketing and Education Advisory Committing (FAME) funding
- Develop incentives for alligator leather product manufacturing in Florida to increase hide consumption
- Develop incentives for fish processing facilities to locate in Florida

Regulatory

Government regulatory policies may disproportionally impact small farms as they are often crafted to address larger constituencies. In addition, the original intent of the policy may be outdated or no longer serving its intended purpose. Florida's aquaculture industry has identified a number of regulatory policy areas (both state and federal) where resolving outstanding issues could be beneficial to the industry.

State

Water Management Districts

- Facilitate automatic renewal of existing Consumptive Use Permits (CUP)
- Increase CUP interval from 10 to 20 years
- Maintain consumptive use permit allowances when converting from crop or grove operations to aquaculture

Florida Fish and Wildlife Conservation Commission

- Update tilapia rules by determining tilapia species distribution in Florida
- Amend current rules to allow production and sale of largemouth bass and snook as food products

Department of Environmental Protection

- Define shellfish shore-based support facilities as eligible for "working waterfront" designations

Federal

U.S. Food and Drug Administration

- Trade – If a drug is prohibited for use in products produced in the U.S., prohibit entry of any imported products on which that drug has been used
- Achieve new drug approvals for aquatic species

National Marine Fisheries Service (U.S. Department of Commerce)
U.S. Fish and Wildlife Service (U.S. Department of the Interior)

- Remove existing prohibitions on the production and marketing of aquacultured products whose wild counterparts may be state or federally listed as endangered
- Allow the marketing of shortnose and beluga sturgeons

In summary, the issues delineated above represent the current priorities of Florida's aquaculture industry. In the coming year, the Florida Department of Agriculture and Consumer Services will work cooperatively with our federal and state agency partners to resolve some of the regulatory hurdles that are impeding growth of the industry. In addition, the Department will continue to ensure that the Florida Legislature is informed of the industry's research needs so that any research funding made available will be directed to the areas identified in the Plan.

For additional information, please contact:

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Front cover images (counterclockwise starting at top left): Siberian sturgeon provided by the Mote Marine Laboratory, alligator hatchlings provided by the USGS Southeast Ecological Science Center, blue ram cichlid provided by the Florida Tropical Fish Farms Association, tropical water lily provided by Suwannee Laboratories, Inc., hybrid striped bass provided by Carl Webster with Kentucky State University, and sunray venus clam provided by the University of Florida, Institute of Food and Agricultural Sciences.

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