

Florida Aquaculture Plan

Fiscal Year 2014-2015



Prioritized applied research and economic development recommendations from the Aquaculture Review Council for the purposes of creating new farms, job opportunities, increased farm income and other benefits to the state of Florida.



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

Florida Aquaculture Plan

Fiscal Year 2014 – 2015

Dear Floridians:

Annually the Aquaculture Review Council, an advisory group to the Florida Department of Agriculture and Consumer Services, revises the *Florida Aquaculture Plan* to identify new applied research and economic development priorities that may increase statewide aquaculture production. These identified priorities result in state funded research which has led to the creation of new farms, job opportunities, increased farm income, and other benefits to the state of Florida.



Florida aquaculture is composed of small family-owned farms that culture many different kinds of aquatic plants and animals. During 2012, Florida aquaculturists sold \$69 million worth of products into food (primarily shellfish and fish products) and ornamental (aquarium, water garden, and pet) markets.

This *Plan* identifies a variety of priorities focused on species development, production cycle improvements, technologies, animal and plant health, nutrition, environment, marketing and economic development. The department will be working the Council over the next year to identify, evaluate and select additional projects to address these priorities.

Please visit our website, www.FreshfromFlorida.com, to learn more about Florida aquaculture or contact the Division of Aquaculture at (850) 488-5471.

Thank you,

Adam H. Putnam

Commissioner of Agriculture



Applied Aquaculture Research and Development Priorities

An annual Florida Aquaculture Plan is authorized by statute to communicate research and economic development needs by Florida aquaculturists to state government and the public. The goals for addressing these priorities are to:

- Diversify production.
- Improve farm productivity.
- Reduce input costs.
- Increase farm-gate income.

The priorities provided here are also used by the Aquaculture Review Council and the department to guide an annual applied research grant program. This applied research answers biological or technical challenges that benefit aquafarmers raising food, aquarium and bait fish and crustaceans, aquatic plants, clams and oysters, alligators and turtles.

Research Priorities

Species

- Determine ornamental fish species reproduction and grow-out characteristics of priority species identified by the Florida Tropical Fish Farms Association.
- Diversify commercial molluscan shellfish species by determining reproductive, production and/or marketing characteristics and potential.
- Examine the commercial feasibility of producing and marketing cobia, spotted sea trout, red snapper, red drum, black sea bass, southern, summer or Gulf flounder and other promising marine food fish species in outdoor ponds, raceways, tanks or indoor tank or raceway systems to include an analysis of production costs and market returns.
- Examine the commercial feasibility of producing and marketing live pinfish, pigfish, killifish (*Fundulus grandis* or *F. similis*), finger mullet, ballyhoo, pink, brown or white shrimp and other promising species as sportfish bait in outdoor ponds, raceways, tanks or indoor tank or raceways systems to include an analysis of production and marketing costs and returns.
- Develop and test the culture (production systems, costs, and market value) of the blue crab (*Callinectes sapidus*).

Production Cycle Improvements

- Identify social/environmental cues necessary for marine ornamental fish to initiate and complete natural reproduction in captivity to produce viable larvae.
- Compare effects of various types/designs of rearing tanks on marine ornamental fish production.
- Achieve the masculinization (improved color and/or finnage) of ornamental fish through chemical or environmental treatment.
- Develop chemical or physical pond treatments to eliminate predacious zooplankton.
- Identify physiological conditioning requirements (environmental and/or nutritional) and histological indicators to achieve and maintain sunray venus clam broodstock reproductive maturity and productivity for successful year-round spawning.
- Develop remote technologies for shellfish growing area surveillance and security.
- Shellfish gear improvements: extend shellfish grow-out bag and net materials working life.
- Develop closed system culture techniques for the aquatic plant *Egeria densa*.
- Improve aquatic plant production techniques for new and existing species that will improve growth rate and production system design and operation.
- Scale-up for commercial application prior research supported by the Aquaculture Review Council to mitigate off-flavor compounds in closed systems used to produce food fish.
- Produce a how-to manual for the construction, maintenance and operation of an alligator anaerobic lagoon waste treatment system.
- Develop the means and/or methodology to assess shrimp densities during pond grow-out.
- Develop water quality specific mineral supplement recommendations for low-salinity marine shrimp grow-out.

Technologies

- Develop a brevetoxin enzyme-linked immunosorbent assay (ELISA) test for shellfish (oyster, clam or mussel) meats.
- Investigate and compare costs of alternative energy sources (i.e., electric, propane, solar) to heat small and large scale grow-out systems.

Animal and Plant Health

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

- Control microbial communities in marine ornamental fish hatcheries and larval rearing systems.
- Identify a hatchling alligator treatment or handling method to reduce or eliminate excessive umbilical scarring.

Nutrition

- Develop live feed protocols for marine ornamental fish based on wild population diet data.
- Create a research capacity to develop and test fish feeds that is linked to a feed mill that will produce feed in small batches for on-farm testing under commercial conditions.

Environment

- Evaluate and recommend water conservation practices including the availability and use of non-potable water sources.
- Science-based risk assessment and management of non-native species that informs responsible cultivation.
- Quantify disturbed and undisturbed habitat biotic and abiotic resistance to non-native species introduction.
- Develop and test environmentally compatible production technologies appropriate for small shellfish farms (low-cost, robust, and labor saving).
- Develop methods to evaluate shellfish production technologies relative to environmental effects, cost effectiveness and efficiency.
- Evaluate environmental benefits/ effects of shellfish grow-out and harvesting; compile information on the environmental benefits of shellfish aquaculture.
- Improve understanding of shellfish farm environmental interactions on water quality, benthic soil, and bathymetry.
- Compare various techniques/ methods to prevent and control biofouling of shellfish farming gear and products.
- Compile and publish data proving the value of riparian aquatic plants to reduce nutrients in surface waters flow from land-to-water.
- Develop recommendations that identify correct plant species to use in the appropriate setting (i.e., upland, shoreline, emerged, littoral, or submerged plantings) when designing and construction a wetland mitigation/restoration project.

Marketing Priorities

- Create and distribute a publication that describes Florida aquaculture: Culture methods, species grown, and potential environmental effects.

- Determine whether the consumer is discriminating between wild-harvested or farm-raised shellfish.
- Carryout a shellfish promotion/public education campaign for a segment of the population most likely to consume Florida grown products.
- Test the effectiveness of shellfish product brand communication and consumer recognition using social media to quantify the value-added benefit.
- Assess the return on investment amongst existing food marketing shows.
- Test shellfish product branding approaches (regional vs generic vs a product quality characteristic).
- Compare, contrast and estimate product value improvements between various processing methods (e.g., freezing, irradiation, packaging) for oysters and clams (hard and sunray venus).
- Improve shellfish processors and public understanding of food safety and quality issues across the entire processing system from production practices to consumption.
- Educate the public, consumers, resource managers, boaters and others about the benefits of shellfish, shellfish culture, and the importance of a clean coastal environment.
- Create and conduct an aquarium fish and plant promotional campaign to increase sales and product values.
- Create a directory of aquatic plant growers and products and distribute that directory to potential buyers (e.g., landscape architects, wetland restoration specialists, wholesale and retail nurseries, and wholesale and retail aquarium products).

Economic Development Priorities

- Conduct a Florida aquaculture versus foreign competitor strengths, weaknesses, opportunities, and threats analysis that will yield actionable recommendations to improve national and global competitiveness.
- Conduct a Florida aquaculture development analysis to: 1) Define aquaculture resource needs: water, soils, temperature, 2) Describe and map geopolitical regions of the state that welcome aquaculture activities, agriculture zoning, potential municipal partnerships that will accept effluents, and farming segments that will accept effluents for crop irrigation, and 3) Combine and provide this information as a geographic information system (GIS) tool to state and county economic development officials.
- Compare and contrast public and private insurance products and services appropriate for the shellfish (oyster, clam or mussel) farming community and recommend improvements to available products and services.

Glossary

Anaerobic – Without oxygen.

Aquaculture – Cultivation of aquatic organisms (597.0015(1) F.S.).

Bathymetry – Underwater equivalent of topography that describes the bottom contours.

Bio-fouling – The attachment and growth of unwanted marine algae and animals (e.g., barnacles, oysters, calcareous worms) on hard or soft surfaces that add weight, restrict water flow, or create a safety hazard.

Benthic soil – The mix of clays, sands and organic matter that makes up the bottom of the sea.

Brand - The American Marketing Association defines a brand as a "name, term, sign, symbol or design, or a combination of them intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of other sellers."

Brevetoxin – Toxic compounds contained in marine microorganisms that make up red tide.

Broodstock – Sexually mature animals maintained to reproduce and yield fertile eggs, larvae, or fingerlings for sale to other farmers or for grow-out on the farm.

Closed system – Water is filtered and recirculated with a tank or raceway production system.

Enzyme-linked immunosorbent assay (ELISA) – A wet chemistry analytical tool that involves a compound (antigen) that binds to a known antibody that is linked to an enzyme. When the antigen and antibody combine a recognizable color change occurs that indicates the antibody is present.

Farm-gate – A price paid to the farmer for her or his production.

Geographic Information System (GIS) – Digitally recorded geographic information that is captured, stored, manipulated, analyzed, integrated, managed, and displayed as an interactive map.

Grow-out system – Tanks, raceways, ponds or combination thereof in which aquatic species are held captive, fed, protected, and monitored.

Larvae – Any early motile life stage that develops from a fertilized egg and which may include a variety of life forms to survive changing aquatic environments.

Littoral - Close to the shore.

Live feed - Specific phyto- or zooplankton species produced to feed fish larvae.

Off-flavor compounds - Complex organic molecules produced by microorganisms in a production system that are absorbed by fish and create unpalatable tastes and smells.

Ornamental fish or plants - Fish or plants produced for their color and/or shape for sale to aquarium and water garden hobbyists.

Phytoplankton - Microscopic single or multicellular plants or organisms that use chlorophyll to produce energy that drift in the water column.

Riparian - Interface between land and water.

Shellfish - Bivalve molluscs grown for human consumption (oysters, clams, scallops or mussels).

Stocking rate - The number of animals placed into a pond, tank, raceway or on leased submerged coastal lands for grow-out to a marketable size.

Zooplankton - Microscopic or very small animals that float in the water column and feed on organic debris or other plankton.



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FDACS-P-00061 Rev. 10/2013