

CHARLES H. BRONSON, Commissioner of Agriculture

Florida Aquaculture Plan 2005-2006



DIVISION OF AQUACULTURE
FLORIDA DEPARTMENT OF AGRICULTURE
AND CONSUMER SERVICES



April 2005

Dear Florida Aquaculturists:

The State of Florida has been a leader in aquaculture production and support for many years. Being home to exemplary producers, researchers, marketing experts and supply companies, our state has much to offer existing and prospective aquaculturists. For these reasons, I am pleased to present you with the seventh edition of the *Florida Aquaculture Plan*. The *Plan* is a compilation of information about Florida aquaculture (species in culture, production systems, technological developments, and market challenges) and the public investment needed to sustain growth and development. This document serves as a planning tool to coordinate the efforts of state agencies, the public and private research community, the Legislature, and other interested parties.

In addition to the challenges faced by Florida farmers in producing and marketing high quality products while remaining competitive, our farmers face further challenges as a result of an unprecedented four major hurricanes sweeping through our state during 2004. The *Florida Aquaculture Plan 2005-2006* identifies technical, production, economic and market related challenges that must be solved to fuel sustained, managed and continued growth. Please join me in resolving those challenges so that future generations of Floridians may benefit by our investments in education, research and on-farm application of these advances.

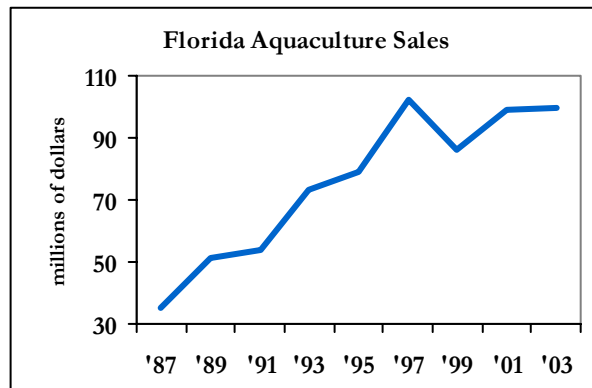
Sincerely,

A handwritten signature in black ink that reads "Charles H. Bronson". The signature is written in a cursive, flowing style.

CHARLES H. BRONSON
COMMISSIONER OF AGRICULTURE

Executive Summary

Florida aquaculture grew rapidly from 1987 to 1997 (the first survey of the industry was in 1987). Farm gate value tripled from \$35 million sold by 342 farms during 1987 to \$102 million sold by 696 farms during 1997. Most recently, Florida aquaculture farm gate sales have leveled to some extent, with 2003 sales reaching \$99.5 million. Over the last 21 years, since the inception of the Florida Aquaculture Policy Act, the Florida Legislature has repeatedly amended the Act to consolidate regulatory activities to one agency, recognize that aquaculture is an agricultural endeavor, and invest public funds in applied research, industry development, several job retraining programs, and public education at the high school and university levels. Through these critical public policy changes and public investments the makeup of the industry has evolved and grown to



benefit rural communities and small businesses throughout Florida. As examples of these impacts, hard clam farming (practiced by farmers living in rural, coastal communities) contributes \$55 million annually in total economic activity and Hillsborough County has invested considerable public funds in support of tropical fish production that is a vital economic engine for its rural population.

Florida aquaculture is on the cusp of significant expansion with major components of public research, extension, production, economic development, and marketing organized for growth and maturity. Preparation for the future has come not a moment too soon. The United States is the third largest consumer of seafood in the world, importing 77 percent of its seafood fare. We imported fish and shellfish products worth 21.3 billion dollars during 2003 and exported 12 billion dollars for a net trade deficit of 9.3 billion dollars. National per capita consumption of fresh and frozen fish and shellfish set a new record of 16.3 pounds. Florida is also a huge market for seafood with an international reputation for delicious seafood that is sold through a \$15 billion restaurant industry and 4,600 seafood retailers (independent and grocery chain stores) to satisfy 75 million visitors and 17 million residents. Florida's residents are seafood lovers. They consume 30 to 40 pounds of seafood (purchased and self-caught) per person per year which is more than twice the national per capita average of 16.3 pounds.

Florida Aquaculture is a very diverse industry across the variables important to aquafarming: species, production system and geographic location. Floridians farm an estimated 1,500 species or varieties of fish, plants, mollusks, crustaceans and reptiles. These products are sold into food and non-food markets that include seafood, freshwater and marine aquarium hobby, high fashion leather, water gardening, bait, or biological control. Farm designs used to produce these products include lined and unlined earthen ponds, raceways, indoor tanks or hybrid systems of tanks and

ponds, and submerged sovereign land leases. Aquaculture facilities have been constructed and managed to be environmentally compatible with Florida's abundant natural resources and varied ecotypes and have dramatically improved the efficient use of land and water. Aquaculturists in 1987 managed 8,425 acres of land and water spread over 342 farms to produce \$4,154 worth of sales per acre. In 2003, 544 Florida aqua-farms more than tripled the value of products sold per acre to \$15,426 through efficient water management and re-use and improved production practices on 1,415 fewer acres of land and water.

The *Florida Aquaculture Plan 2005-2006* provides an analysis of industry status and identifies technical, production, economic, and market related challenges that must be conquered to insure continued growth and expansion. Societal, political and economic trends that are accelerating globalization of trade, information exchange, and technology sharing demand unceasing innovation by Florida farmers to remain competitive. Florida's Aquaculture Review Council identified the following challenges. Each challenge is of equal importance to the industry.

Industry Infrastructure

Improvements in aquacultural production fundamentals pay huge dividends for all farmers no matter their size or scale. Florida farmers are seeking assistance to develop innovative production techniques and add approved drugs, chemicals or develop alternative husbandry methods to combat pests and diseases. Currently there are three approved therapeutic agents available for a limited number of fish species.

The growing cost of labor (salaries and benefits) can be offset if the employee has a grasp of aquaculture at theoretical and practical levels. Farmers want to determine the quality of the educational programs available through a survey that identifies content, graduation rate and student test scores for aquaculture educational programs in Florida. This information will be utilized to advocate enhanced educational opportunities at the technical and university levels.

Ornamental Fish and Aquatic Plant

Tropical ornamental fish and plants compose over 70 percent of Florida aquaculture sales. Farmers are seeking improved production techniques for existing and new species. Aquatic plant producers wish to quantify plant nutritional needs. These producers also need a means to monitor, collect and disseminate up to date information about regulatory actions in other states. A growing segment of the industry produces marine ornamental fish and invertebrates, but there are huge information gaps. Marine ornamental producers would benefit from research to quantify and qualify marine ornamental species physiological, nutritional, cultural, economic, health management and market information. Across the spectrum of farmers that are producing ornamental species there is strong support for funding to strengthen the national marketing campaign, *Dive-In!*, that is working to expand the hobby in cooperation with aquarium equipment manufacturers and distributors.

Food Production

Business associated costs are higher in Florida than the other food fish producing states, states like Alabama, Arkansas, Louisiana and Mississippi. Florida farmers growing food species such as

catfish, tilapia, hybrid striped bass, sturgeon, hard clams or various marine species are seeking public investment in integrated production, economic and marketing demonstration projects to prove the feasibility of new production technologies or significant improvements proposed for tried-and-true grow out systems. Florida aqua-farms are generally small which requires a greater commitment of time and money by farmers to market their crops. To ease that burden, Florida food species producers are seeking public investment into market research and increased support for an integrated industry-public agency marketing effort.

Alligator

Alligator farmers experience a unique set of challenges. None of the considerable amount of biological information common to many of the species cultured in Florida applies to alligators. Research is required to develop effective and efficient feeds (size, texture, and integrity), life stage nutritional needs, and a genomic database. In recent years a skin disease has spread amongst farm-raised alligators that dramatically reduces hide value. Work is needed to identify and develop treatments for skin diseases and parasites. Traditional markets have been in Asia and Europe. The prolonged global economic doldrums has turned farmer attention to seeking support for two intertwined efforts: developing new markets and expanding existing markets and creating an alligator leather products production, wholesale and retail infrastructure to serve existing and new markets.

Gamefish: Fry, Fingerlings and Stockers

To insure an exciting day of fishing, private pond owners or commercial fee fishing operators buy largemouth bass, hybrid striped bass, bream or catfish to place in their ponds. Farmers producing gamefish in various life stages, fry, fingerlings or fish ready to be caught (stockers), need microencapsulated feeds and the techniques to mass culture plankton to improve the survival of newly hatched fry. They are also seeking improved techniques to reduce mortality at time-of-sale through new low impact handling/grading and culture techniques.

Biotechnology

Biotechnologies are and will greatly improve existing production and husbandry techniques for maximum efficiencies and environmental compatibility. Cryopreservation of gametes and germplasm to preserve founder stocks and endangered species can be achieved. Cultured species will benefit through genetic engineering to yield varieties with improved survival, growth and vigor. The complete understanding of gene regulation will unlock the secret of year-round spawning for those species that currently require complex environmental triggers. Aquatic animal health will be a benefactor through gene therapy techniques; brood stocks free of pathogens; safe, effective prophylactic agents, including immune modulators antigens and vaccines; safe, effective therapeutic agents; improved delivery systems for natural and synthetic hormones; and improved systems for administering prophylactic and therapeutic agents. Genetic engineering of nitrifying and denitrifying bacteria will greatly reduce the costs of operating fully enclosed, recirculating systems. Transgenic fodder plants without amino acid deficiencies may completely replace fish meal in pelleted diets. Probiotic use may reduce or eliminate the need for antibiotics and provide the basis for diets that include microorganisms designed to supply specific proteins and enzymes. Biotechnology could also provide new species for culture. Recent research in biotechnology has

yielded faster growing catfish, spectacular ornamental fish, sponges for commercially important secondary metabolites, and the production of serums, enzymes, anti-viral compounds from marine bacteria found in the Arctic and in deep ocean thermal vents. It is critical that Florida continue to improve its programs of basic research to ensure future advancements in the commercial application of these complex technologies are achieve their stated goals and pose little to no risk to human health, environment and agriculture.

Purpose/Intent

As set forth in Florida Aquaculture Policy Act, Chapter 597, Florida Statutes, aquaculture is agriculture and the Florida Department of Agriculture and Consumer Services is the lead aquaculture agency (see Appendix A) . The Act also directs the Department to coordinate and assist in the development of aquaculture and to regulate aquafarms with the objectives of conserving Florida's natural resources and protecting environmental quality. In order to meet these objectives, the Department's Division of Aquaculture was created on July 1, 1999. The Act directs the Department to annually revise the *Florida Aquaculture Plan*.

The *Florida Aquaculture Plan 2005-2006* is created to ensure effective communication between the industry, agencies, Legislature and public about the status and needs of Florida's aquaculture industry. The *Plan* describes industry priorities and identifies mechanisms for increasing aquaculture production, which leads to the creation of new industries, job opportunities, income for aquaculturists and other benefits to the state. Funds designated by the Legislature for aquaculture research and development must be used to address the projects and activities designated in this *Plan*.

The Florida Aquaculture Review Council (see Appendix B), an industry advisory committee to the Commissioner of Agriculture uses the *Florida Aquaculture Plan 2005-2006* as a steering document. The Council annually weighs proposals for aquaculture research. Projects are reviewed for their applicability to the goals and needs identified in this *Plan*. The recommendations of the Council are then transmitted to the offices of the Commissioner of Agriculture, Governor and Legislature.

2004 Hurricane Season

More significant to Florida aquaculture than any other recent event was the unprecedented 2004 hurricane season. Four major storms, Charley, Frances, Jeanne, and Ivan, affected nearly every producer and significantly impacted a large portion of the industry. Early estimates of losses come to over seven million dollars.

The first hurricane, Charley came ashore on Friday, August 13th and began the incredible six week pounding that lasted until September 21st with Hurricane Ivan. Charley traveled through North Captiva Island, Bokeelia at the tip of Pine Island, Punta Gorda, Port Charlotte, and then followed the Peace River on through Arcadia to cross the state and exit via Daytona Beach. Three Aquaculture Use Zones and two private aquaculture leases in Charlotte Harbor and Pine Island Sound that encompass 265 acres were severely damaged. Extensive wind and wave scouring flipped clam bags, ripped cover nets, and redistributed sediments to smother clams not covered by woody debris and an influx of freshwater reduced salinity to 20 parts per thousand.



Fish farms, ornamental and bait, located along the storm path (Charlotte, Desoto, east Polk, Hardee, and Osceola Counties) reported extensive structural damage. Farms lost small buildings, trailers, and roofs. The prolonged loss of power inhibited aeration, and combined with summer temperatures, killed or stressed fish in production.



Hurricane Frances closely followed causing devastating damage to clam farms along the Indian River. There was substantial loss of infrastructure that supports hard clam production and marketing including docks, boats, clam seed hatcheries and raceways, processing plants, and associated buildings. Long time hard clam hatcheries that provide seed to Florida and out-of-state farmers through the Atlantic Coast region were severely damaged by high winds, tidal surge, and rain. About 1,285 acres of sovereign submerged lands on Florida's East Coast were adversely affected by the storm. Planted clams were killed or scattered by pounding waves that scoured the river bottom and heavy rain that reduced salinities in the Indian River lagoon. Damage to clam hatcheries, lost roofs, and power outages stopped algae production and stressed clam seed.

Heavy rainfall across the state, 11 inches reported in Lakeland and 10 to 12 inches in Cedar Key, flooded fish production ponds and lowered estuarine salinities. Upland farms that lost production buildings or the roofs on those buildings during Charley were beginning to rebuild when heavy rains from Frances hit. This frustrated farmers who had already experienced delays in regaining electric power and finishing up insurance damage assessments. Frances' rains slowed recovery efforts for several more weeks in Port Charlotte and Pine Island Sound as record floods in the Peace and Caloosahatchee Rivers emptied into Charlotte Harbor and San Carlos Bay, respectively.

Hurricane Ivan, packing 130 mile per hour winds and torrential rains, came ashore near Mobile, Alabama causing widespread and severe damage to Pensacola and West Florida. Catfish farmers with 700 acres of pond production experienced electrical power outages, flooded roads, and structural damage to barns and bulk catfish feed bins.

In a terrible twist of fate, Hurricane Jeanne brought renewed destruction to aquaculturists across Florida that had yet to recover from Hurricane Frances. Packing stronger winds and more rain, Jeanne came ashore near Vero Beach and moved quickly across the state following the swath of destruction laid down by Frances. Jeanne flooded fish ponds from coast-to-coast as



well as ripping roofs off and demolishing barns and buildings that had survived Frances.

Florida agriculture sustained billions of dollars in damages, including lost crops and structural damage to facilities. For the aquaculture industry specifically, especially hard hit were shellfish, tropical fish and aquatic plant production. Shellfish on grow out leases had high mortalities, but the largest losses experienced during the 2004 hurricane season were to infrastructure. Facility damage was considerable. Some producers will likely leave the aquaculture industry as a result of these events, while others will be rebuilding for some time. The affects of the 2004 hurricane season will be felt among Florida's aquaculturists for years to come.



An Introduction to Florida Aquaculture

Florida Aquaculture is an extraordinarily diverse industry across the species, production systems and geographic locations found in the state. There are an estimated 1,500 species or varieties of fish, plants, mollusks, crustaceans and reptiles grown by over 1,000 certified aquaculturists. Florida aquafarms produce products for food and non-food markets that include seafood, freshwater and marine aquarium hobbyists, high fashion leather, water gardening, bait, biological control or as “seed” for national and international aquaculturists to culture.

Farm designs include lined and unlined earthen ponds, raceways, indoor tanks, hybrid systems of tanks and ponds, and leased submerged sovereign lands. Aquaculture facilities have been constructed and managed to be environmentally compatible with Florida's abundant natural resources and varied ecotypes. Florida encompasses 58,560 square miles, including 4,308 square miles of water, bordered by a tidal shoreline 2,276 miles in length. Surface water resources consist of 50,000 miles of streams and rivers, 7,800 lakes and 4,000 square miles of estuaries and abundant groundwater resources which supply 90 percent of the state's population with potable drinking water and 50 percent of the water needed for agriculture, industry, mining, and electric power generation. Its marine waters extend three miles into the Atlantic Ocean and nine miles into the Gulf of Mexico with Florida composing the eastern shore of America's only Mediterranean-type sea: the 600,000 square mile Gulf of Mexico. Florida is also unique to North America in that its 447 mile north-to-south axis traverses a sequence of diverse ecotypes: north Florida red clay hills, longleaf pine flatwoods, coastal estuaries of the Gulf and Atlantic coasts, deep white sands of the Lake Wales ridge, bald cypress swamps and wet prairies, Gulf and Atlantic coast barrier islands, south Florida karst limestone soil, and the Caribbean-style islets of the Florida Keys. These unique ecological characteristics yield a mosaic of habitats and organisms that have been shaped by: geographic location bridging tropic and temperate zones, ancient and recent geological history, humid climate at a latitude characterized by deserts, and peninsular configuration that combines island and continental biogeographies. Florida's environmental complexity is robust and yet fragile if not managed in the near- and long-term to conserve natural resources and manage a growing population.

Aquafarming steadily increased during the 1980s and 1990s with some leveling since 1997. Farm gate value almost tripled from the \$35 million sold by 342 farms during 1987 to the \$99.5 million sold by 544 farms during 2003. Public investment to create education and demonstration facilities and to fund applied research has fueled much of this growth. Industry expansion has yielded economic benefits to rural communities and increased crop diversification. Several examples illustrate these efforts. Rural coastal communities hit hard by fishery regulations have welcomed the jobs and income by hard clam farming. Hard clam production has rapidly grown from \$0.43 million worth of product sold during 1987 to \$13 million in 2003. The Big Bend, Charlotte Harbor and Indian River near Sebastian are principal clam production centers that generate \$55 million in total economic impact to the State of Florida (labor, input purchases and ancillary businesses). One of Florida's richest counties, Hillsborough, recognized the phenomenally low ratio of public service support dollars to net economic impact generated by ornamental fish farms and, together with the state and federal governments, supports a dynamic research facility in Ruskin, the University of Florida's Tropical Aquaculture Laboratory, to strengthen Florida's tropical fish and aquatic plant aquaculture. Citrus producers suffering low product prices are examining the potential to grow marine shrimp in hard freshwater and pushed for the construction of a shrimp demonstration and education farm at the Indian River Research and Education Center.

Florida aquafarms are small enterprises in which the owner/operator and family members or partners provide labor and financing. Aquaculturists used 7,010 land and water acres in 2003. Most of the farms are small with 44 percent planting three acres or less, 20 percent using three up to six acres, 22 percent using six up to 20 acres, ten percent 20 up to 50 acres, and three percent 50 and more acres.

Land and water utilization efficiencies have dramatically improved over the last 15 years as a result of public investment in research and demonstration. Aquaculturists in 1987 managed 8,425 acres of land and water to produce \$4,154 worth of sales per acre. In 2003, Florida aqua-farms more than tripled the value of products sold per acre to \$15,426 through efficient water management and re-use, improved production practices and the addition of some higher value species.

The diversity in species and production systems provide advantages to small aquafarms. Commodity agriculture creates opportunities for farm concentration and economies of scale that are not readily available to the small farmer. However, large farms cannot readily adopt flexible production schedules, rapidly evolving biological and technical knowledge or access specialty niche and ethnic markets. Small farmers can adapt to changing circumstances (market or technology) to stay one step ahead of global competition. Florida aquaculturists are primarily small farmers and the importance of public sector investment in Florida aquaculture cannot be overemphasized. Production and technical information tailored to small farms (scale and cost) and information delivery methods that accommodate small businesses that do not have spare time or personnel are needed. Current public investment to build research or demonstration facilities in Gainesville, Cedar Key, Ruskin, Bartow and Ft. Pierce creates the opportunity to extend information where it is needed in formats and forums that are readily absorbed and immediately implemented by small farms.

Tropical Ornamental Fish Production

Ornamental fish production started in Miami in the late 1920s. Tropical fish farming rapidly expanded following the return of World War II veterans. They brought home an appreciation for colorful Asian tropical fish and aquatic plants and began experimenting with outdoor ponds in the warm climate of South Florida. In 1960 these pioneers demonstrated the feasibility of air transport by shipping Florida raised fish via a DC-3 on a round-the-world tour. Today, tropical fish production is concentrated in Hillsborough and Polk Counties with some farms located near Miami to take advantage of the Tampa, Orlando or Miami international airports.

Ornamental fish for the home aquarium and water garden are Florida's most valuable aquaculture products accounting for 49.4 percent of total aquaculture sales. The 2003 survey by the Florida Agricultural Statistics Service reported 151 producers with farm gate sales of \$47.2 million. An estimated 600 to 800 species and varieties are produced. Well known aquarium fish include guppies, mollies, swordtails, tetras, gouramies, goldfish, angels, barbs and African cichlids.

While the freshwater ornamental fish industry has experienced steady growth since the first aquaculture survey in 1987, the current national economic doldrums combined with the explosive growth in pet superstores and changing patterns in the spending of disposable income have impacted product distribution and sales. Tropical fish farmers are surviving by modifying production to avoid certain low-valued species, adopting production strategies to reduce cost and intensify production, supporting the national *Dive-In!* promotional campaign created and implemented by the Department, and differentiating their business on a service basis. Standard pond production technologies are being gradually improved and intensified to increase production system control and reduce costs. Farmers are adding greenhouse pond covers for freeze protection during the winter and building recirculation systems to increase stocking rates and avoid predation and weather related losses. Farmers have also tested consumer direct marketing via the Internet and tailored production to fit in with "big box" retail store demand and pricing.

The future for ornamental species production, which requires a warm climate and higher levels of technology than many other forms of aquaculture, is extremely bright in Florida. The University of Florida has strengthened its role through sustained expansion and technological improvements at

Transgenic species engineered for commercial aquaculture have been developed to improve yields or product value or to reduce production costs through increased disease resistance, growth rate, food conversion, thermal tolerance, human nutritional value, esthetic value or pharmaceutical production. These desirable traits have positive economic and environmental benefits, but there may be associated environmental, agricultural or human health risks.

A Transgenic Aquatic Species Task Force has been created by the Department to address such concerns. This group of scientists from various state agencies completes a science-based risk analysis for each application for transgenic species production received from an aquaculture producer. The Task Force advises the Department whether culture and sale should be allowed and if so, under what special conditions.



Two Florida aquaculture facilities are now producing a transgenic ornamental fish marketed as the Glofish™. The fish is a patented zebra danio modified by the addition of a sea anemone gene which triggers a red glow under certain lighting conditions. The Task Force reviewed and approved the production of this fish.

the Tropical Aquaculture Laboratory in Ruskin. The Laboratory has demonstrated the culture of higher valued species, production systems, on-farm management and aquatic animal health practices, and is continually testing a variety of production systems to conserve water, increase yields and reduce on-farm mortality. The Lab offers diagnostic and production related services and has expanded the number of pesticides available to the farmer through special use labels. The level of available expertise at the Laboratory has also recently increased with the additions of an U.S. Department of Agriculture Veterinarian Medical Officer and a non-native fish specialist.



The freshwater ornamental fish sector is a mature agri-business with an 80-year history of growing fish in Florida. Farmers are focused on maintaining market share and developing new techniques to improve production as well as add new species that are currently imported or entirely new to the hobby. Public assistance is needed to improve profitability and environmental sustainability through activities that include approval of therapeutants to maintain fish health, refinements in water quality management and conservation, new breeding and production methods to create brighter colors and eye-catching finnage, and national promotion to expand the aquarium-keeping hobby.

Aquatic Plant Production

Aquatic plants are primarily produced in the central and southern portions of Florida. During 2003, 35 farmers marketed \$20.4 million worth of aquatic plants to reach the aquarium, water gardening, wetland restoration and food markets. In excess of 600 plant species were cultured with most of the production geared to aquarium and water gardening markets. Common types include hardy and tropical water lilies, lotuses, *Vallisneria*, *Aponogeton*, *Cabomba*, and watercress. Sales have been stable since the mid to late 1990s with increasing competition from overseas producers in China, Holland and Israel. Large wholesalers have switched from domestic sources and are primarily buying from foreign producers. Florida producers are continuing to adjust production to target midsized wholesalers or large retailers by offering a full-line of plant species and aggressively seeking new species or breeding new varieties to produce fuller, more colorful flowering plants.

Aquarium plant producers are supporting the national *Dive-In!* aquarium hobby promotional campaign and all aquatic plant producers are increasing their marketing efforts to counter foreign competition and communicate product information and availability.

Aquarium plant producers propagate colorful, slow growing submerged plants that enhance the beauty of home aquariums. Plants with interesting textures, shapes, colors and sizes create living, three-dimensional



habitats and absorb nutrients to keep aquariums healthy and vibrant. Aquarium plants are available bunched, bare-root or potted, depending on their growth characteristics and value.

Water gardening has become very popular in the United States as means to add beauty and value to homes and businesses. Horticulture, trade and consumer publications have nourished this interest by featuring articles describing the design, construction and maintenance of ponds, fountains and grottos. Aquatic plants are an essential component for functional and aesthetic purposes. Florida growers of water lilies and submerged and emergent aquatic plants started production in the mid-1980s and have significantly expanded each year to meet demand. Considerable effort has been made by producers and University of Florida horticulturists to perfect hybridization and tissue culture techniques to produce new and colorful lilies and to standardize the appearance of popular plants.

A wide variety of native aquatic plants, as well as aquatic plant habitats, are damaged directly or indirectly by human habitation. Ecologists, engineers, and other professionals have developed methods to restore damaged wetlands and mitigate unavoidable losses. Laws requiring wetland restoration have created a mitigation plant industry. The demand for mitigation plants is directly tied to the construction industry and the state's efforts to gradually phase out the collection of wild wetland plants.

The aquatic plant production sector of Florida aquaculture will continue to grow as interest in water gardening expands and wetland mitigation/restoration grows. The industry is in need of additional pesticides for use in controlling pests on the farm. The recent success of the Tropical Aquaculture Laboratory to gain special use labeling for a commonly available pesticide has brought welcomed relief to growers beset by a variety of invertebrate plant pests. Research into the nutritional needs of aquatic plants and research to determine production methods for plants not currently in culture will help boost the industry.

Marine Ornamentals and Live Rock

Estimates are that 1.5 – 2 million households worldwide keep marine aquaria (approximately 600,000 in the United States). The global wholesale trade in marine species for aquaria amounts to \$200-330 million and includes fish, corals, sponges, anemones, mollusks, crustaceans and live rock. The annual marine ornamental fish trade is estimated to be 20-24 million organisms, worldwide. Approximately 1,400 marine ornamental fish species, 500 invertebrate species and an additional 140 coral species are wild-caught and sold into the trade.

Most of the wild caught species are associated with reef systems because the majority of pelagic species are unsuited to life in small to medium aquaria. Due to advances in aquarium keeping, "mini-reef" aquariums are now possible and are one of the fastest growing components of the hobby. In comparison to freshwater



fish tanks, mini-reef aquariums require live rock and sand and a variety of reef invertebrates to properly function as captive ecosystems. All of these factors have energized efforts to culture ornamental marine species for the aquarium trade. Only about 40 of the species currently traded can be farm raised and are commercially available. Cultured fish account for one to two percent of the global trade.

Enterprising Florida farmers have been commercially raising clownfish since the early 1970s. Three facilities were dedicated to the culture of marine tropicals with emphasis on clownfish. Currently, a variety of marine species (gobies, dottybacks, sergeant majors, queen triggerfish, angelfish and ornamental shrimp) are being investigated or produced on a limited scale. Rapid growth in the production of marine tropicals is hampered by a lack of information related to life history, culture techniques, nutrition, health management and economic analysis.

In addition to colorful and exotic marine reef fish, hobbyists are also interested in a wide variety of crustaceans, corals and mollusks. Various ornamental shrimp (golden banded coral, fire, Caribbean anemone, clown anemone and peppermint), mollusks (queen conch, Florida fighting conch, giant clams (*Tridacna* spp)) and other invertebrates (feather duster worm) are prime candidates. Immediate production and distribution of these species is slowed by work needed to resolve larval survival or regulatory conflicts.

Live rock consists of living marine plants and animals growing on the surface and within the crevices of dead coralline rubble pieces or porous rock types. Encrustation may consist of sponges, algae, anemones, marine worms, tunicates, bryozoans and an undefined number and variety of microflora and fauna. Hobbyists value the live rock for aesthetic and functional reasons. Live rock in an aquarium creates an instant reef of varied life forms and the macro and microbiotic components maintain water quality. Approximately, two pounds of live rock are used for every gallon of water in the aquarium.

The harvest of naturally-occurring live rock in Florida waters (state and federal) was prohibited in the late 1990s. During the peak, roughly 300 tons of live rock valued at an estimated \$10 million were harvested annually. Former live rock harvesters have established nearly 50 submerged land leases in state and federal waters. They have deposited rock on these leases to provide a substrate for the recruitment of encrusting species. Their success has been mixed with location and luck playing a large role. Rock placed too shallow becomes an attachment site for undesirable algae and all sites have experienced damage and loss due to algae blooms and tropical weather systems. Farm gate sales for 2003 were reported around \$660,000.

To satisfy some of the demand for marine ornamentals, a wide variety of organizations around the world have been working to solve biological and technical problems. Floridians have been at the forefront of these efforts but have lacked the resources to sustain consistent physiological, nutritional, culture and market research for a wide variety of high quality species. The Florida Sea Grant Program and the University of Florida's Tropical Aquaculture Laboratory have made recent commitments to expanding public sector research and extension education efforts in marine ornamentals, focusing on farmer needs and opportunities.

Clam, Oyster, Scallop and Mussel Production

Florida is perfectly positioned as the preeminent source of wild-harvested and farm-raised mollusks. Estuaries on the Gulf and Atlantic coasts are highly productive, have clean water, and moderate temperatures that make for a long growing season that can yield marketable shellfish in a third of the time that northern growers experience. Approximately 1.4 million acres spread over 38 shellfish management areas are actively monitored by the Department in accordance with the Model Shellfish Ordinance created and maintained by the Interstate Shellfish Sanitation Conference to insure wholesome and safe shellfish are available to national and international consumers. Florida's principal mollusks are the hard clam and American oyster; although, several other bivalve mollusks are being tested to diversify production.

The northern hard clam is farmed to satisfy national demand for food and seed clams in three regions of the state: Big Bend, Charlotte Harbor and Indian River Lagoon. Production of farm-raised hard clams has grown at an almost exponential rate since 1995 when public investment occurred to retrain fishers impacted by a Constitutional Amendment that limited certain fishing practices. Between 1995 and 2001 the value of hard clams more than tripled from \$5.4 million to \$18.3 million. The most recently reported sales figures (2003) indicate some decline to \$13 million.



While total sales have grown rapidly, per unit revenue and total farm profitability have declined. To offset a trend of low prices that will be exacerbated by increased production, clam farmers are seeking public sector investment in efforts to: reduce mortality during culture, continue and improve a pilot crop insurance program managed by the U.S. Department of Agriculture, market hard clams to Florida's 17 million residents and 75 million seasonal visitors, diversify production with new species, reduce seed costs, and increase shelf life through improved handling and temperature management. The vehicles to drive these initiatives has been laid with increased cooperation amongst research institutions and state agencies that have focused on clam production needs and the recent completion of a shellfish research laboratory on Cedar Key by the University of Florida.

A statewide shellfish extension specialist and scientists from the University of Florida are investigating the variables to determine optimal productivity of current aquaculture lease areas, evaluating planting rates and analyzing total carrying capacity. In cooperation with the Department, real-time weather and water quality characteristics are being posted to the Division of Aquaculture web site for farmers to make on-the-spot planting, harvesting and crop maintenance decisions (visit <http://www.FloridaAquaculture.com>). They are also investigating the potential to broaden Florida's mollusc product line by spawning, culturing, harvesting, handling and marketing a variety of alternative species. Several mollusks (blood and ponderous arks and sun ray venus

clam) have proven market value and demand but little is known about their production characteristics. Market and production work are needed for a variety of other candidates: Southern surf clam, angel wing clam, pen clam, queen conch, Florida fighting conch and green mussel.

Another valuable shellfish is the American oyster, now cultured on over 500 acres of State owned submerged lands leases as constructed and maintained oyster reefs. These leases, located in Apalachicola Bay, yields a very flavorful oyster that is served on the half-shell to discerning oyster connoisseurs throughout the United States. Low market prices for wild-harvested oysters have limited growth in culturing oysters. Recently consumer interest in fresh oysters has increased and may reignite efforts to investigate the production of sterile, triploid oysters. A triploid oyster does not expend energy on summer reproduction and yields a full-meated product all year long.

The sophisticated production and marketing infrastructure developed to support the hard clam industry provides a model and avenue for the immediate marketing of alternative mollusc species and should greatly shorten the time required to move a species from an experimental stage to the consumer. In a span of 20 years the cultured hard clam has evolved from the interest of a few farmers to Florida's role as the preeminent source of U.S. farm raised hard clams. The opportunity and potential to repeat this success for one or more mollusks is entirely possible and probable if sufficient public investment is made into the basic production and marketing work to prove farm and market level feasibility and profitability.

Marine and Freshwater Crustacean Production

Pacific white shrimp, Malaysian prawn and Australian red claw crawfish are produced in greater or lesser amounts in Florida for a variety of markets. Interestingly, all are grown in freshwater including the Pacific white shrimp that is grown in hard freshwater (nonpotable water used for irrigation with a hardness in excess of 100 parts per million calcium carbonate).

Production of Pacific white shrimp for retail and restaurant markets and as "seed" for national and international farms is limited to south Florida and the Keys. Shrimp farming is highly speculative and technically demanding. A intensive market analysis entitled, *Identifying and Assessing Potential Direct Markets for Farm-Raised Shrimp Grown on Small Farms*, was recently completed by the University of Florida and the Department (visit <http://www.fl-seafood.com> for the complete report).



The research team found that retailers and consumers benefit from the purchase of freshwater farm-raised shrimp. The quality assessment indicated freshwater farm-raised shrimp is a product that will either maintain or increase in weight during retail ice storage. Consumer taste tests scored freshwater farm-raised shrimp with the highest ratings for acceptable aroma, appearance, flavor, texture and likeability. Overall consumers preferred the freshwater farm-raised shrimp. To maximize this species' attributes, the research team advised wholesalers and retailers to adopt the HACCP concepts developed as a project component.

Citrus producers in the Indian River region have pushed for public investment to create a Shrimp Demonstration Project at the University of Florida, Indian River Research and Education Center near Ft. Pierce. These farmers have recognized that the ideal time to begin growing shrimp as a crop occurs exactly when the citrus harvesting season concludes. Three outdoor ponds have been constructed with the goal of providing research information, biological and economic, to potential shrimp farmers (see www.FloridaAquaculture.com/pub.htm for a full report). Pond culture will only yield a single crop per year. Adding greenhouses to the production system will jumpstart the small shrimp seeded to ponds (termed “postlarvae”) or become the principal production system for year round growth. Future activities associated with the Shrimp Demonstration Project include adding a greenhouse production component. The success of shrimp aquaculture in Florida will rely upon technical expertise, creative methods to reduce production costs, and a sound marketing strategy that addresses a limited production schedule.

Malaysian prawn and the Australian red claw crawfish are being produced in tropical countries and are under investigation by other southeastern universities to resolve market, economic and production challenges for the U.S. farmer. Small farmers are attracted to these species because of reputed high market value and relatively easy production schemes. Objective evaluations are needed to demonstrate marketability, technical feasibility and profitability. Florida’s subtropical (as opposed to tropical) environment and very competitive seafood market pose unique challenges to small farmers that yield product on an intermittent basis and in variable quantities.

Alligator Production

Most of the alligator farms are located in central and southern Florida to benefit from the warm temperatures which are needed for consistent growth. During 2003, 10 farms sold \$2.5 million dollars of raw, green-salted hides and processed meat. Much of the alligator farm-gate value derives from raw hides which are sold to international fashion markets.

Unfortunately, consumer demand and farm-gate prices have been the lowest ever experienced. A soft tourism and world economy combined with the recent merger of high-end fashion houses have resulted in full freezers and infrequent raw leather orders.



Alligator producers are working to create and satisfy new markets and solve disease problems impacting hide quality. During the late 1990s, alligator farmers and trappers cooperatively created a Florida Alligator Marketing and Education Advisory Committee to identify and fund marketing and educational projects that will inform, educate and promote alligator meat, leather, and other by-products to the general public and commercial purchasers. Funding for projects supported by the Committee are derived from a portion of the alligator-related regulatory fees collected by the Fish and Wildlife Conservation Commission. During the past two years, this funding has not been allocated to the Committee, but efforts of the industry are focused on regaining those funds in order to complete necessary projects. The Committee and Department have promoted American

alligator leather during international leather product shows, developed and promoted alligator meat recipes, triggered furniture and fashion design that incorporate alligator leather, and created consumer and trade educational literature to promote increased alligator product consumption (visit <http://www.fl-alligator.com>).

Alligators are extremely resilient animals, the last of the living dinosaurs, but experience low on-farm reproductive rates and are prone to unique skin infections that reduce hide quality. The University of Florida investigated reproductive functions and recommended dietary and farm design improvements. Disease treatments are hampered by the lack of therapeutants labeled for alligators. Public investment is needed to: identify and treat skin infections that scar finished alligator leather, increase national and international promotional efforts, identify and test therapeutants, and work on nutritional requirements for all alligator life stages (juvenile, yearling, and adult).

Food Fish Production

Aquaculturists are interested in profitably producing food fish species; however, Florida is one of the most competitive and active seafood markets in the world. The state is uniquely positioned as a point-of-entry for seafood products from the Caribbean, Central America and South America. During 2004, preliminary figures indicate that Florida companies imported approximately 623 million pounds of edible seafood worth \$1.5 billion for sale within Florida, North America or to re-export. In addition to imports, Florida is a dynamic domestic producer of seafood. Preliminary 2004 information from the Florida Fish and Wildlife Research Institute indicates that Florida's 12,000 commercial fishers landed 92.3 million pounds of high value seafood and fishery products worth \$154 million and during 2003, Florida aquaculturists sold an estimated \$4.9 million worth of edible fish (hybrid striped bass, catfish and tilapia) to national and international markets.

Florida is also a huge handler of seafood. A complex infrastructure exists to buy, process and re-sell edible fish and shellfish. Approximately 300 Florida-based businesses process seafood by methods as simple as gutting and icing fish to large scale breeding and packaging of shrimp, crab or fish products. Another 1,200 businesses buy and sell seafood as dockside fish buyers, wholesalers, brokers and importers/exporters. Florida is also a huge market for seafood with an international reputation for delicious seafood that is sold through a \$15 billion restaurant industry and 4,600 seafood retailers (independent and grocery chain stores) that satisfy 75 million visitors and 17 million residents. Florida's residents are seafood fanatics. They consume 30 to 40 pounds of seafood (purchased and self-caught) per person per year which is more than twice the national per capita average of 16.3 pounds.

As a result, Florida aquaculturists have thrived by utilizing two basic strategies. They have produced products at costs competitive with large farms to access similar markets or they have grown species targeted to specific niche markets (local retailers and consumers familiar with the farm and in search of high quality



products) that yield enough market value to support small farm costs of production. Unfortunately, suitable niche markets and the ability of Florida's 85 small farms to produce products at competitive prices are objectives difficult to achieve consistently.

An excellent example of small farmers that are competing at an agricultural commodity level is the West Florida Regional Fish Farmers Cooperative. The U.S. catfish industry during 2004 consisted of 1,147 farms, 174,000 acres and farm gate sales of \$480 million (predominantly located in Mississippi, Alabama, Arkansas and Louisiana). Approximately 20 West Florida farmers have worked cooperatively to grow and market channel catfish. They cooperate in the construction of catfish ponds, purchase of feed, sharing of harvest equipment and in the marketing of their catfish to processors. They have also taken full advantage of the technical support provided by the University of Florida and an agricultural development initiative through the Department that provided a live haul trailer at a nominal annual fee. Statewide during 2003, 41 catfish farmers reported \$1.5 million in sales of food fish and fingerlings.



Small Florida farms producing hybrid striped bass is another success story. The U.S. hybrid striped bass industry consists of 61 farms with 2004 production of 11 million pounds. Seven farms in Florida are currently producing hybrid striped bass. Production of hybrid striped bass is limited by the availability of fry and fingerlings and the geographic dispersion of farms across Florida. Farms range from family operations to publicly-traded companies. Hybrid striped bass are the product of a cross between white and striped bass accomplished in hatcheries, most of which are out of state and have high transportation costs. The product of this cross between closely related species yields a fish that grows faster because of a biological phenomenon called "hybrid vigor" (additive genetic effects). Unfortunately, the source of gravid females are wild fish and year-to-year fingerling availability fluctuates. This instability coupled with growing interest by white tablecloth restaurants in the Florida and the Mid-Atlantic Region's willingness to pay a premium for on-ice, whole fish has tailored this species to small farm that that modify production to fit fingerling cost and availability to market demand. A trend that Florida farmers monitor is the recovery of wild striped bass on the Atlantic Coast and the on-going modification of the striper fishery management plan that has increased the amount of wild product entering the market place. Live hybrid striped bass farm gate production has steadily increased over the last 17 years from 405,000 pounds in 1987 to 11.5 million pounds in 2004 while price has steadily fallen from \$4.50 in 1987 to \$2.60 per pound in 2004.

Tilapia, several warm water species and species hybrids, are extremely tough fish that can thrive in poor quality water on low-cost feeds derived from vegetable protein. They are grown by 17 small farms because of the simplicity and ease of culture. Floridians sold \$1.5 million worth of food size tilapia and tilapia fingerlings during 2003. Unfortunately, tilapia produced in tropical and sub-tropical countries (Asia and Central and South America) are imported in huge quantity and at low

prices to dominate the U.S. grocery and food service markets. Other competing sources include an annual 3 to 4 million pound wild harvest of blue tilapia in Central Florida that is sold in low income seafood markets in Florida, Georgia and Alabama and an end-of-summer harvested crop produced from Alabama watershed ponds. The Alabama harvest dramatically drives live prices downward during September and October to \$0.75 to \$0.90 per pound.

Florida farms market locally to avoid seasonal price fluctuations and sell into the live trade that serves ethnic markets in Miami, Atlanta, Philadelphia, DC area, and New York on an intermittent basis as price and demand dictate.

Tilapia are a perfect species to use in educational programs and 13 Florida middle and high schools grow tilapia in pond or tank systems. Aquaculture as an unique educational tool that combines science, social studies, math and language arts into a single course of study plus an end-of-year reward can be a memorable dinner for students, parents and faculty.



Public investment to support food fish production infrastructure development—hatcheries, processing and distribution—are needed to improve farm gate value and reduce input costs. Land costs in Florida are increasing at a rate not seen since the 1980s with acreage prices placing major pressure on farming operations throughout Florida. Land-based food fish production will be impacted by escalating land prices along with other agricultural lands. Additional assistance is needed to develop the technology to yield consistent fingerlings of economically-viable species, market research to define competitive products and identify suitable markets, and an integrated public-farmer promotion effort to focus attention on product quality and availability.

Miscellaneous Species

Floridians also produce gamefish fingerlings (largemouth bass, bream, and catfish), triploid grass carp, turtles, snails, and frogs to satisfy specialty local, national and international markets. The technical (biological and physical) and market knowledge to successfully produce these species and sell them for a profit is unique to each item. Producers have expressed a need for specific public investment to improve feeds, primarily nutrition and digestability, to improve growth and animal health.



Regulatory, Research and Education Agencies in the Public and Private Sector

The State of Florida provides an excellent example of what state and private entities, many of which have established collaborative relationships, can do to support an industry.

The Aquaculture Interagency Coordinating Council (AICC) was created to encourage the

development of Florida aquaculture by establishing positive interagency cooperation. The AICC is charged with serving as a forum for the discussion of governmental aquaculture regulations and with the formulation of policy alternatives to facilitate aquaculture development. The AICC is also charged with establishing and maintaining effective cooperative linkages between member agencies, the Aquaculture Review Council, and institutions to ensure that recommendations for improvement are responsive to the needs of aquaculturists. This group meets as necessary and is composed of representatives of several state agencies in the areas of regulation, research, extension and economic development (Appendix C). An annual report is generated and includes summaries of aquaculture activities of all the member agencies (available under “publications” at www.FloridaAquaculture.com).

Aquaculture education programs exist at secondary and post-secondary levels. Small scale production systems are used as a learning tool in at least 18 Florida public middle and high schools. Programs at Hillsborough Community College and Indian River Community College provide training for aquaculture workers via associate’s degree programs. Students seeking bachelor’s and graduate degrees will find aquaculture-related coursework at the University of Florida and a few of Florida’s private universities.

Florida is very fortunate to be the home for three private universities and two private marine research facilities that have devoted considerable investment to: 1) basic and applied research into species and production systems, and 2) educational opportunities that result in undergraduate or graduate degrees or directed studies programs that yield highly trained technicians. These programs are:

Florida Institute of Technology, Aquaculture, in Melbourne. Florida Tech established the first undergraduate training program in the United States in 1977. Emphasis is placed on developing skills in the biological sciences and learning culture methodology and technology for important aquatic species. Please visit <http://hyper.fit.edu/biology/UGPrograms/Aquaculture.htm> for additional information.

Harbor Branch Oceanographic Institution, Aquaculture Division, in Ft. Pierce. Division research and education programs address the culture of mollusks, crustaceans, marine ornamentals, food

The Florida Aquaculture Review Council annually recommends projects to the Commissioner of Agriculture, Governor and Legislature which address the needs of the industry. The projects listed below have been funded through this process over the past several years.

Commercial Scale Penaeid Shrimp Demonstration in Inland Freshwater Systems

Developing Marine Fish Hatchery and Nursery Culture to Expand Florida’s Aquaculture Industry Year 1 and Year 2

Intensive, semi-intensive and extensive fingerling production of cobia (*Rachycentron canadum*) in Florida using tanks, mesocosms and ponds

Educational Training Workshop

The Collier City / Pompano Beach Aquaculture and Hydroponics Complex

Demonstration of the Commercial Potential for Aquaculture of Russian Sturgeon in Florida

fish, seaweed, and biomedical species. Aquaculture development and service programs are in place to support industry expansion in Florida and around the world. Please visit http://www.hboi.edu/aqua/aqua_home.html for additional information.

Mote Marine Laboratory, Center for Aquaculture Research and Development, in Sarasota. Mote is developing new and innovative technologies to advance aquaculture industry development and support and expand stock enhancement research. Please visit <http://www.mote.org> for additional information.

University of Miami, Rosenstiel School Marine and Atmospheric Sciences, Aquaculture Program in Miami. The Program focuses on technological, environmental and economical feasibility of sustainable aquaculture operations. Emphasis is put on technology and management strategies for sustainable aquaculture development, including marine fish and crustacean aquaculture, environmental issues and project development. Please visit <http://www.rsmas.miami.edu/groups/aquaculture/> for additional information.

The Department of Agriculture and Consumer Services, in its role as the primary regulatory body for aquaculture in Florida, provides Aquaculture Certification and Best Management Practices (BMPs) as a means to identify aquaculture producers in the state. The BMPs were developed in a way that allows the best-suited practices to be put into effect on each farm while ensuring protection for the surrounding natural resources.

The Florida's Aquaculture Certification and BMP program have become well-recognized by industry and other regulatory agencies, even in other states. This program eliminated burdensome requirements from multiple agencies and brought the state an inspection program that did not previously exist. As evidence of the program's support, the US Fish and Wildlife Service recently agreed to allow live rock shipments accompanied by a statement that the product was produced under the provisions of an Aquaculture Certification to be exported without the typically required CITES permit.

The BMP document is altered as changes in technology or production practices warrant. Recent updates to the BMP manual include amendments to construction guidelines, changes in the size of aquaculture docks that fall under the BMP program, addition of on-water requirements for shellfish producers, updates to health management guidelines, and additions of sections on transgenic species, wildlife depredation and aquatic animal welfare. Please visit http://www.floridaaquaculture.com/BAD/BAD_intro.htm for more information.

Focusing Public Investment

Globalization of trade, information exchange, and technology-sharing demand unceasing innovation by Florida farmers to remain competitive. The *Florida Aquaculture Plan 2005-2006* identifies the technical, production, economic and market related challenges that must be solved to fuel continued, sustained and managed growth. Florida's Aquaculture Review Council identified

the following investment issues with each issue being of equal importance to the industry.

Industry Infrastructure

- Development of innovative production techniques that comply with Best Management Practices for aquaculture.
- Approval for new drugs, chemicals or development of alternative methods to combat pests and diseases in farm production systems.
- Enhancement of educational opportunities for all levels as a means to bring aquaculture to the public and train a skilled workforce.
- Survey of aquaculture educational programs in the Florida school system at middle school through post-secondary level.

Ornamental Fish and Aquatic Plant

- Freshwater ornamental fish: Develop improved production techniques for existing and new species, gain approval for new drugs to maintain fish health, and develop better recirculation technology to conserve water.
- Aquatic plants: Develop production methods for plants not currently in culture, quantify plant nutritional needs, and identify new pesticides for use on the farm.
- Aquatic Plants: Develop avenue for 1) timely response to emerging concerns which could result in regulatory actions taken by other states and 2) disseminating interstate aquatic plant regulations of other states to producers.
- Marine ornamentals: Quantify and qualify physiological, nutritional, cultural, economic, health management and market information. Develop and test practical production techniques.
- A national marketing campaign to expand the hobby in cooperation with aquarium equipment manufacturers and distributors.

Food Production

- Integrated demonstration projects that bring production, economic and marketing specialists together are needed to improve or develop: production systems (ponds, tanks, raceways, cages and hybrid systems), spawning and hatchery techniques, microencapsulated feeds, batch plankton culture procedures, preventative aquatic animal health practices and product value.
- Improve production practices for molluscan shellfish, especially hard clams, with emphasis on genetic improvement, predator characterization and control, and species diversification.
- Develop the techniques to spawn and produce economically-viable species fingerlings on a continuous basis.
- Market research encompassing value, demand, product form, price and in-depth analysis of substitutable products and competitive sources.

- Integrated industry-public agency marketing effort addressing awareness, promotion and development for various species, including farm-raised hard clams.

Alligator

- Identify and develop treatments for skin diseases and parasites
- Develop new markets in the United States, Mexico and Central America and rekindle market demand in Western Europe.
- Develop effective and efficient feeds and nutrition, and genetic studies.
- Establish an alligator leather products production, wholesale and retail infrastructure.

Gamefish: fry, fingerlings and stockers

- Improve larval nutrition for species by developing microencapsulated feeds and the techniques to mass culture zoo- and phyto-plankton.
- Improve fish health and develop low impact handling/grading and culture techniques to reduce cannibalism.

Biotechnology

- Explain gene interaction and expression.
- Induce host immunity and resistance to diseases and associated pathogens.
- Create bioprocess engineering of beneficial bacteria and viruses.

Appendix A

Please note: Florida Statutes are subject to change. Visit <http://www.myflorida.com> to locate current statutes or contact the Division of Aquaculture.

CHAPTER 597
AQUACULTURE

- 597.001 Florida Aquaculture Policy Act; short title.
- 597.0015 Definitions.
- 597.002 Legislative declaration of public policy respecting aquaculture.
- 597.0021 Legislative intent.
- 597.003 Powers and duties of Department of Agriculture and Consumer Services.
- 597.004 Aquaculture certificate of registration.
- 597.0041 Prohibited acts; penalties.
- 597.0045 Cultured shellfish theft reward program.
- 597.005 Aquaculture Review Council.
- 597.006 Aquaculture Interagency Coordinating Council.
- 597.010 Shellfish regulation; leases.
- 597.020 Shellfish processors; regulation.
- 597.001 Florida Aquaculture Policy Act; short title.--This chapter may be cited as the "Florida Aquaculture Policy Act."

History.--s. 1, ch. 84-90; s. 1, ch. 93-152.

597.0015 Definitions.--For purposes of this chapter, the following terms shall have the following meanings:

- (1) "Aquaculture" means the cultivation of aquatic organisms.
- (2) "Aquaculture producers" means those persons engaging in the production of aquaculture products and certified under s. 597.004.
- (3) "Aquaculture products" means aquatic organisms and any product derived from aquatic organisms that are owned and propagated, grown, or produced under controlled conditions. Such products do not include organisms harvested from the wild for depuration, wet storage, or relay for purification.
- (4) "Commissioner" means the Commissioner of Agriculture.
- (5) "Department" means the Department of Agriculture and Consumer Services.

History.--s. 7, ch. 91-187; s. 23, ch. 96-247; s. 10, ch. 99-390.

597.002 Legislative declaration of public policy respecting aquaculture.--The Legislature declares that aquaculture is agriculture and, as such, the Department of Agriculture and Consumer Services shall be the primary agency responsible for regulating aquaculture, any other law to the contrary notwithstanding. The only exceptions are those areas required by federal law, rule, or cooperative agreement to be regulated by another agency. The Legislature declares that, in order to effectively support the growth of aquaculture in this state, there is a need for a state aquaculture plan that will

provide for the coordination and prioritization of state aquaculture efforts and the conservation and enhancement of aquatic resources and will provide mechanisms for increasing aquaculture production which may lead to the creation of new industries, job opportunities, income for aquaculturists, and other benefits to the state. The state aquaculture plan shall guide the research and development of the aquaculture industry. Funds designated by the Legislature for aquaculture research and development or for contracting for aquaculture research and development shall be used to address the projects and activities designated in the state aquaculture plan. Any entity receiving legislative funding for aquaculture research and development programs shall report annually to the department all activities related to aquaculture to facilitate coordination and compliance with the state aquaculture plan.

History.--s. 2, ch. 84-90; s. 3, ch. 90-92; s. 8, ch. 91-187; s. 24, ch. 96-247; s. 24, ch. 98-333.

597.0021 Legislative intent.--

- (1) It is the intent of the Legislature to enhance the growth of aquaculture in this state, while protecting Florida's environment.
- (2) It is also the intent of the Legislature to give the department the duty to coordinate and assist the development of aquaculture.
- (3) It is the intent of the Legislature that the Aquaculture Review Council and the Aquaculture Interagency Coordinating Council are established to provide a means of communication between the aquaculture industry and the regulatory agencies.

History.--s. 1, ch. 87-367; s. 4, ch. 90-92; s. 9, ch. 91-187; s. 29, ch. 91-201; ss. 2, 6, ch. 93-152; s. 25, ch. 96-247.

597.003 Powers and duties of Department of Agriculture and Consumer Services.--

- (1) The department is hereby designated as the lead agency in encouraging the development of aquaculture in the state and shall have and exercise the following functions, powers, and duties with regard to aquaculture:
 - (a) Issue or deny aquaculture certificates that identify aquaculture producers and aquaculture products, and collect all related fees.
 - (b) Coordinate the development, annual revision, and implementation of a state aquaculture plan. The plan shall include prioritized recommendations for research and development as suggested by the Aquaculture Review Council, the Aquaculture Interagency Coordinating Council, and public and private institutional research, extension, and service programs.
 - (c) Develop memoranda of agreement, as needed, with the Department of Environmental Protection, the Fish and Wildlife Conservation Commission, the Florida Sea Grant Program, and other groups as provided in the state aquaculture plan.
 - (d) Provide staff for the Aquaculture Review Council and the Aquaculture Interagency Coordinating Council.
 - (e) Forward the annually revised state aquaculture plan to the commissioner and to the chairs of the House Committee on Agriculture and Consumer Services and the Senate Committee on Agriculture 1 month prior to submission of the department's legislative budget request to the Governor.
 - (f) Submit the list of research and development projects proposed to be funded through the department as identified in the state aquaculture plan, along with the department's legislative

budget request to the Governor, the President of the Senate, and the Speaker of the House of Representatives. If funded, these projects shall be contracted for by the Division of Aquaculture and shall require public-private partnerships, when appropriate. The contracts shall require a percentage of the profit generated by the project to be deposited into the General Inspection Trust Fund solely for funding aquaculture projects recommended by the Aquaculture Review Council.

- (g) Provide developmental assistance to the various sectors of the aquaculture industry as determined in the state aquaculture plan.
- (h) Assist persons seeking to engage in aquaculture when applying for the necessary permits and serve as ombudsman to resolve complaints or otherwise resolve problems arising between aquaculture producers and regulatory agencies.
- (i) Develop and propose to the Legislature legislation necessary to implement the state aquaculture plan or to otherwise encourage the development of aquaculture in the state.
- (j) Issue or deny any license or permit authorized or delegated to the department by the Legislature or through memorandum of understanding with other state or federal agencies that furthers the intent of the Legislature to place the regulation of aquaculture in the department.
- (k) Make available state lands and the water column for the purpose of producing aquaculture products when the aquaculture activity is compatible with state resource management goals, environmental protection, and proprietary interest and when such state lands and waters are determined to be suitable for aquaculture development by the Board of Trustees of the Internal Improvement Trust Fund pursuant to s. 253.68; and be responsible for all saltwater aquaculture activities located on sovereignty submerged land or in the water column above such land and adjacent facilities directly related to the aquaculture activity.
 1. The department shall act in cooperation with other state and local agencies and programs to identify and designate sovereignty lands and waters that would be suitable for aquaculture development.
 2. The department shall identify and evaluate specific tracts of sovereignty submerged lands and water columns in various areas of the state to determine where such lands and waters are suitable for leasing for aquaculture purposes. Nothing in this subparagraph or subparagraph 1. shall preclude the applicant from applying for sites identified by the applicant.
 3. The department shall provide assistance in developing technologies applicable to aquaculture activities, evaluate practicable production alternatives, and provide agreements to develop innovative culture practices.
- (l) Act as a clearinghouse for aquaculture applications, and act as a liaison between the Fish and Wildlife Conservation Commission, the Division of State Lands, the Department of Environmental Protection district offices, other divisions within the Department of Environmental Protection, and the water management districts. The Department of Agriculture and Consumer Services shall be responsible for regulating marine aquaculture producers, except as specifically provided herein.
- (2) The department may employ such persons as are necessary to perform its duties under this chapter.

History.--s. 3, ch. 84-90; s. 1, ch. 86-111; s. 5, ch. 87-367; s. 2, ch. 88-377; s. 10, ch. 91-187; s. 3, ch. 93-152; s. 467, ch. 94-356; s. 26, ch. 96-247; s. 25, ch. 98-333; s. 225, ch. 99-245; s. 25, ch. 2000-364; s. 38, ch. 2001-63.

597.004 Aquaculture certificate of registration.--

(1) CERTIFICATION.--Any person engaging in aquaculture must be certified by the department. The applicant for a certificate of registration shall submit the following to the department:

- (a) Applicant's name/title.
- (b) Company name.
- (c) Complete mailing address.
- (d) Legal property description of all aquaculture facilities.
- (e) Actual physical street address for each aquaculture facility.
- (f) Description of production facilities.
- (g) Aquaculture products to be produced.
- (h) Fifty dollar annual registration fee.
- (i) Documentation that the rules adopted herein have been complied with in accordance with paragraph (2)(a).

(2) RULES.--

(a) The department, in consultation with the Department of Environmental Protection, the water management districts, environmental groups, and representatives from the affected farming groups, shall adopt rules to:

1. Specify the requirement of best-management practices to be implemented by holders of aquaculture certificates of registration.
2. Establish procedures for holders of aquaculture certificates of registration to submit the notice of intent to comply with best-management practices.
3. Establish schedules for implementation of best-management practices, and of interim measures that can be taken prior to adoption of best-management practices. Interim measures may include the continuation of regulatory requirements in effect on June 30, 1998.
4. Establish a system to assure the implementation of best-management practices, including recordkeeping requirements.

(b) Rules adopted pursuant to this subsection shall become effective pursuant to the applicable provisions of chapter 120, but must be submitted to the President of the Senate and the Speaker of the House of Representatives for review by the Legislature. The rules shall be referred to the appropriate committees of substance and scheduled for review during the first available regular session following adoption. Except as otherwise provided by operation of law, such rules shall remain in effect until rejected or modified by act of the Legislature.

(c) Notwithstanding any provision of law, the Department of Environmental Protection is not authorized to institute proceedings against any person certified under this section to recover any costs or damages associated with contamination of groundwater or surface water, or the evaluation, assessment, or remediation of contamination of groundwater or surface water, including sampling, analysis, and restoration of potable water supplies, where the contamination of groundwater or surface water is determined to be the result of aquaculture practices, provided the holder of an aquaculture certificate of registration:

1. Provides the department with a notice of intent to implement applicable best-management practices adopted by the department;
2. Implements applicable best-management practices as soon as practicable according to rules adopted by the department; and
3. Implements practicable interim measures identified and adopted by the department which can

be implemented immediately, or according to rules adopted by the department.

(d) There is a presumption of compliance with state groundwater and surface water standards if the holder of an aquaculture certificate of registration implements best-management practices that have been verified by the Department of Environmental Protection to be effective at representative sites and complies with the following:

1. Provides the department with a notice of intent to implement applicable best-management practices adopted by the department;
2. Implements applicable best-management practices as soon as practicable according to rules adopted by the department; and
3. Implements practicable interim measures identified and adopted by the department which can be implemented immediately, or according to rules adopted by the department.

(e) This section does not limit federally delegated regulatory authority.

(f) Any aquatic plant producer permitted by the department pursuant to s. 369.25 shall also be subject to the requirements of this section.

(g) Any alligator producer with an alligator farming license and permit to establish and operate an alligator farm shall be issued an aquaculture certificate of registration pursuant to this section. This chapter does not supersede the authority under chapter 372 to regulate alligator farms and alligator farmers.

(3) FEES.--Effective July 1, 1997, all fees collected pursuant to this section shall be deposited into the General Inspection Trust Fund in the Department of Agriculture and Consumer Services.

(4) IDENTIFICATION OF AQUACULTURE PRODUCTS.--Aquaculture products shall be identified while possessed, processed, transported, or sold as provided in this subsection.

(a) Aquaculture products shall be identified by an aquaculture certificate of registration number from harvest to point of sale. Any person who possesses aquaculture products must show, by appropriate receipt, bill of sale, bill of lading, or other such manifest where the product originated.

(b) Marine aquaculture products shall be transported in containers that separate such product from wild stocks, and shall be identified by tags or labels that are securely attached and clearly displayed.

(c) Each aquaculture registrant who sells food products labeled as "aquaculture or farm raised" must have such products containerized and clearly labeled in accordance with s. 500.11. Label information must include the name, address, and aquaculture certification number. This requirement is designed to segregate the identity of wild and aquaculture products.

(5) SALE OF AQUACULTURE PRODUCTS.--

(a) Aquaculture products, except shellfish, snook, and any fish of the genus *Micropterus*, and prohibited and restricted freshwater and marine species identified by rules of the Fish and Wildlife Conservation Commission, may be sold by an aquaculture producer certified pursuant to s. 597.004 without restriction so long as product origin can be identified.

(b) Aquaculture shellfish must be sold and handled in accordance with s. 597.020.

(6) REGISTRATION AND RENEWALS.--

(a) Each aquaculture producer must apply for an aquaculture certificate of registration with the department and submit the appropriate fee. Upon department approval, the department shall issue

the applicant an aquaculture certificate of registration for a period not to exceed 1 year. Beginning July 1, 1997, and each year thereafter, each aquaculture certificate of registration must be renewed with fee, pursuant to this chapter, on July 1.

(b) The department shall send notices of registration to all aquaculture producers of record requiring them to register for an aquaculture certificate. Renewal notices shall be sent to the registrant 60 days preceding the termination date of the certificate of registration. Prior to the termination date, the registrant must return a completed renewal form with fee, pursuant to this chapter, to the department.

(c) Any person whose certificate of registration has been revoked or suspended must reapply to the department for certification.

History.--s. 27, ch. 96-247; s. 54, ch. 97-98; s. 26, ch. 98-333; s. 11, ch. 99-390; s. 78, ch. 2000-158; s. 27, ch. 2000-364.

597.0041 Prohibited acts; penalties.--

(1) It is unlawful for an aquaculture registrant to:

(a) Commingle in the same container any shellfish aquaculture product with any wild product;

(b) Transport by vessel over water both wild and aquaculture products of the same species at the same time; or

(c) Violate any provision of this chapter or chapter 500.

(2)(a) Any person who violates any provision of this chapter or any rule promulgated hereunder is subject to a suspension or revocation of his or her certificate of registration or license under this chapter. The department may, in lieu of, or in addition to the suspension or revocation, impose on the violator an administrative fine in an amount not to exceed \$1,000 per violation per day.

(b) Except as provided in subsection (4), any person who violates any provision of this chapter, or rule hereunder, commits a misdemeanor of the first degree, punishable as provided in s. 775.082 or s. 775.083.

(3) Any person certified under this chapter who has been convicted of taking aquaculture species raised at a certified facility shall have his or her certificate revoked for 5 years by the Department of Agriculture and Consumer Services pursuant to the provisions and procedures of s. 120.60.

(4) Any person who violates any provision of s. 597.010 or s. 597.020, or any rule adopted under those sections, commits a misdemeanor of the second degree, punishable as provided in s. 775.082 or s. 775.083 for the first offense; and for the second or any subsequent offense within a 12-month period, commits a misdemeanor of the first degree, punishable as provided in s. 775.082 or s. 775.083.

History.--s. 28, ch. 96-247; s. 12, ch. 99-390; s. 28, ch. 2000-364; s. 39, ch. 2001-63.

597.0045 Cultured shellfish theft reward program.--There is created a cultured shellfish theft reward program, to be administered by the department, for the purpose of granting rewards to persons who provide information leading to the arrest and conviction of individuals illegally possessing, harvesting, or attempting to harvest cultured shellfish.

(1) Each person who provides information leading to the arrest and conviction of an individual or individuals for illegally possessing, harvesting, or attempting to harvest cultured shellfish and for whom the respective state attorney notifies the department of such assistance, in writing, shall be eligible for a reward of up to \$2,500; except that law enforcement officers and department

personnel, and members of their immediate families, shall not be eligible for rewards under the program. The department shall, by rule, establish a graduated reward payout schedule.

(2) The General Inspection Trust Fund of the department may be used for the cultured shellfish theft reward program, for deposit of general revenue funds and donations received from interested individuals, and for granting rewards to persons who provide information leading to the arrest and conviction of persons illegally possessing, harvesting, or attempting to harvest cultured shellfish. The granting of rewards shall be subject to legislative appropriations to fund the program.

(3) The department may promote the cultured shellfish theft reward program to provide for public recognition of the rewards and to improve compliance with laws prohibiting illegal possession and harvesting of cultured shellfish.

History.--s. 13, ch. 99-390.

597.005 Aquaculture Review Council.--

(1) COMPOSITION.--There is created within the department the Aquaculture Review Council to consist of nine members as follows: the chair of the State Agricultural Advisory Council or designee; the chair of the Aquaculture Interagency Coordinating Council; and seven additional members to be appointed by the commissioner, including an alligator farmer, a food fish farmer, a shellfish farmer, a tropical fish farmer, an aquatic plant farmer, a representative of the commercial fishing industry, and a representative of the aquaculture industry at large. Members shall be appointed for 4-year terms. Each member shall be selected from no fewer than two or more than three nominees submitted by recognized statewide organizations representing each industry segment or the aquaculture industry at large. In the absence of nominees, the commissioner shall appoint persons who otherwise meet the qualifications for appointment to the council. Members shall serve until their successors are duly qualified and appointed. An appointment to fill a vacancy shall be for the unexpired portion of the term.

(2) MEETINGS; PROCEDURES; RECORDS.--

(a) The members of the council shall meet at least quarterly; shall elect a chair, a vice chair, a secretary, and an industry representative to the Aquaculture Interagency Coordinating Council; and shall use accepted rules of procedure. The terms of such officers shall be for 1 year.

(b) The council shall meet at the call of its chair, at the request of a majority of its membership, at the request of the department, or at such times as may be prescribed by its rules of procedure.

However, the council shall hold a joint annual meeting with the Aquaculture Interagency Coordinating Council.

(c) A majority of the members of the council constitutes a quorum for all purposes, and an act by a majority of such quorum at any meeting constitutes an official act of the council.

(d) The council secretary shall keep a complete record of the proceedings of each meeting, which record shall include the names of the members present and the actions taken. Such records shall be kept on file with the department, and these records and other documents about matters within the jurisdiction of the council shall be subject to inspection by the members of the council.

(3) RESPONSIBILITIES.--The primary responsibilities of the Aquaculture Review Council are to:

(a) Formulate and recommend to the commissioner rules and policies governing the business of aquaculture by studying and evaluating aquacultural issues.

- (b) Provide aquaculture industry recommendations for research and development to be included in the annual revision of the state aquaculture plan.
- (c) Submit to the commissioner on an annual basis:
 1. A prioritized list of research projects to be included in the department's legislative budget request. Each year, the council shall review the aquaculture legislative budget requests submitted to the department and rank them according to the state aquaculture plan.
 2. Recommendations to be forwarded to the Speaker of the House of Representatives and the President of the Senate on legislation needed to help the aquaculture industry.
 3. Recommendations on aquaculture projects, activities, research, and regulation and other needs to further the development of the aquaculture industry.
- (d) On a quarterly basis, review and discuss problems that serve as barriers to the growth and development of aquaculture.
- (e) Assist the department in carrying out duties identified in s. 597.003 by studying aquaculture issues and making recommendations for regulating and permitting aquaculture and in the development, revision, and implementation of the state aquaculture plan.
- (f) Provide input to the department to perform studies, identify needs, research issues, write reports, record actions and meetings of the council and, in general, conduct the business of the council.
- (g) Receive input from state agencies and public and private institutions on aquaculture research, service, development, and regulatory needs.
- (h) For any problem that cannot be solved through simple cooperation or negotiation, provide an issue analysis to the Aquaculture Interagency Coordinating Council and to the chairs of the legislative appropriations committees. The analysis shall include, but not be limited to, specific facts and industry hardships, regulatory provisions, questions relative to the issue, and suggestions for solving the problem.
- (i) Provide the Governor, the President of the Senate, the Speaker of the House of Representatives, and the chairs of legislative committees having primary jurisdiction over either the subject of aquaculture or the budget of the Department of Agriculture and Consumer Services, by August 1 of each year, a list of prioritized research needs critical to development of the aquaculture industry.

(4) EXPENSES; PER DIEM.--Members of the council shall receive expenses and per diem for travel, including attendance at meetings, as allowed state officers and employees pursuant to s. 112.061.

History.--ss. 5, 8, ch. 84-90; s. 7, ch. 87-367; ss. 3, 5, 6, ch. 88-377; s. 5, ch. 90-92; s. 11, ch. 91-187; ss. 4, 6, ch. 93-152; s. 29, ch. 96-247; s. 27, ch. 98-333; s. 29, ch. 2000-364.

597.006 Aquaculture Interagency Coordinating Council.--

(1) CREATION.--The Legislature finds and declares that there is a need for interagency coordination with regard to aquaculture by the following agencies: the Department of Agriculture and Consumer Services; the Office of Tourism, Trade, and Economic Development; the Department of Community Affairs; the Department of Environmental Protection; the ¹Department of Labor and Employment Security; the Fish and Wildlife Conservation Commission; the statewide consortium of universities under the Florida Institute of Oceanography; Florida

Agricultural and Mechanical University; the Institute of Food and Agricultural Sciences at the University of Florida; and the Florida Sea Grant Program. It is therefore the intent of the Legislature to hereby create an Aquaculture Interagency Coordinating Council to act as an advisory body as defined in s. 20.03(9).

(2) COMPOSITION.--The head of each agency listed in subsection (1) shall designate an aquaculture coordinator to act as the aquaculture contact person regarding the statutory responsibilities of the agency and to serve as a member of the Aquaculture Interagency Coordinating Council, except that the Vice President for Agricultural Affairs of the University of Florida or designee shall represent the Institute of Food and Agricultural Sciences.

(3) MEETINGS; PROCEDURES; RECORDS.--The coordinating council shall meet at least quarterly.

(a) A chair and vice chair shall be elected by the membership and shall serve for 1 year, commencing in September. The chair shall preside at all meetings and shall call a meeting of the coordinating council as often as necessary to transact business. Meetings shall include at least one joint annual meeting with the Aquaculture Review Council. The coordinating council may designate subcommittees from time to time to assist in carrying out its responsibilities.

(b) A majority of the members shall constitute a quorum, and action by a majority of a quorum shall be official.

(c) The department shall have primary responsibility for providing administrative and staff support services for the coordinating council and shall maintain a complete record of the proceedings of each meeting, which record shall include the names of members present and the actions taken. Such records shall be kept on file with the department, and these records and other documents about matters within the jurisdiction of the coordinating council shall be subject to inspection by the members of the coordinating council.

(4) PURPOSE AND RESPONSIBILITIES.--The purpose of the coordinating council is to establish positive interagency cooperation to foster the development of the state's aquaculture industry. In carrying out this purpose, the coordinating council shall:

(a) Serve as a forum for the discussion and study of governmental regulations relating to aquaculture.

(b) Review and discuss aquaculture issues developed by the Aquaculture Review Council.

(c) Formulate responses to industry issues, as presented by the Aquaculture Review Council, which include solutions and policy alternatives to facilitate aquaculture development.

(d) Review the recommendations for short-term research projects submitted to the commissioner by the Aquaculture Review Council. The coordinating council shall forward any pertinent comments to the commissioner.

(e) Review the results of the aquaculture research projects funded by the department.

(f) Establish and maintain effective and cooperative linkages between member agencies, the Aquaculture Review Council, and public and private institutional research, extension, and service programs, so that recommendations for improvement are responsive to the needs of aquaculture.

(g) Prepare an annual report to be submitted by December 1 of each year to the Governor, the President of the Senate, the Speaker of the House of Representatives, the chairs of the legislative

appropriations and agriculture committees, and the heads of each agency represented on the coordinating council. This report shall describe all actions and include all recommendations of the coordinating council, as well as the responsive actions taken by the agencies. This report shall provide a list of all aquaculture activities undertaken by member agencies. The list shall include the needs each activity is designed to address, the results, the funds expended on each activity, and the source of those funds.

(h) Develop guidelines for use by member agencies when reporting any aquaculture activities.

History.--ss. 6, 8, ch. 84-90; ss. 4, 5, 6, ch. 88-377; s. 6, ch. 90-92; s. 12, ch. 91-187; ss. 5, 6, ch. 93-152; s. 468, ch. 94-356; s. 226, ch. 99-245; s. 30, ch. 2000-364.

¹Note.--Section 69, ch. 2002-194, repealed s. 20.171, which created the Department of Labor and Employment Security.

597.010 Shellfish regulation; leases.--

(1) LEASE, APPLICATION FORM.--When any qualified person desires to lease a part of the bottom, water column, or bed of any of the water of this state for the purpose of growing oysters or clams, as provided for in this section, he or she shall present to the department a written application pursuant to s. 253.69.

(2) LANDS TO BE LEASED.--The lands leased shall be as compact as possible, taking into consideration the shape of the body of water and the condition of the bottom as to hardness, or soft mud or sand, or other conditions that would render the bottoms desirable or undesirable for the purpose of oyster or clam cultivation.

(3) SURVEYS, PLATS, AND MAPS OF REEFS.--The department shall accept, adopt, and use official reports, surveys, and maps of oyster, clam, or other shellfish grounds made under the direction of any authority of the United States as prima facie evidence of the natural oyster and clam reefs and beds, for the purpose and intent of this chapter. The department may also make surveys of any natural oyster or clam reefs or beds when it deems such surveys necessary and where such surveys are made pursuant to an application for a lease, the cost thereof may be charged to the applicant as a part of the cost of his or her application.

(4) EXECUTION OF LEASES; LESSEE TO STAKE OFF BOUNDARIES; PENALTY FOR FAILURE TO COMPLY WITH REGULATIONS.--When a survey of the lands to be leased has been completed pursuant to s. 253.69 and filed with the department, and the cost thereof paid by the applicant, the department may execute in duplicate a lease of the water bottoms to the applicant. One duplicate, with a plat or map of the water bottoms so leased, shall be delivered to the applicant, and the other, with a plat or map of the bottom so leased, shall be retained by the department and registered in a lease book which shall be kept exclusively for that purpose by the department; thereafter the lessees shall enjoy the exclusive use of the lands and all oysters and clams, shell, and cultch grown or placed thereon shall be the exclusive property of such lessee as long as he or she shall comply with the provisions of this chapter and chapter 253. The department shall require the lessee to stake off and mark the water bottoms leased, by such ranges, monuments, stakes, buoys, etc., so placed and made as not to interfere with the navigation, as it

may deem necessary to locate the same to the end that the location and limits of the lands embraced in such lease be easily and accurately found and fixed, and such lessee shall keep the same in good condition during the open and closed oyster or clam season. All leases shall be marked according to the standards set forth in s. 253.72. The department may stipulate in each individual lease contract the types, shape, depth, size, and height of marker or corner posts. Failure on the part of the lessee to comply with the orders of the department to this effect within the time fixed by it, and to keep the markers, etc., in good condition during the open and closed oyster or clam season, shall subject such lessee to a fine not exceeding \$100 for each and every such offense.

(5) LEASES IN PERPETUITY; RENT.--

(a) All leases issued previously under the provisions of s. 370.16 shall be enforced under the authority of this chapter, notwithstanding any other law to the contrary, and shall continue in perpetuity under such restrictions as stated in the lease agreement. The annual rental fee charged for all leases shall consist of the minimum rate of \$15 per acre, or any fraction of an acre, per year and shall be adjusted on January 1, 1995, and every 5 years thereafter, based on the 5-year average change in the Consumer Price Index. Rent shall be paid in advance of January 1 of each year or in the case of a new lease at the time of signing, regardless of who holds the lease.

(b) All fees collected under this subsection and subsection (6) shall be deposited in the General Inspection Trust Fund and shall be used for shellfish aquaculture activities.

(6) FORFEITURE FOR NONPAYMENT.--All leases shall stipulate that failure to timely pay the rent on or before January 1 of each year shall cause the department, at its discretion, to terminate and cancel the lease after the department has given the lessee 30 days' written notice of the nonpayment. If after receiving the notice the lessee chooses to keep the lease, the lessee shall pay the rental fee plus a \$50 late fee within the 30-day period. After the 30-day notice has expired, the department may take possession of the lease and all improvements, assets, clams, and oysters thereon.

(7) SURCHARGE FOR IMPROVEMENT OR REHABILITATION.--A surcharge of \$10 per acre, or any fraction of an acre, per annum shall be levied upon each lease, other than a perpetual lease granted pursuant to chapter 370 prior to 1985, and deposited into the General Inspection Trust Fund. The purpose of the surcharge is to provide a mechanism to have financial resources immediately available for improvement of lease areas and for cleanup and rehabilitation of abandoned or vacated lease sites. The department is authorized to adopt rules necessary to carry out the provisions of this subsection.

(a) Moneys in the fund that are not needed currently for cleanup and rehabilitation of abandoned or vacated lease sites shall be deposited with the Chief Financial Officer to the credit of the fund and may be invested in such manner as is provided for by statute. Interest received on such investment shall be credited to the fund.

(b) Funds within the General Inspection Trust Fund from receipts from the surcharge established in this section shall be disbursed for the following purposes and no others:

1. Administrative expenses, personnel expenses, and equipment costs of the department related to the improvement of lease areas, the cleanup and rehabilitation of abandoned or vacated aquaculture lease sites, and the enforcement of provisions of this section.

2. All costs involved in the improvement of lease areas and the cleanup and rehabilitation of abandoned or vacated lease sites.
3. All costs and damages which are the proximate results of lease abandonment or vacation.
4. Reward payments made pursuant to s. 597.0045.

The department shall recover to the use of the fund from the person or persons abandoning or vacating the lease, jointly and severally, all sums owed or expended from the fund.

(8) CULTIVATION REQUIREMENTS.--

(a) Effective cultivation shall consist of the growing of the oysters or clams in a density suitable for commercial harvesting over the amount of bottom prescribed by law. This commercial density shall be accomplished by the planting of seed oysters, shell, and cultch of various descriptions. The department may stipulate in each individual lease contract the types, shape, depth, size, and height of cultch materials on lease bottoms according to the individual shape, depth, location, and type of bottom of the proposed lease. Each lessee leasing lands under the provisions of this section or s. 253.71 shall begin, within 1 year after the date of such lease, bona fide cultivation of the same, and shall, by the end of the second year after the commencement of such lease, have placed under cultivation at least one-half of the leased area and shall each year thereafter place in cultivation at least one-fourth of the leased area until the whole, suitable for bedding of oysters or clams, shall have been put in cultivation. The cultivation requirements for perpetuity leases granted pursuant to chapter 370 prior to 1985 under previously existing law shall comply with the conditions stated in the lease agreement, and the lessee or grantee is authorized to plant the leased or granted submerged land in both oysters and clams.

(b) These stipulations apply to all leases granted after the effective date of this section. All leases existing prior to the effective date of this section will operate under the law that was in effect when the leases were granted.

(c) When evidence is gathered by the department and such evidence conclusively shows a lack of effective cultivation, the department may revoke leases and return the bottoms in question to the public domain.

(d) The department has the authority to adopt rules pertaining to the water column over shellfish leases. All cultch materials in place 6 months after the formal adoption and publication of rules establishing standards for cultch materials on shellfish leases that do not comply with such rules may be declared a nuisance by the department. The department has the authority to direct the lessee to remove such cultch in violation of this section. The department may cancel a lease upon the refusal by the lessee violating such rules to remove unlawful cultch materials, and all improvements, cultch, marketable oysters, and shell shall become the property of the state. The department has the authority to retain, dispose of, or remove such materials in the best interest of the state.

(9) LEASES TRANSFERABLE, ETC.--The leases in chapters 253 and 370 shall be inheritable and transferable, in whole or in part, and shall also be subject to mortgage, pledge, or hypothecation and shall be subject to seizure and sale for debts as any other property, rights, and credits in this state, and this provision shall also apply to all buildings, betterments, and improvements thereon. Leases granted under this section cannot be transferred, by sale or barter, in whole or in part, without the written, express approval of the department, and such a transferee

shall pay a \$50 transfer fee before department approval may be given. Leases inherited or transferred will be valid only upon receipt of the transfer fee and approval by the department. The department shall keep proper indexes so that all original leases and all subsequent changes and transfers can be easily and accurately ascertained.

(10) CANCELLATION OF LEASES TO NATURAL REEFS OR BEDS.--Any person, within 6 months after the execution of any lease, may file a petition with the department for the purpose of determining whether a natural oyster or clam reef or bed having an area of not less than 100 square yards existed within the leased area on the date of the lease, with sufficient natural or maternal oysters or clams thereon (not including coon oysters) to have constituted a stratum sufficient to have been resorted to by the public generally for the purpose of gathering the same to sell for a livelihood. The petition shall be in writing addressed to the department, verified under oath, stating the location and approximate area of the natural reef or bed and the claim or interest of the petitioner therein and requesting the cancellation of the lease to the natural reef or bed. A petition may not be considered unless it is accompanied by a deposit of \$500 to defray the expense of the department's investigation of the matter. Upon receipt of such petition, the department shall cause an investigation to be made into the truth of the allegations of the petition, and, if found untrue, the \$500 deposit shall be retained by the department to defray the expense of the investigation, but should the allegations of the petition be found true and the leased premises to contain a natural oyster or clam reef or bed, as described in this subsection, the \$500 deposit shall be returned to the petitioner and the costs and expenses of the investigation taxed against the lessee and the lease canceled to the extent of the natural reef or bed and the same shall be marked with buoys and stakes and notices placed thereon showing the same to be a public reef or bed, the cost of the markers and notices to be taxed against the lessee.

(11) WHEN NATURAL REEFS OR BEDS MAY BE INCLUDED IN LEASE.--

(a) When an application for a submerged land lease for cultivating shellfish is filed, and when a resource survey of such lands identifies natural oyster or clam reefs or beds, the department shall determine if such reefs and beds are to be included in the leased area. The department, if it deems it to be in the best interest of the state, may include such natural reefs or beds in a lease. In those cases where a natural area is included in a lease, the department shall fix a reasonable value on the same, to be paid by the applicant for lease of such submerged land. No natural reefs shall be included in any shellfish or aquaculture lease granted in Franklin County.

(b) The department shall determine and settle all disputes as to boundaries between lessees. The department shall, in all cases, determine whether a particular submerged land area contains a natural reef or bed or whether it is suitable for raising oysters or clams.

(12) FRANKLIN COUNTY LEASES.--On and after the effective date of this section, the only leases available in Franklin County shall be those issued pursuant to ss. 253.67-253.75; chapter 370 leases shall no longer be available. The department shall require in the lease agreement such restrictions as it deems necessary to protect the environment, the existing leaseholders, and public fishery.

(13) TRESPASS ON LEASED BEDS; PROTECTION OF LEASE AREAS.--

(a) Any person who willfully takes oysters, shells, cultch, or clams bedded or planted by a licensee under this chapter, or grantee under the provisions of heretofore existing laws, or riparian owner who may have heretofore planted the same on his or her riparian bottoms, or any oysters or clams deposited by anyone making up a cargo for market, or who willfully carries or attempts to carry away the same without permission of the owner thereof, or who willfully or knowingly removes, breaks off, destroys, or otherwise injures or alters any stakes, bounds, monuments, buoys, notices, or other designations of any natural oyster or clam reefs or beds or private bedding or propagating grounds, or who willfully injures, destroys, or removes any other protection around any oyster or clam reefs or beds, or who willfully moves any bedding ground stakes, buoys, marks, or designations placed by the department, commits a violation of this section.

(b) Harvesting shellfish is prohibited within a distance of 25 feet outside lawfully marked lease boundaries or within setback and access corridors within specifically designated high-density aquaculture lease areas and aquaculture use zones.

(14) SHELLFISH DEVELOPMENT.--

(a) The department shall improve, enlarge, and protect the natural oyster and clam reefs and beds of this state to the extent it may deem advisable and the means at its disposal will permit.

(b) The Fish and Wildlife Conservation Commission shall, to the same extent, assist in protecting shellfish aquaculture products produced on leased or granted reefs and beds.

(c) The department, in cooperation with the commission, shall provide the Legislature with recommendations as needed for the development and the proper protection of the rights of the state and private holders therein with respect to the oyster and clam business.

(15) SPECIAL ACTIVITY LICENSES.--The department is authorized to issue special activity licenses, in accordance with s. 597.020, to permit the harvest or cultivation of oysters, clams, mussels, and crabs.

(16) STAKING OFF WATER BOTTOMS OR BEDDING OYSTERS WITHOUT OBTAINING LEASE.--Any person staking off the water bottoms of this state, or bedding oysters on the bottoms of the waters of this state, without previously leasing same as required by law commits a violation of this section, and shall acquire no rights by reason of such staking off. This provision does not apply to grants heretofore made under the provisions of any heretofore existing laws or to artificial beds made heretofore by a riparian owner or his or her grantees on the owner's riparian bottoms.

(17) SHELLFISH HARVESTING SEASONS; SPECIAL PROVISIONS RELATING TO APALACHICOLA BAY.--

(a) The Fish and Wildlife Conservation Commission shall by rule set the noncultured shellfish harvesting seasons in Apalachicola Bay.

(b) If the commission changes the harvesting seasons by rule as set forth in this subsection, for 3 years after the new rule takes effect, the commission, in cooperation with the department, shall monitor the impacts of the new harvesting schedule on the bay and on local shellfish harvesters to determine whether the new harvesting schedule should be discontinued, retained, or modified. In monitoring the new schedule and in preparing its report, the following information shall be

considered:

1. Whether the bay benefits ecologically from the new harvesting schedule.
2. Whether the new harvesting schedule enhances the enforcement of shellfish harvesting laws in the bay.
3. Whether the new harvesting schedule enhances natural shellfish production, oyster relay and planting programs, and shell planting programs in the bay.
4. Whether the new harvesting schedule has more than a short-term adverse economic impact, if any, on local shellfish harvesters.

(18) REMOVING OYSTERS, CLAMS, OR MUSSELS FROM NATURAL REEFS; LICENSES, ETC.; PENALTY.--

(a) It is unlawful to use a dredge or any means or implement other than hand tongs in removing oysters from the natural or artificial state reefs or beds. This restriction shall apply to all areas of Apalachicola Bay for all shellfish harvesting, excluding private grounds leased or granted by the state prior to July 1, 1989, if the lease or grant specifically authorizes the use of implements other than hand tongs for harvesting. Except in Apalachicola Bay, upon the payment of \$25 annually, for each vessel or boat using a dredge or machinery in the gathering of clams or mussels, a special activity license may be issued by the Fish and Wildlife Conservation Commission pursuant to subsection (15) or s. 370.06 for such use to such person.

(b) Approval by the department to harvest shellfish by dredge or other mechanical means from privately held shellfish leases or grants in Apalachicola Bay shall include, but not be limited to, the following conditions:

1. The use of any mechanical harvesting device other than ordinary hand tongs for taking shellfish for any purpose from public shellfish beds in Apalachicola Bay shall be unlawful.
2. The possession of any mechanical harvesting device on the waters of Apalachicola Bay from 5 p.m. until sunrise shall be unlawful.
3. Leaseholders or grantees shall notify the department no less than 48 hours prior to each day's use of a dredge or scrape in order for the department to notify the Fish and Wildlife Conservation Commission that a mechanical harvesting device will be deployed.
4. Only two dredges or scrapes per lease or grant may be possessed or operated at any time.
5. Each vessel used for the transport or deployment of a dredge or scrape shall prominently display the lease or grant number or numbers, in numerals which are at least 12 inches high and 6 inches wide, in such a manner that the lease or grant number or numbers are readily identifiable from both the air and the water. Any violation of this paragraph or of any other statutes, rules, or conditions referenced in the lease agreement shall be considered a violation of the license and shall result in revocation of the lease or a denial of use or future use of a mechanical harvesting device.

(c) Oysters may be harvested from natural or public or private leased or granted grounds by common hand tongs or by hand, by scuba diving, free diving, leaning from vessels, or wading. In Apalachicola Bay, this provision shall apply to all shellfish.

(19) FISHING FOR RELAYING OR TRANSPLANTING PURPOSES.--

(a) The department shall designate areas for the taking of oysters and clams to be planted on leases, grants, and public areas. Oysters, clams, and mussels may be taken for relaying or transplanting at any time during the year so long as, in the opinion of the department, the public

health will not be endangered. The amount of oysters, clams, and mussels to be obtained for relaying or transplanting, the area relayed or transplanted to, and relaying or transplanting time periods shall be established in each case by the department.

(b) Application for a special activity license issued pursuant to subsection (15) for obtaining oysters, clams, or mussels for relaying from closed public shellfish harvesting areas to open areas or certified controlled purification plants or for transplanting sublegal-sized oysters, clams, or mussels must be made to the department. In return, the department may assign an area and a period of time for the oysters, clams, or mussels to be relayed or transplanted to be taken. All relaying and transplanting operations shall take place under the direction of the department.

(c) Relayed oysters, clams, or mussels shall not be subsequently harvested for any reason without written permission or public notice from the department.

(20) OYSTER AND CLAM REHABILITATION.--The board of county commissioners of the several counties may appropriate and expend such sums as it may deem proper for the purpose of planting or transplanting oysters, clams, oyster shell, clam shell, or cultch or to perform such other acts for the enhancement of the oyster and clam industries of the state, out of any sum in the county treasury not otherwise appropriated.

(21) DREDGING OF DEAD SHELLS PROHIBITED.--The dredging of dead shell deposits is prohibited in the state.

(22) COOPERATION WITH UNITED STATES FISH AND WILDLIFE SERVICE.--The department shall cooperate with the United States Fish and Wildlife Service, under existing federal laws, rules, and regulations, and is authorized to accept donations, grants, and matching funds from the Federal Government in order to carry out its oyster resource and development responsibilities. The department is further authorized to accept any and all donations including funds, oysters, or oyster shells.

(23) OYSTER AND CLAM SHELLS PROPERTY OF DEPARTMENT.--

(a) Except for oysters used directly in the half-shell trade, 50 percent of all shells from oysters and clams shucked commercially in the state shall be and remain the property of the department when such shells are needed and required for rehabilitation projects and planting operations, in cooperation with the Fish and Wildlife Conservation Commission, when sufficient resources and facilities exist for handling and planting such shell, and when the collection and handling of such shell is practicable and useful, except that bona fide holders of leases and grants may retain 75 percent of such shell as they produce for aquacultural purposes. Storage, transportation, and planting of shells so retained by lessees and grantees shall be carried out under the conditions of the lease agreement or with the written approval of the department and shall be subject to such reasonable time limits as the department may fix. In the event of an accumulation of an excess of shells, the department is authorized to sell shells only to private growers for use in oyster or clam cultivation on bona fide leases and grants. No profit shall accrue to the department in these transactions, and shells are to be sold for the estimated moneys spent by the department to gather and stockpile the shells. Planting of shells obtained from the department by purchase shall be subject to the conditions set forth in the lease agreement or in the written approval as issued by the

department. Any shells not claimed and used by private oyster cultivators 10 years after shells are gathered and stockpiled may be sold at auction to the highest bidder for any private use.

(b) Whenever the department determines that it is unfeasible to collect oyster or clam shells, the shells become the property of the producer.

(c) Whenever oyster or clam shells are owned by the department and it is not useful or feasible to use them in the rehabilitation projects, and when no leaseholder has exercised his or her option to acquire them, the department may sell such shells for the highest price obtainable. The shells thus sold may be used in any manner and for any purpose at the discretion of the purchaser.

(d) Moneys derived from the sale of shell shall be deposited in the General Inspection Trust Fund for shellfish programs.

(e) The department may publish notice, in a newspaper serving the county, of its intention to collect the oyster and clam shells and shall notify, by certified mail, each shucking establishment from which shells are to be collected. The notice shall contain the period of time the department intends to collect the shells in that county and the collection purpose.

(24) OYSTER CULTURE.--The department, in cooperation with the Fish and Wildlife Conservation Commission and the Department of Environmental Protection, shall protect all clam beds, oyster beds, shellfish grounds, and oyster reefs from damage or destruction resulting from improper cultivation, propagation, planting, or harvesting and control the pollution of the waters over or surrounding beds, grounds, or reefs, and to this end the Department of Health is authorized and directed to lend its cooperation to the department, to make available its laboratory testing facilities and apparatus.

(25) REQUIREMENTS FOR OYSTER OR CLAM VESSELS.--

(a) All vessels used for the harvesting, gathering, or transporting of oysters or clams for commercial purposes shall be constructed and maintained to prevent contamination or deterioration of shellfish. To this end, all such vessels shall be provided with false bottoms and bulkheads fore and aft to prevent onboard shellfish from coming in contact with any bilge water. No dogs or other animals shall be allowed at any time on vessels used to harvest or transport shellfish. A violation of any provision of this subsection shall result in at least the revocation of the violator's license.

(b) For the purpose of this subsection, "harvesting, gathering, or transporting of oysters or clams for commercial purposes" means to harvest, gather, or transport oysters or clams with the intent to sell and shall apply to a quantity of two or more bags of oysters per vessel or more than one 5-gallon bucket of unshucked hard clams per person or more than two 5-gallon buckets of unshucked hard clams per vessel.

History.--s. 31, ch. 2000-364; s. 741, ch. 2003-261.

597.020 Shellfish processors; regulation.--

(1) The department is authorized to adopt by rule regulations, specifications, and codes relating to sanitary practices for catching, cultivating, handling, processing, packaging, preserving, canning, smoking, and storing of oysters, clams, mussels, scallops, and crabs. The department is also authorized to license shellfish processors who handle oysters, clams, mussels, scallops, and crabs when such activities relate to quality control, sanitary, and public health practices pursuant to this

section and chapter 500. The department is also authorized to license or certify, for a fee determined by rule, facilities used for processing oysters, clams, mussels, scallops, and crabs, to levy an administrative fine of up to \$1,000 per violation per day or to suspend or revoke such licenses or certificates upon satisfactory evidence of any violation of rules adopted pursuant to this section, and to seize and destroy any adulterated or misbranded shellfish products as defined by rule.

(2) A shellfish processing plant certification license is required to operate any facility in which oysters, clams, mussels, scallops, or crabs are processed, including but not limited to: an oyster, clam, mussel, or scallop cannery; a shell stock dealership; an oyster, clam, mussel, or scallop shucking plant; an oyster, clam, mussel, or scallop repacking plant; an oyster, clam, mussel, or scallop controlled purification plant; or a crab or soft-shell crab processing or shedding plant.

(3) The department may suspend or revoke any shellfish processing plant certification license upon satisfactory evidence that the licensee has violated any regulation, specification, or code adopted under this section and may seize and destroy any shellfish product which is defined by rule to be an adulterated or misbranded shellfish product.

(4) Any license or certification authorized and issued under this chapter shall automatically expire on June 30 of each year.

History.--s. 1, ch. 65-110; ss. 25, 35, ch. 69-106; s. 6, ch. 83-134; s. 2, ch. 84-121; ss. 4, 5, ch. 86-219; ss. 5, 19, ch. 86-240; s. 218, ch. 94-356; s. 13, ch. 96-247; s. 44, ch. 99-245; s. 32, ch. 2000-364; s. 42, ch. 2002-295.

Note.--Former s. 370.071.

Appendix B

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