



**FLORIDA AQUACULTURE
INTERAGENCY COORDINATING
COUNCIL**

ANNUAL REPORT 2005-2006

Florida Department of Agriculture and Consumer Services

Presented by:

**The Honorable Charles H. Bronson
Commissioner of Agriculture**

December 1, 2006

The Honorable Jeb Bush
Governor
The Capitol
Tallahassee, Florida 32399-0001

Dear Governor Bush:

I am pleased to submit the Aquaculture Interagency Coordinating Council's (AICC) Annual Report as required by Florida Statutes, Section 597.006. This report documents the Council's activities and recommendations from July 2005 to June 2006, and includes a summary of agency activities and expenditures on aquaculture programs.

Florida's aquaculturists continue to provide our citizens with high quality products for food, aesthetic and other uses. As you know, Florida's aquaculture industry annually documents aquaculture sales of \$95.5 million and full and part-time employment for over 1,500 citizens. The diversity of species in production and variety of production systems, in nearly every county of the state as well as coastal waters, is remarkable. It is only with the cooperation of the agencies of the Coordinating Council that Florida has been able to develop a regulatory, research and support system that serves the aquaculture industry while protecting Florida's environment.

The hardships experienced over the last two summers have hampered the industry in the short term. However, thanks to the hard work of Florida's producers, with support of the AICC member agencies, you and our legislators, I expect the aquaculture industry's success to continue and grow.

Sincerely,

CHARLES H. BRONSON
COMMISSIONER OF AGRICULTURE

cc: President of the Senate
Speaker of the House
Chairman of the Senate Ways & Means Committee
Chairman of the House Fiscal Council
Chairman of the House Agriculture Committee
Chairman of the Senate Agriculture Committee

**Annual Report:
Aquaculture Interagency Coordinating Council (AICC)
December 1, 2006**

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AICC SUMMARY OF ACTIVITIES July 2005 - June 2006

Introduction

The Aquaculture Interagency Coordinating Council (AICC) was legislatively created in 1984 by the Florida Aquaculture Policy Act (Chapter 597, Florida Statutes). The Council 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.

AICC Meetings

The AICC met on October 6, 2005. This was the only meeting held during the report period of July 1, 2005 through June 30, 2006. For details of the Council's discussion and actions, the agenda and minutes follow.

**FLORIDA AQUACULTURE INTERAGENCY
COORDINATING COUNCIL MEETING**

Division of Aquaculture Conference Room
1203 Governor's Square Boulevard, Fifth Floor
Tallahassee, Florida
October 6, 2005
1:00 p.m.

AGENDA

- I. CALL TO ORDER
- II. MINUTES OF MEETING March 24, 2004
- III. NEW BUSINESS
 - A. Agency Updates
 - B. Aquaculture Best Management Practices Manual
 - C. Other New Business
- IV. NEXT MEETING
- V. ADJOURN

Minutes
Aquaculture Interagency Coordinating Council
Division of Aquaculture Conference Room
Tallahassee, Florida

October 6, 2005

I. Call to Order

The meeting was called to order at 1:05 pm.

Members Present

Chuck Adams	Florida Sea Grant
Mary Helen Blakeslee	Office of Trade, Tourism and Economic Development (OTTED)
Larry Nall	Florida Department of Environmental Protection (DEP)
Craig Watson	University of Florida - Institute of Food and Agricultural Science (IFAS)
Sherman Wilhelm	Florida Department of Agriculture & Consumer Services (DACS)

Members Absent

Lawrence Carter	Florida A&M University
Ray Eubanks	Florida Department of Community Affairs (DCA)
Bill Halstead	Florida Fish and Wildlife Conservation Commission (FWC)
Larry Robinson	Florida Institute of Oceanography

Guests

Kal Knickerbocker	DACS
Karen Metcalf	DACS

II. Minutes of Previous Meetings March 24, 2004.

The minutes of March 24, 2004 were approved as written.

II. New Business

A. Agency Updates

Florida Fish and Wildlife Conservation Commission (FWC): The FWC member of the AICC was unable to attend the meeting but sent a brief summary of agency activities at the Richloam State Fish Hatchery, Blackwater Fisheries Research and Development Center and Stock Enhancement Research Facility. A full report of activities will be included in the AICC annual report for 2004-2005.

Sea Grant: The Sea Grant work plan activities that relate to aquaculture were distributed and discussed. It was noted that this included increased interaction between Sea Grant and the IFAS Tropical Aquaculture Lab. Additionally, Sea Grant

is working on a project to study the feasibility of using triploidy to improve hard clam production. This project was delayed by last year's hurricanes. Chuck Adams is working on a project funded with invasive species money to examine biofouling in the aquaculture setting and the DACS-funded pompano production project at Mote.

There are three aquaculture projects being funded by Florida Sea Grant for 2006. These projects deal with improving hatchery technology for marine ornamentals, work on triploid hard clam culture and an investigation of the sunray venus clam as an aquaculture product.

University of Florida - Institute of Food and Agricultural Science Department of Fisheries and Aquatic Sciences (IFAS): IFAS reiterated that there are cooperative projects as mentioned in the Sea Grant summary (shellfish projects). Changes in the Department of Fisheries and Aquatic Sciences were mentioned. Courtney Ohs has started in a position at the Indian River Research and Education Center focusing on aquaculture issues. He has experience in alternative species research and is interested in researching barramundi production. This species, in the same family as snook, has fast growth in culture and brings a good price in the market. Another research interest is live shipment of *Penaeus vannamei* to niche markets. The process would involve chilling the shrimp to increase survival in transport.

IFAS is ready to make an employment offer to a non-native aquatic species and aquaculture faculty. This position will be funded from a variety of sources including IFAS, USDA, and FWC for the first five years.

Florida Department of Environmental Protection (DEP): DEP is involved with new councils and initiatives. DEP has been overseeing the creation and staffing of the new Oceans Council. This council is charged with oversight of Florida's ocean research. The Gulf of Mexico Alliance was created as a reaction to the national Oceans Report. This group is comprised of the Gulf States and will work on white papers on a number of topics related to ocean issues. The Oceans Initiative was funded for a statewide water monitoring plan, a water reuse study, environmental education and for use by the Oceans Council.

The aquatic preserves are currently revising their management plans and will be up for public comment within the next few weeks. DEP just opened a new education center for one of its National Estuarine Research Reserves.

Office of Trade, Tourism and Economic Development (OTTED): The loan program that was discussed at the last meeting for clam producers did not happen because there was not an entity willing to manage the program. Mary Helen Blakeslee traveled to Mississippi and Louisiana after Hurricane Katrina to provide information and assistance on emergency loans in those states.

Oyster harvesters in Franklin County have been getting the attention of OTTED as a result of Hurricane Dennis and red tide. There may be funding for updated municipal facilities coming to that area through a Working Waterfront grant in Apalachicola.

There was some discussion of relief for lobster harvesters and live rock producers in the Keys, since these industries were hard hit by Hurricane Katrina. The problem with these people getting assistance is that there has not been a disaster declaration for this area. Live rock producers may be able to qualify for non-insured crop disaster assistance since this does not require a disaster declaration if certain criteria are met.

Florida Department of Agriculture & Consumer Services (DACS): The latest Best Management Practices manual was updated last week. Changes were made to clarify where references could be located. This new manual is expected to be adopted within 60 days. The new version includes changes that the AICC has seen related to shellfish production, dock construction, transgenics, animal health and initial construction plans.

The legislature funded three projects recommended by the Aquaculture Review Council. These projects included research on pompano production, alligator pix disease and an aquaculture program at Wildwood Middle School.

Six projects recommended by the ARC for 2006-2007 funding are in the Department's budget request for next year. There is also renewed interest in production research at the Indian River REC which is included in the DACS budget. This is becoming a priority as more and more acres of commercial citrus are removed due to citrus canker.

The Department has created a clam industry advisory council. There are 13 members coming from areas based on the geographic distribution of leases within the state as well as the Aquaculture Review Council shellfish representative. This group will meet quarterly. Part of the oyster industry has asked for a similar group which would include harvesters and processors. The industry would like a greater say in where resource redevelopment funding goes.

B. Ocean Council Legislation

The Oceans Council was created in the last legislative session. The council is chaired by DEP and FWC. DEP, FWC and DACS each appointed five members to the council. The group has four initial obligations, to develop a research assessment, develop a research plan, prioritize research projects for the legislature and complete a pilot aquaculture project in an upland recirculating system with the goal of stock enhancement. The group will meet next in November in West Palm Beach.

C. Other New Business

Economic Assistance and Data

The AICC was informed of a resolution from the Franklin County Board of County Commissioners. The October 4 resolution requests public assistance for the seafood industry and its workers which have been severely impacted by Hurricane Dennis and lingering red tide. There was discussion of the lack of good data on the economic impact of that industry. Chuck Adams is working on a project in hopes of getting a better handle on some of that data. His group has a memorandum of understanding with FWC to get individual-level harvester data. The group commented that oystermen and aquaculturists need to realize the importance of giving real numbers to surveyors. Without accurate data, agencies cannot always justify supporting these industries at requested levels. The national and Florida survey of the aquaculture industry will begin in January.

Net Pen and Cage Best Management Practices

The DACS has an advisory group commenting on the developing BMPs for net pens and cages. The BMP document is modeled after a report completed for the USEPA by Dr. Craig Tucker of Mississippi State University. The draft BMP was distributed. There is some serious discussion about what monitoring would be required for producers. DACS would like to ensure the monitoring requirements are not so expensive or time consuming that producers cannot be profitable. There is also discussion on language related to genetics of cultured stocks.

The BMP defines the area where producers can have aquaculture facilities, feed, waste, escape and health management, general operations, and record-keeping. The BMPs only address facilities producing less than 100,000 pounds annually. Other operations will fall into NPDES permitting requirements.

The advisory group is leaving Monday on a trip to Puerto Rico to observe existing cages growing cobia. Additional discussion focused on the expense of starting a net pen or cage operation (estimated near \$1 million). There was a comment about ways to monitor cages and pens such as video observation of the seafloor, testing organics, sulfide and redox potential. After the trip to Puerto Rico, the BMP language will be finalized and the workshop process begun.

Alligator Farm Oversight

There is a move to shift alligator farm regulation from under DEP to DACS. This would mean developing BMPs for these facilities and taking them out of industrial wastewater permitting. It was noted that DACS new aquaculture engineer should work with Ron Malone from Alabama as he has done work with the alligator industry outside Florida.

Red Tide Economics

There is a project proposed to study economic impacts of red tide. Chuck Adams will be using beach attendance records where available. It was noted that economic impact data was also needed for shellfish harvesters and processors.

The next meeting will be in February or March

IV. Adjourn

The meeting was adjourned at 3:00 pm.

MEMBER AGENCY REPORTS

One purpose of the AICC annual report is to compile all aquaculture activities undertaken by member agencies. Each member agency is expected to provide a list to include; the needs each activity is designed to address, the results, the funds expended on each activity, and the source of those funds. The remainder of this report consists of activity summaries, as submitted, for each of those agencies.



Aquaculture Annual Activity Report



July 1, 2005 – June 30, 2006

Extension and Outreach Program
College of Engineering Sciences, Technology and Agriculture
Florida A&M University

Submitted By

Dr. Lawrence Carter
Associate Dean, Extension and Outreach Programs

November 16, 2006

During the year 2005-2006, the Florida A & M University Cooperative Extension Program personnel participated in various activities working with farmers in several counties in north Florida. A proposal entitled "Development of Small Scale Aquaculture Farms in North Florida" was done to address the Statement of Interest of requests from the Florida Aquaculture Review Council (ARC). Dr. Uford Madden, Extension Food Safety Specialist presented his proposed work to the ARC. Dr. Madden's project was among the six projects that were recommended to Commissioner of Agriculture, Mr. Charles Bronson for the budget year 2006-2007. The project was funded One Hundred Thousand Dollars.

The proposed project addressed the specific objective, 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, preventive aquatic animal health practices and product value.

Four ponds were dedicated to be used for conducting research, hands-on training and demonstrations for small, limited resource farmers and economically disadvantaged farmers. Farmers who are currently growing fish and farmers who are interested in growing fish with or without ownership of existing water bodies will be identified. The farmers will receive training on the best management practices and on alternative methods for improvement of production systems for fish (Bait fish and Sturgeon). Development of appropriate marketing strategies will result in increased production of fish and profitability of these farms. Farmers will be assisted in the development of small scale enterprises and producing fingerlings for their own production.

A face-to-face meeting was held on July 14, 2006 at Florida A&M University, Perry-Paige Building, in the Cooperative Extension Service conference room. The following people were in attendance: Dr. Uford Madden, Principal Investigator; Ms. Vonda Richardson, Marketing Specialist, FAMU Cooperative Extension Program; Dr. Fidelis Okepebhola, Mr. Godfrey Nurse and Dr. Jean Beaudouin, Collaborators FAMU Community Development Center (Quincy); Mr. Alex Bolques, FAMU County Agent, Gadsden County; Mr. Scott Christmas, Florida Farm Bureau Federation and Mr. Martin May and Mr. Paul Baltrop, Department of Agriculture and Consumer Services, Bureau of Seafood and Aquaculture. Dr. Frank Chapman, Collaborator, University of Florida, Gainesville was unable to attend. Dr. Madden began by welcoming everyone and introductions was followed by an overview of the project. Discussions were held on the Aquaculture Curriculum, Project Implementation and Work schedules. Collaborators decided on starting to assist with various areas of the curriculum and suggested other assistance that may be explored. Identification of farmers and marketing information were recognized as high priorities and it was agreed that these topics would be addressed as early as possible

Identification of farmers is continuing because the targeted number is not yet reached. A registration form was designed and copies were sent to County Agents and interested farmers. Farmers were requested to complete the form and return it to the Cooperative Extension Program office. Preparation of the ponds for the project is continuing at the

Community Development Center and curriculum development is in progress and several individuals have been contacted in the Department of Agriculture, Division of Aquaculture, the University of Florida and other agencies to assist with presentation of information to the farmers. The position descriptions for project personnel have been prepared and advertised.

Overall, the project is progressing and some materials have been ordered and implementation planning meetings and discussions are on going. It is anticipated that with full implementation, the project we will be able to fulfill the goals and objectives. We believe that we can work in aquaculture to contribute to increase in food production and the agricultural economy of the State of Florida by development of small scale aquaculture farms.

A proposal was submitted to ARC entitled “Development of aquaculture programs for low-income farmers and students” to address the specific objective: Development of county wide or regional aquaculture programs for middle or high school students. Some schools have aquaculture programs that provide limited opportunities for education of youth in aquaculture and Florida’s aquaculturists are in need of a means to educate the public, peak interest in young people and train a skilled workforce. This proposal was among the projects were recommended to Commissioner of Agriculture, Mr. Charles Bronson for the budget year 2007-2008.

Since the inception of the Florida Aquaculture Act, the Florida Legislature in the last 21 years has recognized aquaculture as an agricultural endeavor and has invested public funds in applied research, industry development, several job training programs and public education at high schools and universities. Development of an Aquaculture Program to Enhance Aquaculture Education can contribute to educating students, small farmers and the public and garner the interest of numerous young people who can be trained to produce a highly skilled workforce for the aquaculture industry.

This project will facilitate the education of students from two middle and two high schools in counties in North Florida. This program is designed to utilize the limited resources available in these schools to enhance the interest and knowledge of students. An aquaculture curriculum will be developed and the program will be coordinated with the science teachers in each school during the semesters. The activities of the program will enhance the students’ abilities to apply their classroom knowledge of reading, writing, math, and science to the best management practices involved in aquaculture production, economics and marketing. The North Florida Aquaculture Program will be located at the (FAMU) Community Development Center (CDC) in Quincy, Florida where there are existing ponds. During the regular semesters, students from each school in the Aquaculture Program will visit the FAMU CDC for instruction and demonstrations once per month to reinforce what they learned in the classroom. In summer months, a four-week session will be offered and will be open to students from the previously selected schools and other schools. This four-week session will allow for classroom, hands-on training and integrated demonstrations that will educate the students on applying their classroom knowledge of reading, writing, math, and science to the best management practices involved in production, economic and marketing of aquaculture and how aquaculture can contribute to increase in fish food

production and the agricultural economy of the State of Florida. Field trips and education tours to aquaculture research and commercial facilities will be included in program.

In North Florida, some schools have aquariums or fish tanks but the opportunities for enhancing aquaculture education of the youth are limited. There is a need to develop programs that will allow schools with limited resources to increase the opportunities of students to gain aquaculture experience and education. This will lead to an increased amount of young people who will garner interest in aquaculture and will be trained to fulfill the need for a skilled workforce for the aquaculture industry. The Florida Aquaculture Plan 2005-2006 provided an analysis of the industry's status and identified technical, production, economic, and market related challenges that are of equal importance to the industry and must be conquered in order to insure continued growth and expansion.

We believe that the development of an Aquaculture Program in North Florida will contribute to enhancing Aquaculture Education not only at a regional level but will have an impact statewide. This project will allow Florida A & M University (FAMU) to broaden its Land-grant Mission while making a significant contribution to Aquaculture Education that should result in increased youth interest and increased amount of young people interested in careers in the Aquaculture Industry.

Overall, the collaboration of specialists from the universities, county agents, producers, business (public and private), the Florida Farm Bureau Federation and Florida Department of Agriculture and Consumer Services should improve communication and cooperation between personnel in state, local and federal governments, schools and farmers, the private sector and businesses. This should result in enhanced knowledge and understanding of the vision and the needs of all stakeholders in the fish industry and should result in enhancement of education of students seeking careers and or working in aquaculture, increase in the number of trained young people need for a skilled workforce, increase in the means to educate the public about the aquaculture industry, increase in the number of small scale fish farmers, enhanced production efficiency (quantity and quality) of fish, increased economic activity, increased marketing, increased profitability and further advancement of the aquaculture industry.



Florida Department of Agriculture & Consumer Services
CHARLES H. BRONSON, Commissioner

**Annual Report
July 2005 – June 2006**

Division of Aquaculture

The Division of Aquaculture was created in 1999 by the Florida Legislature and is responsible for six programs: aquaculture certification, aquaculture leasing of sovereignty submerged land, shellfish resources development, shellfish processing plant certification, shellfish harvesting area management, and technical support. Florida's aquaculture industry is one of the leading producers in the nation with \$95 million in farm gate value during the 2003 production year.

Aquaculture Certification Program

Chapter 597, Florida Statutes, established the Aquaculture Certificate of Registration to recognize aqua-farming businesses. Aquacultural businesses in Florida are required to be certified annually and to attest that they will comply with the Best Management Practices provided in Chapter 5L-3, Florida Administrative Code. The Aquaculture Certificate of Registration is used to identify aquaculture producers as members of Florida's agricultural community and to identify aquacultural products produced in the state. Site inspections are conducted at aquaculture facilities to ensure compliance.

The Department certified 960 aquaculture facilities during fiscal year 2005-06. Shellfish producers make up 49 percent of certified farms, 24 percent are ornamental producers and 19 percent produce food fish, with the remaining producing live rock, alligators and bait. Certified farms are found in 58 of the state's 67 counties, with the highest number of certified farms (20 percent) occurring in Levy County. Hillsborough County is next with ten percent, followed by Dixie and Lee Counties with six percent, each.

Sovereignty Submerged Lands Leasing Program

The Department is responsible for the Aquaculture Lease Program under the provisions in Chapter 253, Florida Statutes. Currently, the Department administers 633 aquaculture leases containing about 1,508 acres and 79 shellfish leases containing about 1,285 acres. Aquaculture leases are located in Brevard, Charlotte, Collier, Dixie, Franklin, Indian River, Lee, Levy, Manatee, Monroe, Palm Beach, Pinellas, St. Johns, Volusia and Wakulla Counties. In response to its statutory mandate, the Department identifies tracts of submerged lands throughout the state that are suitable for aquacultural development. Twenty-one Aquaculture Use Areas have been identified by the Department and authorized by the Board of Trustees in nine coastal counties; including Brevard, Charlotte, Collier, Dixie, Franklin, Indian River, Lee, Levy and Volusia.

Oyster Culture and Shellfish Resource Development Program

Under the mandate to improve, enlarge, and protect the oyster and clam resources of the state, the Department is actively engaged in enhancing shellfish resources and restoring oyster reefs on public submerged lands. During fiscal year 2005-06, the Department collected 33,312 bushels of processed oyster shell from processors in Franklin County and 3,696 bushels from processors in Levy County. Oyster resource development projects were conducted in cooperation with local oystermen's associations in four coastal counties. A total of 376,446 bushels of live oysters were re-planted on public reefs in Franklin, Wakulla, Dixie, and Levy Counties.

Restoring Public Oyster Reefs

The Department is involved in a comprehensive multi-county project to restore oyster reefs that were damaged by Hurricane Ivan through a \$1.7 million grant from the National Oceanic and Atmospheric Administration. This project is designed to enhance oyster production, to facilitate recovery of the oyster business and to provide significant resource restoration benefits. The project promotes the development of self-sustaining reef communities, which in turn, perform ecological services which contribute to fisheries habitat, ecosystem stability, nutrient cycling, and improved water quality. Functioning oyster reefs are recognized as an essential component in stabilizing and sustaining ecological relationships in almost all Gulf estuarine ecosystems.

Shellfish Harvesting Area Classification and Management Program

This program seeks to classify and manage Florida coastal waters for maximum use of shellfish resource, protection of public health, and promotion of a healthy coastal environment. The program is audited each year by the U.S. Food and Drug Administration to ensure compliance with the provisions of the National Shellfish Sanitation Program.

A total of 38 shellfish harvesting areas are currently classified and managed statewide. During fiscal year 2005-06, the required annual update reports were completed for all 38 shellfish harvesting areas and all of the shellfish harvesting areas requiring a triennial reappraisal report were completed. The data and reports support current classification and management for all shellfish harvesting areas.

During fiscal year 2005-06, a total of 795 sampling excursions were conducted to collect and analyze 13,101 water samples for fecal coliform bacteria and there were a total of 435 closures and reopenings of shellfish harvesting areas.

Shellfish Processing Facility Program

This program seeks to ensure wholesome shellfish products through inspection, education and enforcement of state regulations and national guidelines. The program is audited each year by the U.S. Food and Drug Administration to ensure compliance with the provisions of the National Shellfish Sanitation Program.

A total of 99 Shellfish Processing Plant Certifications Licenses were issued during fiscal year 2005-06. A total of 367 regulatory processing plant inspections were conducted.

Based on fiscal year 2005-06 inspection results, a total of 51 warning letters were issued and 9 settlement letters were issued. Action was taken to destroy shellfish products when they were found to be adulterated, contaminated, unwholesome, mislabeled, or exceeding the product shelf life.

Technical Support Programs

The Division provides substantial technical and administrative support for aquacultural and shellfish operations. Staff provides and participates in workshops, seminars and problem solving activities to help provide information to Florida farmers. In addition, staff manages contracts to researchers for legislative appropriation to provide quick answers to industry issues.

Division of Plant Industry

For the year ending June 30, 2006, the Division of Plant Industry had 102 aquatic nurseries registered and under inspection with the Department. These nurseries are inspected to insure that the aquatic plants sold or distributed by these nurseries are free from pests and diseases and meet the export certification requirements of other states and countries.

Also in conjunction with the aquatic nursery inspection activities, the Division of Plant Industry, through the authority granted in a Memorandum of Understanding with the Florida Department of Environmental Protection, issued 5 Class II Prohibited Aquatic Plant Permits to registered aquatic nurseries for the out-of-state sale of Class II Prohibited Aquatic Plants, as listed in DEP's Chapter 62C-52.011, F.A.C.

Division of Marketing

BeOysterAware.com

The Gulf and South Atlantic Fisheries Foundation, with a grant from NOAA provided funding to the Bureau for a logo development project. The logo, BeOysterAware.com is a website identifier for a new website of the same name. The Bureau worked closely with Motivaitt Seafood, Bull Bay Clam Farm and other industry representatives on this logo project. The actual logo design was created by the Department's graphics section. The website will help interested parties learn more about *Vibrio vulnificus*, a natural occurring bacteria in raw oysters harvested in warm coastal waters.

While not a serious threat to healthy individuals, consumption of raw or undercooked oysters by at-risk individuals may cause serious illness or even death from *Vibrio vulnificus* bacteria. To determine whether you or a loved one is at-risk, and learn more about oyster consumption, including recipes, and the post harvest processes that make raw oysters safer for the at-risk population, visit the BeOysterAware.com website.

Vibrio vulnificus Information and Walgreens

To further educational efforts targeted to the at-risk population, the Bureau of Seafood and Aquaculture Marketing, the Gulf and South Atlantic Fisheries Foundation and

the Interstate Shellfish Sanitation Conference (ISSC) partnered with Walgreens Pharmacy. Walgreens committed to placing the ISSC's "Risk of Eating Raw Oysters" brochures in their 620 Florida, Caribbean and Puerto Rico stores. If this goes well Walgreens will place the brochures in their other 700 stores in the Southeast and ultimately in their 4500 stores nationwide. Pharmacists are the front line in health care, therefore, Walgreens will also instruct their pharmacists to: learn about *Vibrio vulnificus*, the at risk population, present the ISSC brochure to the at-risk patient, counsel that patient on the risks of eating raw oysters, make the brochures available on the shelf, and target Hispanic neighborhoods with the Spanish version of the brochure. Additionally, Walgreens has partnered with the Mayo clinic on a web-based health library and will incorporate this at-risk information into their health library. For example, a person searches for liver disease on the health library, when the liver disease information appears there will be information regarding vibrio and the risk of eating raw oysters for the liver patient.

Trade Events

Several Florida companies, such as All American Gator Products participated in the Bureau of Seafood and Aquaculture Marketing's Florida Pavilion at the International Boston Seafood Show, March 2006. Leavins Seafood Company displayed value added post harvest treated oysters and clams, as well as White Water Clams.

Festivals

July 2005

Attended Clamerica Festival in Cedar Key:
Provided booth & distributed alligator, oyster, clam recipe brochures
Prepared Clam Scampi prepared as live cooking demonstration
Judged clam recipe contest
Decorated clam boat for Festival

October 2005

Provided booth in Cedar Key @ Seafood Festival - distributed alligator, oyster & clam recipe brochures

November 2005

Sebastian Lagoon Clambake Festival
Cost of Participation: \$975
POP distributed: 1,935

March 2006

Attended Farm Bureau Legislative Event in Tallahassee - Provided booth distributed alligator, oyster & clam recipe brochures

Provided Aquaculture Gumbo for 300 people in Tallahassee @ Farm Bureau Legislative Event

April 2006

Attended Sysco Food Show in Jacksonville – distributed alligator, oyster & clam recipe brochures

May 2006

Clam Scampi prepared on WCTV

June 2006

Attended Clam Informational Fair sponsored by the Cedar Key Aquaculture Association

Dive In

The Dive-In! tropical fish campaign ended at the end of last fiscal year; however promotional materials that remained in inventory were distributed to retailers, 3 public aquariums, schools throughout Florida, education resource centers in Florida and Perfecto Aquarium Manufacturing.

All of the shipping costs were paid by the Florida Tropical Fish Farmers Association.

Distributed Promotional Materials

Kids fisHedz posters:	34,500	
Kid’s aquarium set-up/care brochures:	20,000	
Adult aquarium set-up/care brochures:	20,000	
Web site promo cards:	10,000	
Betta/goldfish fish plastic aquariums:	108	
Aquarium fish identification static clings:	100,000	(25 boxes)
Tote bags for teachers:	350	

Press Releases

2/22/06 “Maintaining Seafood Quality” press release with clams in it; distributed to culinary trade publications.

Published in *Today’s Restaurant News*

1/5/06 “Florida Seafood History” press release with clams in it. Published in *Today’s Restaurant News*.

No Cost Involved

Summary of Department of Agriculture and Consumer Services
 Aquaculture Funds
 Fiscal year 2005-2006

Division	Category	Amount	Source
		\$3,851,205	General Revenue
Aquaculture	Division Operating Funds	\$776,924	General Inspection Trust Fund
	Grants and Contracts	\$1,173,816	US Department of Agriculture, National Oceanographic and Atmospheric Administration, National Sea Grant, Florida Ag in the Classroom
Plant Industry	Aquaculture Inspection Activities	\$22932	General Revenue/Plant Industry Trust Fund
Marketing	Tropical Fish Marketing	\$0	
	Total Expenditure	\$5,824,877	



Florida Department of Community Affairs

No report submitted.



Florida Department of Environmental Protection

AICC Annual Report for FY 2005-2006

Division of Water Resources: Staff has worked with the Division of Agriculture and Consumer Services (DACS) to establish Best Management Practices (BMPs) for construction of small docks relating to aquaculture. These standards are currently in rulemaking at DACS. Staff is also participating in a technical advisory committee to establish BMPs for offshore net pens that will produce less than 100,000 pounds of fish.

Office of Coastal and Aquatic Managed Areas (CAMA): CAMA was tasked with coordinating the activities of a newly created council this fiscal year, the Florida Oceans and Coastal Resources Council. The Council was created by the Legislature to identify coastal and ocean research needs and recommend research priorities. Additionally, the Council was charged with administering an aquaculture pilot to demonstrate the feasibility of collaborative research effort.

The Oceans Council's 2006-2007 Annual Science Research Plan contained aquaculture-related research among its recommendations. The Research Plan is available at www.FloridaOceansCouncil.org. An aquaculture pilot was initiated, with results to be reported to the Legislature February 1, 2007.

CAMA completed its Aquatic Preserve program overview document and continued the process of revising site management plans in accordance with CAMA's new Integrated Management Framework that, among other things, emphasizes strong participation from stakeholders, including aquaculture interests, in shaping policies and procedures that will go into the management plans.

Rookery Bay National Estuarine Research Reserve

CAMA staff is working with Florida Gulf Coast University to develop a hatchery to support native hard clam and oyster restoration projects in Southwest Florida. The hard clam aquaculture leases (200 acres in the Cape Romano Ten Thousand Island Aquatic Preserve in 2003) in Collier County have not been very successful and this hatchery could have a positive influence in guiding this activity in a more ecologically sustainable manner.

Historically, (1940's) the area supported one of the largest clam fisheries in the nation but a combination of over fishing and red tide wiped out most of the native clams. For the future, it is thought that if re-seeding can be started with native clams it could be a significant habitat restoration project.

The Alligator Harbor Aquatic Preserve: Have been in contact with DACS in regards to water quality monitoring at the clam aquaculture sites. The Preserve has begun nutrient

monitoring at six sites within the harbor and has collected water quality data at four seagrass sites. This data will be compared with DACS historical/present datalogger data.

East Central Florida Aquatic Preserves (ECFAP): ECFAP is partnering with Dr. William Arnold, of the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute, on hard clam research involving a spat culture tank at the ECF Environmental Field Office. This potential research is part of a grant funded project with local aquaculturalists for release of spat into the Banana River.

ECFAP staff assisted DACS with a survey of a potential clam lease area in Mosquito Lagoon Aquatic Preserve. The request involved a new lease in a previously abandoned lease site. DACS had adjusted the lease area to reduce environmental impacts to surrounding habitat. DACS surveyed the proposed area to identify submerged aquatic vegetation or existing wild clam densities with ECFAP staff verifying results in the field.

ECFAP regularly coordinates with several lease holders to identify issues within the Aquatic Preserves. Staff assisted a local commercial spat grower with information pertaining to grants and other funding opportunities for conversion of his facility for propagation of seagrasses for seagrass restoration projects.



Florida Fish and Wildlife Conservation Commission

Report on Aquaculture Activities Florida Fish & Wildlife Conservation Commission FY 2005/2006

Fish & Wildlife Research Institute

Stock Enhancement Research Facility (SERF)

The Stock Enhancement Research program, based at the FWC Stock Enhancement Research Facility (SERF) at Port Manatee, conducts applied research to develop aquaculture technology for selected marine sport fish and invertebrates. The animals reared are used to develop strategies for releasing cultured organisms as a management tool for important recreational fisheries and to evaluate the effect and the cost-effectiveness of marine stock enhancement.

Fish culture at SERF continued with red drum *Sciaenops ocellatus* during this period. During July 2005, staff completed a total inventory of phase-III red drum (77,696) infected with lenticular cataracts reared from the previous fall. Juvenile red drum were cultured in ponds during the fall 2005 and cataracts were again observed in our fish during spring 2006. Potential causes for this disorder have yet to be determined, but degradation of influent water quality appears to be the most likely possibility, based on limited contaminant sampling. Planning is underway for routine monitoring of influent water, sediments, and fish tissue for heavy metals and other contaminants during fall 2006.

The Manatee County Port Authority (MCPA) had previously requested from FWC SERF the return of 39-acres of leased land for the expansion of their dredge pond containment system. In return, the MCPA offered land south of the current facility for future hatchery development. Fish Pro, an engineering firm specializing in fish hatchery design, was contracted by FWC to evaluate the suitability of this new site for hatchery development. Fish Pro's final report did not support development at this location because of the presence of environmentally sensitive habitats, the lack of a viable seawater supply, and a shortage of sufficient uplands for pond construction. The SERF hatchery will remain operational on ten-acres of existing MCPA property for the next 3-4 years until a new fish hatchery is constructed.

The FWC Stock Enhancement program received a \$2,000,000.00 allocation from the Florida legislature to expand stock enhancement statewide. FWC plans to develop partnerships with other agencies involved with aquaculture to accomplish this legislative mandate. Research is underway to develop a prototype recirculation system for advance red

drum production to overcome water quality issues and parasite challenges often encountered with pond culture.



Florida Institute of Oceanography

No report submitted.

Florida A & M University, Florida Atlantic University, Florida Gulf Coast University, Florida Institute of Technology, Florida International University, Florida State University, New College of Florida, University of Central Florida, University of Florida, University of Miami, University of North Florida, University of South Florida, University of West Florida, Nova Southeastern University, Mote Marine Laboratory, Harbor Branch Oceanographic Institution



**Report on
Aquaculture Activities
Florida Sea Grant College Program
Florida Board of Education
University of Florida
2005-2006**

The following is a summary of aquaculture activities carried out by the Florida Sea Grant College Program. Florida Sea Grant (FSG) is a statewide program of Florida's public and cooperating private universities. Federal sponsors (NOAA), state and county governments, industry groups, and foundations participate in the program. Scientific research is conducted and public information reports, conferences, workshops and personal contacts by Sea Grant Extension and research faculty ensure that information required to meet environmental and economic goals reaches those who need it on a statewide basis.

Each year Florida Sea Grant determines its research and extension tasks scheduled for completion the coming year. For 2005, these tasks were published as the 2005 Work Plan. Then, in mid 2006, the accomplishments and benefits derived from the 2005 tasks were collected and reported as our "Performance Counts," Annual Progress Report for 2005. This is available upon request from the Florida Sea Grant office or is available on our website www.flseagrant.org. The following section contains each of our 2005 tasks and results for marine aquaculture. Our plans for 2006 are also listed in this report, and are also available from our office and/or website. Our overall goal is to assist in the development of the food and hobby segments of Florida's marine aquaculture industry.

Florida Sea Grant has made a substantial investment in marine aquaculture research and Extension. This has been possible due to raising aquaculture (particularly marine ornamentals and shellfish) to a higher priority and also due to the increased availability of federal funds devoted to marine aquaculture. Florida faculty and students have been highly successful in competing for these funds. FSG Extension faculty also work on aquaculture projects and aquaculture is one of the six statewide programs for FSG Extension. Between 1 July 2005 and 30 June 2006, including federal and Sea Grant matching funds, approximately \$519K was spent during this twelve-month period on research. An approximate \$93K was invested in aquaculture Extension activities, for a total of \$612K.

2005 Accomplishments

Accomplishments for 2005 for marine ornamental species (MO), shellfish (S), finfish (F), shrimp (SH) and general activities (G) are reported below. Each task and the response is listed, and the person responsible for the activity is listed after each task.

Shellfish

- S.1 Continue cooperative programming with Sea Grant Clam Aquaculture Specialist, Leslie Sturmer, in two workshops assisting clam aquaculture enterprises, in efforts to improve their economic efficiencies. (Combs and Sturmer)

Continued cooperative programming with Sea Grant Shellfish Aquaculture Extension Agent, Leslie Sturmer, by providing current information and assisting clam aquaculture enterprises, in efforts to improve their economic efficiencies. (Sturmer)

- S.2 Establish, coordinate and provide training for Lee County clam farmers. Two workshops to be held to provide post-hurricane recovery of destroyed clam crops. (Wasno and Sturmer)

Met with Lee County clam farmers on two occasions to provide assistance with post-hurricane recovery efforts of destroyed clam crops. Specifically, growers on Pine Island supported the concept of a community land-based nursery. Worked with county representatives and farmers in identifying potential sites and funding opportunities. (Sturmer)

Two workshops were held with Lee County clam farmers to determine strategy to increase revenue and clam harvest success rates following losses during hurricane event. (Wasno)

- S.3 Increase the scientific, industry and agency knowledge about Florida clam aquaculture through participation at regional and national conferences. (Sturmer)

- S.4 Participate in the Aquaculture America 2005 conference in New Orleans. Invited to present papers on ongoing research and educational efforts in support of the Florida clam culture industry and an introduction to shellfish aquaculture. (Sturmer)

Participated in the Gulf and South Atlantic States Shellfish Conference in South Carolina, and provided an overview of the Florida hard clam aquaculture industry highlighting this year a new program to collect clamshell at processing plants for restoration of local oyster reefs. (Sturmer)

- S.5 Participate in the Gulf and South Atlantic States Shellfish Conference in South Carolina, and provide an overview of the Florida hard clam aquaculture industry

highlighting this year a new program to collect clamshell at processing plants for restoration of local oyster reefs. (Sturmer)

S.6 Give a presentation on the development and implementation of a pilot crop insurance program for Florida clam growers to the Louisiana Farm Bureau for oyster growers who are interested in exploring financial protection for their crops. (Sturmer)

S.7 Give a presentation about Florida's clam farming industry and its dependence on clean water at a American Water Resources Association regional conference to be held in Cedar Key. (Sturmer)

S.8 Establish, coordinate and provide training and technical assistance in counties where clam farming is ongoing. Counties involved include Levy, Dixie, Charlotte, Lee, Brevard, St. Lucie, Indian River and Franklin. (Sturmer)

S.8.1 Initiate and conduct workshops in support of the new clam farmers who are developing their farms on lease sites in Collier County. Topics to be addressed include seed sources and handling, culture equipment, stocking and planting methods, and rules and regulations. (Sturmer with Wasno)

Conducted "hands-on" workshops in support of the new clam farmers who are developing their farms on lease sites in Collier County. Topics addressed included seed sources and handling, culture equipment, stocking and planting methods, and rules and regulations. (Sturmer with Wasno)

Conducted workshops to assist new farmers with initial set-ups and local regulations. (Sturmer with Wasno)

S.8.2 Continue to provide local workshops and technical assistance for potential and existing clam farmers in southwest Florida. This year, specifically working with growers in an effort to restore infrastructure lost as a result of the 2004 hurricane season by evaluating a community land-based nursery. (Sturmer with Wasno)

Continued to provide local workshops and technical assistance for potential and existing clam farmers in southwest Florida. This year, specifically worked with growers in an effort to restore infrastructure lost as a result of the 2004 hurricane season by evaluating the potential of a community land-based nursery. Efforts focused on siting and funding sources. (Sturmer with Wasno)

Clam farmers upland staging area known as Lee County Fishermen's Co-Op was purchased by Lee Co government for \$16 million. Site is being evaluated for the construction of a clam farmer's grow-out facility. This facility will serve to increase clam growers profit potential. (Sturmer)

- S.8.3 Continue to work with new growers in Franklin County by providing current information to assist them in their business plans. Further will begin educating local citizens in the area about the new seafood product being raised in their coastal waters. (Sturmer with Mahan)

Continued to work with new growers in Franklin County by providing current information to assist them in their business plans. Plans for informational sessions for local citizens about the new seafood product being raised in their coastal waters were thwarted by the impact of the 2005 hurricane season in the area. (Sturmer with Mahan)

- S.8.4 Provide technical assistance to the clam growers in Levy County by helping them acquire funding for infrastructural needs, specifically boat access to lease areas and parking facilities. (Sturmer)

Provided technical assistance to clam growers in Levy County by helping them acquire funding through USDA Rural Development for infrastructural needs, specifically boat access to lease areas and acquiring property for parking facilities. (Sturmer)

- S.8.5 Continue to provide individual consultations to clam growers on how to use a computerized spreadsheet program to enhance their record keeping and inventory management activities for a commercial clam culture operation. (Sturmer)

Continued to provide individual consultations to clam growers on how to use a computerized spreadsheet program to enhance their record keeping and inventory management activities for a commercial clam culture operation. (Sturmer)

- S.8.6 Continue development of workshops and materials, as well as educational support, to shellfish growers who are participating in the USDA pilot crop insurance program and other crop assistance programs. (Sturmer)

Continued providing educational support to shellfish growers who are participating in the USDA pilot crop insurance program and other crop assistance programs, as well as providing technical support to USDA Risk Management Agency and reinsured companies in implementing the pilot program. The program will be remain under agency evaluation through crop year 2007. (Sturmer)

- S.9 Continue a coordinated effort to enhance hard clam farming in Florida through a series of USDA funded projects. (Sturmer)

- S.9.1 Continue field trials to compare the performance of multiple Florida strains of hard clams under aquaculture conditions and to assist researchers in collecting field data to correlate this performance with genetic diversity. (Sturmer)

Completed field trials to compare the performance of multiple Florida strains of hard clams under aquaculture conditions. Assisted UF Department of Fisheries and Aquatic Sciences researchers in collecting field data to correlate this performance with genetic diversity. Preliminary findings show significant performance differences between commercial stocks in the culture trials, both in survival and growth rates and also significant differences between at least some hatcheries in genetic diversity indices. Genetic diversity indices, however, were unrelated to either performance or to morphotype. (Sturmer)

- S.9.2 Continue to provide technical assistance to the 5-year Clam Lease Assessment, Management, and Modeling using Remote Sensing (CLAMMRS) project. Provide “farmer friendly” graphs of monthly archived water quality data, as well as post to a web site, and compare a 3-year continuous water quality database at 10 aquaculture lease sites in the state with clam production. This project allows for adoption of remote sensing technology for the clam aquaculture industry. (Sturmer)

Continued to provide technical assistance to the Clam Lease Assessment, Management, and Modeling using Remote Sensing (CLAMMRS) project. Provided “farmer friendly” graphs of monthly archived water quality data, as well as posted to a web site, and compared a 3-year continuous water quality database at 10 aquaculture lease sites in the state with clam production. This project allows for adoption of remote sensing technology for the clam aquaculture industry. (Sturmer)

- S.9.3 Assist in compiling a final report on study that provided baseline information on the presence and absence of shellfish pathogens in aquaculture lease areas. This report will allow clam growers to increase their awareness of potential health problems for their stocks. (Sturmer)

Assisted in compiling a final report on a study that provided baseline information on the presence and absence of shellfish pathogens in aquaculture lease areas. This report allows clam growers to increase their awareness of potential health problems for their stocks. (Sturmer)

- S.9.4 Continue to provide technical assistance to the UF Whitney Lab in developing reliable spawning and larval rearing techniques, and monitoring the production performance of the blood ark and ponderous ark during nursery and growout phases. The project is evaluating

alternative molluscan shellfish species for possible aquaculture production. (Sturmer with Creswell)

Technical assistance was provided to staff at the UF Whitney Marine Laboratory leading to the successful spawning and hatchery production of blood ark and ponderous ark clams. A technical manual for hatchery production of these species for shellfish hatchery operators is in preparation. (Sturmer with Creswell)

Continued to provide technical assistance to the UF Whitney Lab in developing reliable spawning and larval rearing techniques, monitoring the production performance of the blood ark and ponderous ark during nursery and growout phases, and developing a final report for the project. The project is evaluating alternative molluscan shellfish species for possible aquaculture production. (Sturmer)

- S.9.5 Disseminate results of a project addressing the issue of stock diversity in cultured clam stocks to commercial hatchery operators. (Sturmer)

Disseminated results of a project addressing the issue of stock diversity in cultured clam stocks to commercial hatchery operators.(Sturmer)

- S.10 Evaluate the production and processing for alternative techniques and alternative species of clams for Florida clam growers. (Sturmer)

- S.10.1 Serve as a liaison between industry partners and researchers in evaluating production of triploid and diploid clams under commercial growout conditions in open-water aquaculture leases. This Florida Sea Grant-funded project will evaluate the use of triploidy, a basic breeding technique, for the improvement of hard clam culture, specifically to improve survival during the summer environmental stressors experienced in subtropical waters. (Sturmer)

Served as a liaison between industry partners and researchers in evaluating production of triploid and diploid clams under commercial nursery and growout conditions in open-water aquaculture leases. This Florida Sea Grant-funded project is evaluating the use of triploidy, a basic breeding technique, for the improvement of hard clam culture, specifically to improve survival during the summer environmental stressors experienced in subtropical waters. (Sturmer)

- S.10.2 Assist the Agriculture Market Research Center in distributing a report on the magnitude of the potential domestic market and product attributes desired by the seafood trade for the blood ark and ponderous ark clams. These findings will be used to educate shellfish wholesale dealers as to the

market attributes of these alternative molluscan shellfish species. (Sturmer with Degner)

- S.10.3 Develop a research and extension team and identify funding to begin evaluating the sunray venus clam as a new molluscan shellfish species for diversification of the Florida hard clam aquaculture industry. (Sturmer with Creswell/Adams)

Sunray venus clam project was funded. Work was initiated. No findings to report for 2005. (Sturmer with Adams)

- S.10.4 Serve on a national committee, the National Organic Aquaculture Workgroup, Shellfish SubGroup, that is developing guidelines and standards for organic shellfish labeling. Guidelines and standards for organic shellfish labeling were developed and submitted to the NOAWG for consideration by the National Organic Standards Board. (Sturmer)

- S.11 Provide statewide service to clam grower associations and state agencies. (Sturmer)

- S.11.1 Continue providing organizational support and technical assistance to local clam growers associations, and in working with the boards in developing an umbrella statewide organization. (Sturmer with Adams)

A Florida Sea Grant publication addressing the statewide organization concept was published – “Organizational Structures and Strategies for the Hard Clam Aquaculture Industry in Florida” (SG TP-141, January 2005) (Sturmer with Adams)

Continued providing organizational support and technical assistance to local clam growers associations, and in working with the boards in developing an umbrella statewide organization. Specifically, worked with the Cedar Key Aquaculture Association and the Department of Aquaculture and Consumer Services in developing a statewide clam aquaculture industry task force that will allow for better communications with DACS as well as serve as a statewide advisory committee for shellfish extension. (Sturmer with Adams)

- S.11.2 Continue to serve on the education and conference committee of the Florida Aquaculture Association. Assisted the FAA in providing an educational exhibit at the Farm Bureau Legislative Reception and the Ruskin Seafood Festival. (Sturmer)

- S.12 Provide easy access to up-to-date information on shellfish aquaculture in Florida. (Sturmer)

- S.12.1 Continue to update a web site for the shellfish aquaculture extension program where services provided can be directly accessible by the clam farming industry. The site provides updates on research and extension projects, current suppliers list, links to state and national publications addressing shellfish aquaculture and a calendar of events. (Sturmer)
- S.12.2 Continue to provide information on new issues, concerns and trends at the local, state and national level related to shellfish aquaculture through publishing a quarterly newsletter, *The Bivalve Bulletin*. (Sturmer)
- S.13 Continue to develop educational program and materials, update financial feasibility analysis for a small-scale clam culture operation, and provide technical assistance and educational support where clam farming operations are being considered in the state, in particular Collier County. (Sturmer and Adams)
- Continued to support the overall hard clam educational program with L. Sturmer. (Sturmer and Adams)
- Continued to develop educational program materials, update financial feasibility analysis for a small-scale clam culture operation, and provide technical assistance and educational support where clam farming operations are being considered in the state, in particular Collier County. (Sturmer and Adams)
- S.14 Maintain a shellfish aquaculture research and education facility in Cedar Key. This salt-water running laboratory on Florida's Gulf of Mexico coast allows UF faculty to address the research needs of the clam farmers. (Sturmer)

Finfish

- F.1 The availability of marine baitfish in Florida is limited. This project will evaluate the feasibility of producing a live baitfish (mud minnow) using water from a stormwater treatment system. If successful, the project will benefit the environment by removing nutrients and increase cash flow to farmers. (Reddin/Leteux:PD-04-8).
- F.2 Assist Brevard Co. Sheriff Work Farm deputies and inmates in designing, constructing, and implementing a proposed small-scale Tilapia aquaculture project intended to serve as educational tool for inmates, and hopefully to provide food for County Jail system. (Combs)

Shrimp

SH.1 Interest in shrimp culture in Florida has increased dramatically. Currently, there is no financial information describing the culture of marine shrimp in earthen freshwater ponds in Florida. This project will provide a preliminary financial assessment of the culture of marine shrimp in outdoor freshwater ponds in Florida. (Adams: Ex-USDA-1).

The USDA-funded shrimp culture feasibility study was complete and the final report was submitted. The study assessed the financial feasibility of a hypothetical, small-scale, low-tech, low-cost, inland, earthen pond system for culturing marine shrimp in Florida. The findings suggest that such a system may be financially viable under certain market and cost conditions. A workshop to discuss these findings is scheduled for February 2006. (Adams)

SH.2 Complete the assessment of the economic feasibility of small-scale freshwater, penaeid shrimp culture in Florida. This study will provide guidelines for prospective culturists regarding investing in inland shrimp culture in Florida. Project received a one-year extension. (Adams and Sweat)

With Specialist Adams, completed the assessment of the economic feasibility of small-scale freshwater, penaeid shrimp culture in Florida. (Sweat)

SH.3 Compile informational packets for individuals interested in shrimp aquaculture. Over 40 informational packets for individuals interested in shrimp culture were distributed during workshops and upon request. These packets included general information of shrimp farming, the final report from the UF Shrimp Demonstration Project, Florida Aquaculture Best Management Practices, and state aquaculture certification forms. (Creswell)

SH.4 At least four ½ day workshops will be presented at the Shrimp Aquaculture Demonstration Site at the University of Florida Research and Education Center related to shrimp aquaculture. (Creswell)

SH.5 Four ½ day workshops were presented at the Shrimp Aquaculture Demonstration Site at the UF Indian River Research and Education Center. Participants were provided informational packets related to shrimp farming in Florida and toured the demonstration shrimp farm. (Creswell)

General

G.1 Educate interested public with aquaculture information and consultation. Serve as aquaculture consultant to public schools in Citrus County. (Sweat)

- G.2 Continue to provide one-on-one consultations and technical support to individuals in Franklin County interested in learning more about freshwater and marine aquaculture. (Mahan)

The Franklin County Agent provided approximately 150 aquaculture consultations to individuals on a wide-range of marine and freshwater aquaculture topics. The majority of the marine-related questions were about clam, oyster, shrimp and off-shore aquaculture. The majority of freshwater questions were on catfish, raising shrimp in freshwater, and tilapia aquaculture. (Mahan)

- G.3 Continue to represent Florida Sea Grant on the state's Aquaculture Interagency Coordinating Committee and assist in preparing the annual report to AICC. (Adams)

Continued to serve as the Florida Sea Grant representative on the FDACS Aquaculture Interagency Coordinating Committee. Compiled the FSG component of the 2005 AICC Annual Report that is developed each year. (Adams)

- G.4 Begin working on National Sea Grant funded study addressing the financial costs associated with biofouling in marine aquaculture. This work will be done in cooperation with the University of Connecticut. (Adams)

Work associated with the National Sea Grant Program –funded project concerning bio-fouling in shellfish aquaculture began. No major findings to report for 2005. Adams will be working with faculty at the University of Connecticut. An industry survey is scheduled to be implemented during early 2006 and survey development began in December 2005. (Adams)

- G.5 Provide technical assistance that includes startup considerations to new and existing aquaculturists in Florida and South Alabama. (S. Jackson)

The Agent provided support and assistance to aqua-farmers and pond owners utilizing best management practices for managing these aquatic resources and associated businesses. Through the education programs and with the assistance of the Sea Grant Agent area farmers gained knowledge and fish culture skills necessary to explore potential aquaculture crops appropriate for the give local resources and marketing conditions. Fish Pond owners gained knowledge in pond management through the Extension education programs and individual site visits conducted by the Agent. (S. Jackson)

- G.6 Increase general knowledge of aquaculture through classroom instruction. The general public will be more aware of aquaculture as a potential industry in Florida through seminars, exhibits and mass media presentations. (Creswell)

At least 100 students will learn more about aquaculture through classroom and distant learning programs. (Creswell)

This activity was not completed due to lost school days as a result of hurricanes Francis, Jeanne, and Wilma. Loss of class time and a need to prepare for FCAT testing precluded any additional programming. (Creswell)

- G.7 Develop a series of two-page fact sheets on potential aquaculture species in Florida. (Creswell)

No aquaculture fact sheets were submitted to EDIS in 2005. These sheets are now in preparation. (Creswell)

- G.8 Conduct at least six radio broadcasts (30 minutes each) dedicated to aquaculture topics. (Creswell)

Six, ½ hour radio broadcasts related to aquaculture were presented. These included: grouper culture, queen conch culture, shrimp aquaculture (2), potential for farming Caribbean spiny lobster, and aquaculture and global fisheries. (Creswell)

- G.9 Enhance production, minimize costs, and improve opportunities for aquaculture businesses. (Creswell)

Continue to instruct fish farmers in Puerto Rico to aspects of collection, handling and growout of spiny lobster and provide information regarding development of formulated feeds for spiny lobsters. (Creswell)

- G.10 Conduct at least one workshop on the potential of baitfish aquaculture in Florida. (Creswell)

No workshop on baitfish aquaculture in Florida was presented. One is being planned for 2006 with Dr. Courtney Ohs, the new UF aquaculture specialist stationed at IRREC. * Presented one hour television program on the UF Shrimp Farming Demonstration Project aired at least 20 times on four local television networks. (Creswell)

- G.11 Teach 3rd grade youth about aquaculture as part of Nassau County's "Ag Extravaganza." (McGuire)

Taught 314 third grade youth about aquaculture as part of Nassau County's Ag Extravaganza. Taught 179 kindergarten and fifth grade students about water pollution as part of Flagler County's AgVentures program. (McGuire)

2006 Planned Work

This section contains those items planned for completion in 2006 and beyond for marine ornamentals (MO), shellfish (S), finfish (F), shrimp (SH), and general activities (G).. The

estimated date of completion is shown, along with the person responsible and a research project number where appropriate.

Marine Ornamental Species

- MO.1 High mortality during larviculture remains a major obstacle to successful rearing of a large number of marine ornamental fish species. In particular, catastrophic mortality is associated with first-feeding or the “critical period” during which larvae switch from endogenous to exogenous feeding. This phenomenon creates a need for research aimed at determining the causes of mass mortality during the early stages of exogenous feeding in hatchery-reared marine ornamental fish larvae. (Turingan/Creswell/Gaines: R/LR-A-41PD)
- MO.2 The goal of this study is to develop effective and sustainable hatchery technology for the difficult-to-raise marine ornamental fish species *Centropyge flavissimus* (lemonpeel angelfish) and *Liopropoma carmabi* (candy basslet). These species demand a high price in the aquarium trade and have been successfully spawned in captivity. Researchers will use a novel approach that integrates the development of feeding kinematics, feeding mechanisms and feeding performance in the development of stage-specific feeding regimes that will enhance survivorship during the larval rearing of these species. (2008) (Turingan/Creswell/Gaines: R/LR-A-43)

Shellfish

- S.1 Florida has approximately 350 active clam growers producing a crop worth \$18.2 million in 2001. Recently, the need for a hardier clam strain has become evident as clam culturists in Florida report below average survivals or total losses during the prolonged hot summers. Triploid clams may be a solution to this problem as they are virtually sterile, thereby spawning does not occur and energy is available during this stressful period for basic metabolism. (2008) (Scarpa/Baker/Sturmer/Adams: R/LR-A-39)
- S.2 The Florida clam industry is built on a single species. Diversifying the shellfish culture industry by developing farming technology and markets for other bivalve species will increase economic stability and growth of the industry. The sunray venus clam, *Macrocallista nimbosa*, is an attractive venerid clam distributed from South Carolina to Florida and the Gulf states. The study goal is to develop, test and demonstrate biological and technical methods to spawn and culture the sunray venus clam for its potential as a new molluscan species for Florida shellfish producers. (2008) (Scarpa/Sturmer/Creswell: R/LR-A-44)
- S.3 Continue to work on two Florida Sea Grant funded projects: (1) Triploid hard clam production and (2) sunray venus clam production. The economic characteristics of the hatchery, nursery, and grow-out stages will be the focus of the studies. (Adams)

- S.4 Continue to work on the shellfish culture bio-fouling project, funded through the National Sea Grant Program Invasive Species Initiative. The project is in cooperation with the University of Connecticut. A grower survey will be conducted in early 2006, with an assessment of the economic costs and benefits associated with two fouling control methods to be completed by late 2006. (Adams)
- S.5 Promulgate a manual for the aquaculture of ponderous arks and blood arks from hatchery through harvest. (Creswell, Sturmer, Nunez, Baker)
- S.6 Conduct collection and shipping trials of sunray venus clams. Initiate spawning trials for sunray venus clams in collaboration with Harbor Branch Oceanographic Institution, Inc. (Creswell, Sturmer, Stevely, Sweat)
- S.7 Write invited chapter entitled, “Best Management Practices for Shellfish Aquaculture”, for the book “Best Management Practices for Aquaculture Industry.” (Creswell)
- S.8 Continue work with Franklin County clam farmers to address local issues. (Mahan)
- S.9 Continue to work with Lee County government with the creation of a clam nursery to improve farmer’s profit margin and industry foundation by providing consistent product for market. (Wasno)
- S.10 Working with Florida Division of Aquaculture, facilitate the construction of an educational kiosk at a local boat ramp on Pine Island. The kiosk will feature many aspects of the clam farming industry. (Wasno)
- S.11 Establish, coordinate and provide training for Lee County clam farmers. (Wasno/Sturmer)
- S.12 Increase the scientific, industry and agency knowledge about Florida clam aquaculture through participation at regional and national conference. (Sturmer)
- S.13 Establish, coordinate and provide training and technical assistance in counties where clam farming is ongoing. Counties involved include Levy, Dixie, Charlotte, Lee, Brevard, St. Lucie, Indian River and Franklin. (Sturmer)
- S.14 Continue a coordinated effort to enhance hard clam farming in Florida through a series of USDA funded projects. (Sturmer)
- S.15 Evaluate the production and processing for alternative techniques and alternative species of clams for Florida clam growers. (Sturmer)
- S.16 Provided statewide service to clam grower associations and state agencies. (Sturmer/Adams)

- S.17 Provide easy access to up-to-date information on shellfish aquaculture in Florida through website, quarterly newsletter and fact sheets. (Sturmer)
- S.18 Maintain a shellfish aquaculture research and education facility in Cedar Key. This salt-water running laboratory on Florida's Gulf of Mexico coast allows UF faculty to address the research needs of the clam farmers. (Sturmer)

Finfish

- F.1 "Project Red-start" – continue to provide technical assistance and training to project staff. (Creswell)
- F.2 Continue to cooperate with Mote Marine Lab on project to determine the financial characteristics of pompano culture. (Adams)

Shrimp

- SH.1 Continue to serve as Committee Chair for FRED MS student Jennifer Clark. Ms. Clark's MS thesis will address the financial feasibility of utilizing penaeid shrimp culture as an alternative enterprise for south Florida citrus growers. The thesis will examine several production technologies. An assessment of the risks associated with shrimp culture and citrus production will be a key feature of the analysis. (Adams)
- SH.2 Provide aquaculture consultations and shrimp pond assistance. (Sweat)

General

- G.1 The main objective is to develop innovative, reliable and environmentally sustainable hatchery technology for larval rearing and production of cobia fingerlings. This will be achieved by developing proactive health management methods aiming to reduce the input of microbes from major sources of contamination during the culture cycle (eggs/hatching/live food) and to increase survival and yield of fingerlings through the addition of probiotic bacteria to the larval culture tanks and to live feeds prior to feeding the larvae. A quantitative microbial management technology, using selected strains of probiotic bacteria will be adapted to cobia fingerling production. (2006) (Benetti/Orhun: R/LR-A-40)
- G.2 It is necessary to improve hatchery and offshore growout technology to expand marine fish aquaculture to the US. This project will perfect and transfer innovative, reliable and environmentally sustainable technologies and protocols for disease prophylaxis and management of cobia (*Rachycentron canadum*) eggs, larvae, post-flexion larvae, fingerlings, juveniles and adults. (Benetti/Orhun/Riley/Douillet: R/LR-A-42)

- G.3 Biomarkers are biological changes that are observed in an animal following exposure to sublethal environmental or anthropogenic stressors. There are two approaches to biomarker work: traditional functional biomarkers that measure long-term responses and protein biomarkers that measure the molecular response to environmental stressors. In recent years, protein biomarkers have become increasingly powerful and popular tools in part because they test for evidence of stress at the level of organization primarily affected, the molecular level. However, few studies have attempted to validate the new molecular technology with the traditional functional techniques. That is the purpose of this fellowship. (Julian/Matos/Downs: E/INDST-4)
- G.4 Continue to work with Mote Marine Lab on assessment of the financial characteristics of pompano hatchery and nursery production. Project is funded via the Aquaculture Research Council. (Adams)
- G.5 Continue to serve as the Florida Sea Grant representative on the FDACS Aquaculture Interagency Coordinating Committee. Prepare a annual report for Florida Sea Grant-related activities for the AICC Annual Report. (Adams)
- G.6 Attend the Southeastern Regional Aquaculture Information Exchange Group (SERA IEG) meeting in Ruskin, FL. (Adams)
- G.7 Conferences and Professional Presentations: (Adams)
- Present Paper at the National Shellfisheries Conference in Monterey, CA
 - Paper to be presented (by co-author) at Aquaculture '06, Italy
 - Present Paper at the 7th International Sponge Conference in Buzios, Brazil
- G.8 At least 100 students will learn more about aquaculture through classroom and distant learning programs. (Creswell)
- G.9 Submit proposal to FDACS for state-wide teacher in-service training in the field of aquacultural science (Creswell, Ohs, Martinez, Chapman)
- G.10 Develop a series of two-page fact sheets on potential aquaculture species in Florida. (Creswell, Ohs)
- G.11 Conduct at least six radio broadcasts (30 minutes each) dedicated to aquaculture topics. (Creswell)
- G.12 Present at least one ½ day workshop on the potential for baitfish/shrimp aquaculture in Florida. (Creswell/Ohs)
- G.13 Provide support and assistance to aqua-farmers and pond owners utilizing best management practices for managing these aquatic resources and associated businesses. (S.Jackson)

- G.13.1 Through the education programs and with the assistance of the Sea Grant Agent area farmers (5) will gain knowledge and fish culture skills necessary to explore potential aquaculture crops appropriate for the give local resources and marketing conditions. (S. Jackson)
- G.13.2 Fish pond owners (20) will gain knowledge in pond management through the Extension education programs and individual site visits conducted by the Agent. (S. Jackson)
- G.14 Provide one-on-one consultations to individuals interested in learning more about aquaculture issues. (Mahan)
- G.15 Serve clients with aquacultural information with consultations, publications and site visits. (Sweat)

Office of Trade, Tourism and Economic Development

No report submitted.



Aquaculture Activities of the University of Florida's Institute of Food and Agricultural Sciences for the Period of July 1, 2005 through June 30, 2007

Introduction

The University of Florida's (UF) Institute of Food and Agricultural Sciences (IFAS) continues to make a strong commitment to delivering land grant programs, including research, teaching, and extension to Florida's aquaculture community. Programs are conducted on a statewide basis, from Escambia to Monroe counties, and cover the gambit of species in production. Through the county Cooperative Extension Service, and the Florida Sea Grant Extension program, individual clientele can seek both direct information from meetings and, or published information that is available online and in mailed packages. Major emphasis has been placed on making information available through the Electronic Distance Information System known as EDIS (<http://edis.ifas.ufl.edu/index.html>).

In the fiscal year from July 2005 to June 2006, a new research and teaching faculty position was added to the Department of Fisheries and Aquatic Sciences, with a specific job description involving non-indigenous aquatic species and aquaculture. It is the intent of this initiative to promote the use of sound science to guide management decisions in the often heated debates involving non-native aquatic species and an industry which heavily depends upon them.

Focused research and extension programs, faculty, and staff are located at 4 major locations in the state. In Gainesville, research faculty are within the Department of Fisheries and Aquatic Sciences, the Department of Animal Sciences, and the Food and Resource Economics Department. Florida Sea Grant is also headquartered on the UF Gainesville Campus. Cedar Key is home to the Cooperative Extension Service's Shellfish Extension Program, and includes a statewide extension faculty and a demonstration facility where some applied research is also being conducted. Programming is focused on the state's hard clam and shellfish industry. Indian River Research and Education Center is home to faculty and staff focused on food and bait aquaculture, with an emphasis on searching for high-value alternative crops to some of south Florida's traditional agricultural lands. Ruskin is home to the Tropical Aquaculture Laboratory, and conducts programs focused on the state's ornamental aquaculture industry.

Research is supported by private, state, and federal grants, and continues to increase at all locations within IFAS, and Extension programming continues to serve as a model for other states. Following are specific highlights of IFAS activities.

Leslie N. Sturmer, Multi-county Aquaculture Extension Agent III

UF/IFAS Shellfish Aquaculture Extension Program

**FWC/Senator George G. Kirkpatrick Marine Lab, Cedar Key,
FL**

Program Activities for July 1, 2005 – June 30, 2006:

General:

- Participated in over 850 office visits, on-site visits, telephone conversations, and e-mail discussions with clam farmers for the purpose of providing current information on industry-related matters.
- Provided packages on clam farming, including biological, economical, marketing and regulatory information to about 20 individuals interested in entering the business.
- Provided individual assistance and appropriate forms to growers on over 65 occasions, assisting them in completing aquaculture certificate applications, authorized user agreements, lease transfers, or lease audits.
- Involved (hosted, conducted and taught) in 10 group-learning events with over 300 participants for an estimated 700 instructional hours.
- Prepared about 24 instructional materials with distribution, including direct mailings, handouts, and other means, exceeding 2,100.
- Conducted tours of the shellfish aquaculture industry to various groups including school groups, reporters, researchers, state agency representatives, legislators, equipment suppliers, and other interested people.
- Provided support to the Boards of Directors of the Florida Aquaculture Association, Hidden Coast Shellfish Producers Association, Cedar Key Aquaculture Association, East Coast Shellfish Growers Association, and the Cedar Key Nature Conservancy.
- A stakeholder in The Nature Conservancy's Conservation Action Plan and participated in strategic sessions for the Big Bend region.
- Assisted in the development of the Clam Industry Aquaculture Task Force and am serving as a de facto member. This group also serves as my statewide advisory committee
- Established a Clam Steering Committee with representatives from industry, state agencies and research and extension faculty from several institutions to assist in developing multidisciplinary research projects funded through the Florida Shellfish Aquaculture Development Program

Website:

- Maintained website - <http://shellfish.ifas.ufl.edu>

Workshops:

- Collier Country Aquaculture Workshop: How to Buy and Plant Clam Seed – July 16,

Goodland

- Net Loss...Net Gain, a multimedia performance program – November 4-5, Cedar Key
- Pilot Cultured Clam Crop Insurance Program Listening Sessions – June 13, Cocoa; June 13, Sebastian; June 14, Cross City; June 15, Cedar Key
- Clam Informational Fair – June 15, Cedar Key

Projects:

- **CLAMMRS Water Quality Monitoring Project** – Secured additional funding to allow for continued operation of water quality monitoring stations initially procured through a USDA competitive grant. A cooperative partnership agreement among the USDA CSREES, the Shellfish Aquaculture Extension Program and DACS Division of Aquaculture with funding from the USDA Risk Management Agency, will allow for 6 water quality monitoring stations to be maintained at lease areas in 4 coastal counties.
- **Clam Crop Financial Assistance Programs** – Continued providing technical assistance to the USDA Risk Management Agency in the cultured clam pilot crop insurance program and to the USDA Farm Service Agency in the Noninsured Crop Disaster Assistance Program. Provided logistical support in setting up 4 listening sessions in major clam-producing counties for the Research Triangle Institute, who is contracted by RMA to evaluate the effectiveness of the pilot crop insurance program.
- **Clam Health Monitoring** – With UF Department of Fisheries and Aquatic Sciences faculty, completed an extension-type report that provides baseline information on the presence and absence of shellfish pathogens in clam growing areas of the state and provided results to industry. The electronic report is to be made available through EDIS, <http://edis.ifas.ufl.edu>.
- **Ark Clam Culture and Marketing** – This objective of this USDA/CSREES-funded project is to evaluate two marine bivalves, blood ark and ponderous ark, for diversification of the hard clam culture industry. Completed monitoring production performance of both ark clams in the growout phase and initiated compiling results for an industry report.
- **Genetic Diversity** – Completed field trials to compare the performance of multiple Florida strains of hard clams under aquaculture conditions. Assisted UF researchers in compiling field data to correlate this performance with genetic diversity and began writing up the final report for this USDA CSREES-funded project.
- **Use of Triploidy to Enhance Stress Resistance in Clams** – Continued serving as a liaison between industry partners and UF and HBOI researchers in evaluating production of triploid and diploid clams under commercial conditions. Triploidy, a basic breeding technique is being evaluated for the improvement of clam culture, specifically to improve survival during summer environmental stressors experienced in subtropical waters. With additional funding from Florida Sea Grant was able to repeat the nursery studies and initiate a new growout study as the hurricane season of 2004 severely affected the original field plants.
- **Oyster and Clam Shell Recovery and Recycling Project** – Continued project in Cedar Key, funded through hurricane disaster relief federal funds, which allows for clam shells to be picked up at participating wholesalers and stored at a county site until used in oyster shell replanting efforts by the Florida Department of Agriculture and Consumer Services.
- **Parking and Water Access for Clam Growers** – Two lots in Cedar Key were purchased with funding obtained from a USDA Rural Development grant for parking trucks and boat trailers adjacent to a boat ramp, securing clam growers' access to their leases. Presentations

to the city government resulted in a special use permit to conduct these activities in a residential area and approval of the site plan.

- **CARES (Country Alliance for Responsible Environmental Stewardship) Project** – With the Suwannee River Partnership and funding procured through the Suwannee Valley RC&D Council developed the framework to begin a “derelict” clam bag recovery pilot program that will also provide for shoreline stabilization and oyster restoration.
- ***In Their Own Words*** – Served on the advisory committee for this Florida Humanities Council-funded project in which the oral histories of Cedar Key fishing families were recorded. Assisted in local logistics for presentations of the documentary video and exhibit.
- **Sunray Venus Clam Culture** – With funding from Florida Sea Grant initiated a project with UF and HBOI researchers and industry partners to evaluate the potential of the sunray venus as a new species to expand the bivalve culture industry in Florida. Began identifying methods for broodstock collection, handling and spawning.
- **Florida Shellfish Aquaculture Development Program** – Administered a new research program with federal funds from USDA CSREES. Set up a clam steering committee to identify research priorities and to ensure projects are industry-driven. Identified a team of researchers and submitted a proposal that will evaluate the use of hybridization for stock improvements and conduct a land assessment of leases using a soils-based approach to establish relationships between soil characteristics and clam productivity.

Exhibits:

- CLAMERICA Celebration, 2nd Annual – 4th of July, 2005, Cedar Key
- Clam Farming, Seafood Festival – October 15-16, 2005, Cedar Key
- Disaster Plan Workshop: Hurricane preparedness for boaters, marina operators, and clam farmers – May 22, 2006, Cedar Key

Demonstrations:

- “A Day in a Clam Farmer’s Life” – 2005 4-H Youth Congress, July 28, Cedar Key
- Open House of UF Shellfish Aquaculture Research and Education Facility in conjunction with The Florida Wildlife Experience – September 30, Cedar Key

Presentations:

- *An overview of the clam farming industry in Cedar Key and its dependency on water quality* — American Water Resources Association, Florida chapter meeting, September 30, Cedar Key
- *Welcome to Clamalot* – Florida Natural Resources Leadership Institute, Class VI, February 16-17, Cedar Key
- *Shellfish Aquaculture Education and Extension Efforts in Florida* – South East Atlantic Sea Grant Meeting, February 21-22, Georgetown, SC
- *Genetic Issues in Florida Hard Clam Aquaculture* — National Shellfisheries Association Annual Conference, March 27-29, Monterey, CA
- *Cedar Key’s transition from fishing to water farming - the environmental and economic consequences* – Marketing, Trade and Management of Fisheries and Aquaculture Resources Meeting, April 20, Cedar Key
- *The use of land-based support facilities by the clam aquaculture industry* – Stake a Cla(i)m

for Tax Relief Workshop, May 9, Cedar Key

Publications:

- *Bivalve Bulletin Newsletter* — Vol. IX, No. 2, August, 2005, 6 pp.
- *Bivalve Bulletin Newsletter* — Vol. X, No. 1, February, 2006, 6 pp.
- *Bivalve Bulletin Newsletter* — Vol. X, No. 2, May, 2006, 6 pp.
- *2006 Seed Suppliers List* – January, 2006, 2 pp.
- *2006 Clam Bag Suppliers List* — January, 2006, 1 pp.
- *Nutritional Composition and Marketable Shelf Life of Blood Ark and Ponderous Ark Clams* — EDIS publication FE568, July 2005, 6 pp. (with Degner and Morgan)
- *Biology and Culture of the Hard Clam* – Southern Regional Aquaculture Center, SRAC Pub. No. 433, August 2005 Revision, 6 pp. (with Whetstone and Oesterling)
- *Temperature acclimation (tempering) of hard clams* (with Wright and Otwell) – Journal of Aquatic Food Product Technology (in review).
- *Introduction to Hard Clam Diseases and Pests* — EDIS publication (submitted), 8 pp. (with Baker, Petty, Francis-Floyd and Yanong).

Professional Development:

- Florida Natural Resources Leadership Institute – Class V, Graduated October 2005, Practicum: Clamunications – Establishing a dialogue between industry and state regulatory agencies
- Aquaculture In-Service Training: The potential of marine shrimp aquaculture in Florida – UF/IFAS Indian River Research and Education Center, February 7-8

Funded Projects/Grants:

- Enhancing Stress Resistance of Cultured Hard Clams in Florida by Triploidy – Florida Sea Grant College Program, 2004-6 (with Baker, Adams, Scarpa-HBOI)
- Infrastructural Needs to Ensure Sustainability of the Hard Clam Aquaculture Industry in Cedar Key, FL – USDA Rural Business Enterprise, 2005-6 (with Cedar Key Aquaculture Association)
- Enhancing Production of Cultured Hard Clams in Florida by Triploidy – Florida Sea Grant College Program, 2006-8 (with Baker, Scarpa-HBOI)
- Sunray Venus Clam: A new species to diversity the Florida hard clam aquaculture industry – Florida Sea Grant College Program, 2006-8 (with Scarpa-HBOI, Adams, Creswell, Nunez)

Ongoing Programs and Plans for 2005-6:

- Assist new clam growers in Collier County.
- Implement a CARES project through the Suwannee River Partnership in Levy County.
- Publish a 12-page illustrated brochure with the Cedar Key Aquaculture Association and the LINC Foundation which features the clam farming industry in the Suwannee Sound.
- Provide monthly graphs of water quality data for selected lease areas in 4 counties through the new CLAMMRS project.
- Complete triploid study and growout evaluation with UF and HBOI researchers and industry partners.
- Continue a project to evaluate the culture potential of sunray venus with UF and HBOI

researchers.

- Initiate research and demonstration projects identified in the Florida Shellfish Aquaculture Development Program.

Denise Petty, DVM
Clinical Assistant Professor
Department of Large Animal Clinical Sciences and
Department of Fisheries and Aquatic Sciences
University of Florida, Gainesville, Florida

General:

- Provided telephone assistance to approximately 800 incoming calls
- Provided requested information via approximately 50 mailings and faxes.
- The fish disease diagnostic laboratory in Gainesville saw 167 cases during the reporting period.
- Conducted approximately 20 site visits.

Workshops and Seminars:

Petty BD. Mycobacteriosis in marine fishes. Aquaculture America 2006, World Aquaculture Society Conference, Las Vegas, NV, February 13-16, 2006

Petty BD. The usual suspects: bacterial disease you love to hate. Florida Veterinary Medical Association, 76th Annual Conference, Orlando, FL, September 2005.

Petty BD, Water quality parameters and management that affect fish health. Columbia County Extension Workshop, Lake City, FL, September 2005.

Petty BD, Water quality parameters and management that affect fish health. Tri-county Extension Workshop, Raiford, FL, September 2005.

Petty BD, Brief natural history of Rift Lake cichlids, Cichlid Nutrition Workshop, Homestead, FL, July 2005

Publications

Florida Aqua News – Vol. 1, Issue 3

Florida Aqua News – Vol. 2, Issue 1

Florida Aqua News – Vol. 2, Issue 2

Research:

Graduate students supported:

Tina Crosby

Master of Science, Dept. of Fisheries and Aquatic Sciences

Funded project:

Florida Aquatic Animal Health Program: School of Natural Resources, 2005-2006.

Other Activities:

Co-organizer Aquatic Animal Medicine session. Florida Veterinary Medical Association, 76th Annual Convention, Sept. 2005, Orlando, FL

Assist with Aquatic Animal Laboratory, 142nd American Veterinary Medical Association Annual Convention, July 2005, Minneapolis, MN.

Carlos V. Martinez
Assistant in Extension-Ornamental Aquaculture
University of Florida, Tropical Aquaculture Laboratory, Ruskin, FL

Program Activities for July 1, 2005 to June 30, 2006:

General:

- Provided educational assistance to 683 clients by phone
- Provided educational assistance to 838 clients through direct phone conversations
- Provided educational assistance to over 3,000 incoming cell phone messages
- Prepared 13 educational packets for mailing containing a total of:
910 Extension Publications
- Provided one-on-one discussions with 26 walk-ins
- Provided individual assistance to 88 clients through on site visits
- Conducted 41 educational tours
- Involved in 33 field days

Workshops:

- Introduction to Recirculating Systems - August 25, 2005
(Tropical Aquaculture Laboratory)
- Two Day Fish Health Management Workshop (Yanong) - September 22-23, 2005
(Tropical Aquaculture Laboratory)
- Recirculating Systems - Water Quality Management - September 29, 2005
(Tropical Aquaculture Laboratory)
- Recirculating Systems - Design and Construction - October 27, 2005
(Tropical Aquaculture Laboratory)
- Recirculating Systems - Fish Health Management - December 01, 2005
(Tropical Aquaculture Laboratory)
- Two Day Hormone Induction Spawning Workshop - February 23-24, 2006
(Tropical Aquaculture Laboratory)
- Two Day Fish Health Management Workshop (Yanong) - March 9-10, 2006
(Tropical Aquaculture Laboratory)
- Restricted Use Pesticide Training and Testing - March 30, 2006
(Tropical Aquaculture Laboratory)

Program Presentations:

- A total of over 9,000 3rd grade students reach during 4 weeks of Ag-Ventures
- Received the Polk County Sheriff's Commendation from Sheriff Grady Judd for my continued technical support in the Polk County Star (Sheriff's Training and Respect) Aquaculture Production Program. This program produced both Tilapia and Red Drum which was used to feed the residents as well as generate capitol through sales of annual fish fry plates. My continued support will include Barramundi reproduction in 2006 and 2007.

Aquaculture Program activities for the Tropical Aquaculture Laboratory

Research Projects:

- **Use of Methyltestosterone for Masculinization of *Xiphophorus hellerii*** – USDA/CSREES-funded project working with the FDA on an Investigational New Animal Drug (INAD) application for methyltestosterone as a masculinization agent for swordtail, *Xiphophorus hellerii*, an important ornamental species. Tank studies and initial pond results support labeling based on efficacy. The FDA has approved a protocol for a pivotal study investigating effectiveness under pond and tank production conditions.
- **Diet of Asian Swamp Eels Found in Commercial, Tropical Fish Production Ponds** – USDA/CSREES-funded project collecting Asian swamp eels, *Monopterus albus*, from tropical fish production ponds and examining their gut contents. The Asian swamp eel has appeared as an introduced species in commercial tropical fish production ponds in Hillsborough County. Based on initial information from federal agencies, great concern was expressed regarding their impact on fish populations in these ponds. Results of gut contents examinations indicate that Asian swamp eels in ornamental aquaculture ponds are not a significant threat to fish production. A journal article submitted to the North American Journal of Aquaculture is in press.
- **Coral Propagation and Restoration** – USDA-CSREES-funded project comparing growth and survival of native hard coral fragments among three types of production systems (land-based, indoor, high-end recirculating system; land-based, greenhouse recirculating system; and ocean-based, live-rock lease site), with the eventual goal of providing coral fragments for restoration projects. An acceptable procedure and protocol for the issuance of a USDA-APHIS certificate of health will be established to allow safe return of cultured corals into open waters.
- **Use of Stable Isotopes to Evaluate Feed Quality and Characterize Aquaculture Pond Trophic Dynamics to Maximize Fish Production** – USDA-CSREES-funded project attempting to answer a basic question of pond-based aquaculture regarding the fate of nutrients from commercial fish feeds in a pond—do small fish primarily obtain their nutrition from relatively expensive commercial feeds, from live organisms best supported by relatively cheap fertilizers, or a combination? Stable isotopes of carbon and nitrogen will be tracked through pond and experimental food webs to determine nutrient fate. Growth and ammonia production of swordtail, *Xiphophorus hellerii*, has been evaluated for experimental feeds containing various ratios of plant-based protein sources and fish meal. An experiment evaluating pond production of swordtail using fertilizers and feeds has been completed.
- **Feed Formulation and Feeding Strategies for Bait and Ornamental Fish** – USDA-SRAC-funded project investigating a basic question of pond-based ornamental fish production—when using commercial fish feeds, are we feeding the fish or the pond? Production of six ornamental fish species representing important aquaculture groups using organic fertilizer, inorganic fertilizer, unprocessed pond feed, or processed feed will be compared in replicated ponds. Results are pending for zebra danio, *Danio rerio*, swordtail, *Xiphophorus hellerii*, and pleco, *Pterygoplichthys* sp.

- **Aquaculture Investigational New Animal Drug (INAD) Research** – USDA-CSREES-funded project providing drug effectiveness and target animal safety data to the Food and Drug Administration (FDA) through the INAD process in support of New Animal Drug Approvals (NADA) for metomidate hydrochloride (Aquacalm) as a transport sedative, florfenicol as an antibiotic, and emamectin benzoate (SLICE) as an external parasiticide for ornamental fishes. Current studies have evaluated metomidate hydrochloride with a variety of ornamental species.
- **Relative vulnerability of wild-type and transgenic fluorescent zebra danios to predators** – Project funded by UF/IFAS Tropical Aquaculture Laboratory and University of Minnesota investigating the relative vulnerability of GloFish® (a red fluorescent transgenic zebra danio, *Danio rerio*, the only transgenic pet commercially available to the public) and wild-type zebra danios to predation by native fishes—largemouth bass, *Micropterus salmoides*, and eastern mosquitofish, *Gambusia holbrooki*. Results of tank studies show that both predators select GloFish® at a higher rate than wild-type zebra danios. Eastern mosquitofish was shown to have a predatory effect on zebra danios, even though zebra danios were slightly larger and heavier than the eastern mosquitofish used in the experiments. This experiment suggests that predation may be an important biotic resistance to the potential establishment of GloFish® in open waters.
- **Development of Reproductive Strategies for *Pimelodus pictus*** – This fish is an important species which is imported from wild capture fisheries in the Amazon basin. This project will develop reproductive strategies which can be employed by commercial producers in the state of Florida. This study is funded using a USDA CSREES grant.
- **Investigation into the presence or absence of Spring Viremia of Carp in Florida** – This research will utilize protocols accepted by the OIE to collect and analyze samples from 21 farms in the state of Florida which are producing Koi carp to determine the presence or absence of this important, reportable disease in the state. Participating private partners will be able to utilize the results of this research to help establish their facilities as SVC free assuming no incidence of this disease is found on their facilities for 2 years. This is a two year study using a USDA CSREES grant
- **Use of methyltestosterone (MT) for masculinization of ornamental fish**— In certain species of ornamental fish, males have significantly higher economic value. Development of ongoing studies, including FDA Investigational New Animal Drug pivotal effectiveness studies for swordtails are continuing, as are preliminary and supportive studies for legal use of MT in other ornamental fish species.

Presentations:

- Crosby, T. C., B. D. Petty, J. E. Hill, K. H. Hartman, and R. P. E. Yanong. 2006. Investigation of metomidate hydrochloride as a sedative in shipping ornamental fish. 5th International Symposium of Aquatic Animal Health, San Francisco, California.
- Hill, J. E. 2006. Big, scary exotic fish: an overview of nonindigenous fish in Florida. Exotic Wildlife Workshop: Problem Species in Florida—How We Are Fighting Back. UF/IFAS Pinellas County Extension, Largo, Florida.
- Hill, J. E. 2006. Non-native aquatic species in Florida: an overview. U.S. Food and Drug Administration Center for Veterinary Medicine (FDA-CVM) Aquaculture Drugs Approval Team Training Workshop, UF/IFAS Tropical Aquaculture Laboratory, Ruskin, Florida.

- Hill, J. E. 2006. Non-native aquatic species and aquaculture: science, risk assessment, and regulations. Aquaculture Extension Emerging Issues special session. Aquaculture America 2006, Las Vegas, Nevada.
- Hill, J. E. 2006. Pretty fish in strange places: ornamental aquaculture and the ornamental fish trade as pathways of introduction. Introduced Fish Section symposium Strategies to Prevent, Contain, and Manage Aquatic Invaders: How can we Improve Effectiveness? American Fisheries Society Annual Meeting, Lake Placid, New York.
- Hill, J. E., and C. V. Martinez. 2006. Culture of loricariid catfishes in Florida. Loricariid Workshop. USGS Florida Integrated Science Center, Gainesville, Florida.
- Hill, J. E., T. Pavlowich, and A. Kapuscinski. 2006. Relative vulnerability of wild-type and transgenic fluorescent zebra danios to predators. Exotic Fish Discussion, UF/IFAS Tropical Aquaculture Laboratory, Ruskin, Florida.
- Hill, J. E., and C. A. Watson. 2006. Diet of the nonindigenous Asian swamp eel, *Monopterus albus* (Synbranchidae), in tropical ornamental aquaculture ponds in Florida. International Conference on Aquatic Invasive Species, Key Biscayne, Florida.
- Hill, J. E., and C. A. Watson. 2006. Diet of the nonindigenous Asian swamp eel *Monopterus albus* (Synbranchidae) in tropical ornamental aquaculture ponds in west central Florida. Florida's Exotic Aquatic Organisms Symposium, Florida Chapter, American Fisheries Society Annual Meeting, Altoona, Florida.
- Hill, J. E., and C. A. Watson. 2006. Pond scum, fish sex, fish Rx, and fish on the loose: an overview of research and extension programs at the UF/IFAS Tropical Aquaculture Laboratory. Hoggetown Fishhead Think Tank, Florida Integrated Science Center, U.S. Geological Survey, Gainesville, Florida.
- Hill, J. E., and P. Zajicek*. 2006. National aquatic species risk analysis: a call for improved implementation. International Conference on Aquatic Invasive Species, Key Biscayne, Florida. (*presenting author).
- Watson, C. A., and J. E. Hill*. 2006. If you own a swamp eel, should you tell anyone? Exotic Species: History, Regulation, and Research special session. Aquaculture America 2006, Las Vegas, Nevada. (*presenting author).
- Watson, C. A., and J. E. Hill. 2006. Using applied research to assist in extension recommendations: a case study in Florida involving Asian swamp eels as an invader of aquaculture ponds. Extension Session. Aquaculture America 2006, Las Vegas, Nevada.

Publications:

- Alo, M. 2005. Survivorship, growth and pigmentation responses of the marine ornamental invertebrate *Tridacna maxima* to varied irradiance levels in two different culture systems. MS thesis. University of Florida.
- Crosby, T.C., J.E. Hill, C.A. Watson, R.P.E. Yanong, and R. Strange. 2006. Effects of tricaine methansulfonate, Hypno, Aquacalm, quinaldine, and salt on plasma cortisol levels following acute stress in three spot gourami *Trichogaster trichopterus*. Journal of Aquatic Animal Health 18:58-63.
- Crosby, T.C., J.E. Hill, R.P.E. Yanong, C.V. Martinez, and C.A. Watson. In press. Harvesting ornamental fish from ponds. University of Florida IFAS Extension Circular FA117.

- Crosby, T.C., J.E. Hill, R.P.E. Yanong, C.V. Martinez, and C.A. Watson. In press. Grading ornamental fish. University of Florida IFAS Extension Circular FA118.
- Crosby, T.C., J.E. Hill, R.P.E. Yanong, C.V. Martinez, and C.A. Watson. In press. On farm transport of ornamental fish. University of Florida IFAS Extension Circular FA119.
- Crosby, T.C., J.E. Hill, R.P.E. Yanong, C.V. Martinez, and C.A. Watson. In press. Preparation of ornamental fish for shipping. University of Florida IFAS Extension Circular FA120.
- Hill, J.E. In final revision. Selecting and stocking fish for the home aquarium. University of Florida Institute of Food and Agricultural Sciences IFAS Extension Fact Sheet FA116.
- Hill, J.E. 2006. Regulations pertaining to non-native fish in Florida aquaculture. University of Florida IFAS Extension Circular FA121.
- Hill, J.E., and C.A. Watson. In press. Diet of the nonindigenous Asian swamp eel in tropical ornamental aquaculture ponds in west central Florida. North American Journal of Aquaculture.
- Hill, J. E., and P. Zajicek. Accepted. National aquatic species risk analysis: a call for improved implementation. Fisheries.
- Hill, J.E., J. D. Baldwin, J. S. Graves, R. Leonard, J. F. F. Powell, and C. A. Watson. 2005. Preliminary observations of topical gill application of reproductive hormones for induced spawning of a tropical ornamental fish. North American Journal of Aquaculture 67:7-9.
- Lazur, A. M., D. B. Poudel, and J. E. Hill. Accepted. Preliminary evaluation of sturgeon production and sustainability of a zero-discharge pond water recirculating tank system. North American Journal of Aquaculture.
- Watson, C.A., and J.E. Hill. 2006. Design criteria for recirculating, marine ornamental production systems. Aquacultural Engineering 34:157-162.
- Yanong, R.P.E., J.E. Hill, C. J. Daniels, and C. A. Watson. 2006. Efficacy of 17- α -methyltestosterone for expression of male secondary sexual characteristics in the swordtail *Xiphophorus hellerii*. North American Journal of Aquaculture 68:224-229.

Board/Committee/Working Group Participation

Jeff Hill

- Apple Snail Task Force, Division of Aquaculture, Florida Department of Agriculture and Consumer Services.
- Detection and Monitoring Committee, federal Aquatic Nuisance Species Task Force.
- Research Committee, Aquatic Nuisance Species Task Force.
- Risk Assessment Sub-working Group, Florida Invasive Species Working Group.
- Transgenic Aquatic Species Task Force, Division of Aquaculture, Florida Department of Agriculture and Consumer Services.

Craig Watson

- Florida Aquaculture Association Board
- National Aquaculture Association Board
- Florida Aquarium Board and Executive Committee
- Chair, Program Committee, Marine Ornamentals Conference
- Florida Farm Bureau Aquaculture Advisory Committee

Roy P. E. Yanong, VMD
Tropical Aquaculture Laboratory, University of Florida
Ruskin, FL

July 1, 2005- June 30, 2006

General:

- Provided telephone assistance to 980 incoming calls
- Provided fish health diagnostics for 241 cases
- Provided 230 informational mail outs/faxes/emails. One-on-one contacts with 250 walk-ins. Provided 41 individual client site visits.
- Involved in programs/presentations attended by 380 individuals.

Workshops/Seminars/Presentations/Meetings:

- July 16-18, 2005. Aquatic Animal Medicine Educational Program Session Chair and Coordinator, American Veterinary Medical Association (AVMA), 142nd Annual Convention, Minneapolis, MN.
- July 19, 2005. Ornamental Fish Medicine Wet Lab, AVMA Annual Convention, Minneapolis, MN, Organizer/Instructor.
- August 2-3, 2005, Participant, USFWS Aquatic Animal Drug Approval Partnership Program, Bozeman, MT.
- September 10, 2005, Lecturer and wet lab instructor, Florida Veterinary Medical Association meeting, Orlando, FL
- September 22-23, 2005, Two-Day Fish Health Management Class, Tropical Aquaculture Laboratory, Ruskin, FL
- September 29, 2005, TAL Seminar Series, Recirculating Systems: Water Quality Management
- December 1, 2005, TAL Seminar Series, Recirculating Systems: Fish Health Management
- March 6-7, 2006, FDA-CVM Aquaculture Drugs Team, Two-day ornamental fish industry training program, Rockville, MD; organizer, lecturer/wet lab instructor
- March 9-10, 2006, Two-Day Fish Health Management Class, Tropical Aquaculture Laboratory, Ruskin, FL
- March 14-17, 2006, FDA-CVM Aquaculture Drugs Team, ornamental fish industry tour of farms and producer meeting; organizer
- May 3, 2006, Florida's Ornamental Fish Industry and the Aquarium Hobby, Florida Aquarium, presenter.
- Fish farm tours, Southeast Regional Aquaculture Information Exchange Group (TAL), May, 2006.
- May 11, 2006, Mycobacteriosis in Recirculating Systems and Fish Vaccinology, Fish Practitioner's Workshop, 37th Annual International Association for Aquatic Animal Medicine, Nassau, Bahamas; Session Chair/Organizer

Miscellaneous:

- Worked with CVM and FAS fish health faculty team to develop Florida Aquatic Animal Health Plan for aquaculture program
- FDA-INAD Drug Extension
 - U.S. sponsor for Ovaprim (reproductive hormone for ornamental fish species; Syndel Labs)
 - Working with ornamental industry, drug sponsors, and FDA-CVM for development of aquaculture drug approvals and/or legally marketable status for Ovaprim (reproductive hormone), 17-alpha-methyltestosterone (masculinization), metomidate (sedation), and florfenicol (antibacterial)

Students/Post Docs training:

- December 5, 2005-January 4, 2006, Megan Baebler, veterinary student extern, University of Missouri.
- March 2006, 4.5 weeks, Beth Privett, UK aquaculture student; sponsored/hosted with TAL faculty and staff
- Jennifer Matysczak, VMD, vet intern/post-doc, training in aquatic animal medicine/aquaculture health extension
- Kathy Heym Kilgore, VMD, vet intern/post-doc, training in aquatic animal medicine/aquaculture health extension
- Shari K. Hanson, DVM, MS, vet intern/post-doc, training in aquatic animal medicine/aquaculture health extension

Committees:

- Aquatic Veterinary Medicine Committee, American Veterinary Medical Association
- Animal Agriculture Liaison Committee, American Veterinary Medical Association

Publications:

Crosby, T. C., J. E. Hill, C. A. Watson, R. P. E. Yanong, and R. Strange. 2006. Effects of tricaine methanesulfonate, Hypno, Aquacalm, quinaldine, and salt on plasma cortisol levels following acute stress in three spot gourami *Trichogaster trichopterus*. *Journal of Aquatic Animal Health* 18: 58-63.

Hartman, K.H. and R.P.E. Yanong. July 2005. Getting Wet: Continuing Educational Opportunities for Aquatic Animal Medicine. Proceedings, 142nd American Veterinary Medical Association Annual Convention, Minneapolis, MN.

Hartman, K.H., R.P.E. Yanong, C.A. Harms, and G.A. Lewbart. 2006. The future of training for aquatic animal health veterinarians. *Journal of Veterinary Medical Education*. *Journal of Veterinary Medical Education*, 33(3): 389-393.

Kilgore, K., D.Pouder, S. Hanson and R. Yanong. 2006 Summary of Cases of Mycobacteriosis from 1999-2005 Diagnosed at the University of Florida's Tropical Aquaculture Laboratory. Proceedings, 37th Annual Conference, International Association for Aquatic Animal Medicine, Nassau, Bahamas.

Malone, R.F. and R.P.E. Yanong. 2006. Biosecurity, A Major Design Consideration for Recirculating Systems, and Important Unknowns for Reducing Mycobacterial Outbreaks. Proceedings, 37th Annual Conference, International Association for Aquatic Animal Medicine, Nassau, Bahamas.

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet .FA107.Common Freshwater Fish Parasites Pictorial Guide: Sessile Ciliates. <http://edis.ifas.ufl.edu/FA107>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-108 Common Freshwater Fish Parasites Pictorial Guide: Motile Ciliates. <http://edis.ifas.ufl.edu/FA108>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-109 Common Freshwater Fish Parasites Pictorial Guide: Flagellates. <http://edis.ifas.ufl.edu/FA109>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-110 Common Freshwater Fish Parasites Pictorial Guide: Dinoflagellates, Coccidia, Microsporidians, and Myxozoans. <http://edis.ifas.ufl.edu/FA110>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-111 Common Freshwater Fish Parasites Pictorial Guide: Monogeneans. <http://edis.ifas.ufl.edu/FA111>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-112 Common Freshwater Fish Parasites Pictorial Guide: Digenean Trematodes. <http://edis.ifas.ufl.edu/FA112>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-113 Common Freshwater Fish Parasites Pictorial Guide: Nematodes. <http://edis.ifas.ufl.edu/FA113>

Pouder, D.B., E.W. Curtis, R.P.E. Yanong. July 2005. UF/IFAS Fact Sheet FA-114 Common Freshwater Fish Parasites Pictorial Guide: Acanthocephalans, Cestodes, Leeches, and Pentastomes. <http://edis.ifas.ufl.edu/FA114>

Russo, R., R.P.E. Yanong, and H. Mitchell. 2006. Dietary beta-glucans and nucleotides enhance resistance of Red-tail black shark (*Epalzeorhynchus bicolor*, fam. Cyprinidae) to *Streptococcus iniae* infection. Journal of the World Aquaculture Society. 37 (3): 298-306.

Russo, R., H. Mitchell, and R.P.E. Yanong. 2006. Characterization of *Streptococcus iniae* isolated from ornamental cyprinid fishes and development of challenge models. Aquaculture 256: 105-110.

Yanong, R. May/June 2006. The Potential for Vaccine Use in Florida's Ornamental Fish Industry. Florida Fish Farmer (Newsletter of the Florida Tropical Fish Farms Association).

Yanong, R. March/April 2006. Swordtail Masculinization Project Update. Florida Fish Farmer (Newsletter of the Florida Tropical Fish Farms Association).

Yanong, R.P.E. 2006. Controlling Common Parasites in Freshwater Fish. Pet Age. 35 (9): 50-56.

Yanong, R.P.E. 2006. Using Aquarium Medications Properly. Pet Age. 36 (4): 56-68.

Yanong, R. and H. Mitchell. 2006. A Future Ounce of Prevention: Considerations for Vaccine Development in Florida's Ornamental Industry. Proceedings, 37th Annual Conference, International Association for Aquatic Animal Medicine, Nassau, Bahamas.

Yanong, R.P.E., J. E. Hill, C. J. Daniels, and C. A. Watson. 2006. Efficacy of 17-alpha-methyltestosterone for expression of male secondary sexual characteristics in the swordtail *Xiphophorus hellerii*. North American Journal of Aquaculture 68 (3): 224-229.

Zollinger, T., K. Kilgore, and R. Yanong. 2006. Summary and Report of a Fish Practitioner Survey Concerning Mycobacteriosis Incidence, Surveillance, and Treatment. Proceedings, 37th Annual Conference, International Association for Aquatic Animal Medicine, Nassau, Bahamas.

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PUBLICATIONS

SCIENTIFIC JOURNAL ARTICLES

Ohs, C.L. and L.R. D'Abramo. 2006. Comparison of early season versus late season trap schedules for harvest of Red Swamp Crawfish *Procambarus clarkii* cultured in earthen ponds without planted forage. *Journal of Shellfish Research* 25(2): 561-564.

Ohs, C.L., L.R. D'Abramo, and A.M. Kelly. 2006. Evaluation of dietary administration of 17 α -methyltestosterone to freshwater prawn *Macrobrachium rosenbergii* as a means to control sexual differentiation. *Journal of the World Aquaculture Society* 37(3): 328-333.

Ohs, C.L., L.R. D'Abramo, L. Petrie-Hanson, and A.M. Kelly. 2006. Apparent control of sexual differentiation of freshwater prawn *Macrobrachium rosenbergii* through dietary administration of dopamine hydrochloride. *Journal of Applied Aquaculture* 18(3): 19-32.

D'Abramo, L.R., C.L. Ohs, and K.C.E. Elgarico. 2006. Effect of added substrate on production of red swamp crawfish (*Procambarus clarkii*) in earthen ponds without planted forage. *Journal of the World Aquaculture Society* 37(3): 307-312.

BOOK CHAPTER

D'Abramo, L.R., C.L. Ohs. 2005. Management practices for production of the red swamp crayfish *Procambarus clarkii* in earthen ponds without planted forage. *Aquaculture in the 21st Century*. Eds. A.M. Kelly and J. Silverstein. American Fisheries Society Symposium 46: 171-178. American Fisheries Society, Bethesda, MD.

EXTENSION PUBLICATIONS

Cortney L. Ohs, Scott W. Grabe, R. LeRoy Creswell. 2005. Utilizing a Fish Pump for Harvesting Shrimp from Tanks and Ponds. University of Florida EDIS Publication FA123.

Louis R. D'Abramo, James H. Tidwell, Mack Fondren and Cortney L. Ohs. 2006. Pond Production of the Freshwater Prawn in Temperate Climates. Southern Regional Aquaculture Center Number 484.

TEACHING

-Guest Lecturer: Crustacean Aquaculture FAS 2150 (Indian River Community College 2006)

PRESENTATIONS

Pond Construction. Pond Management In-service Training. 2006. Department of Fisheries and Aquatic Sciences Gainesville, FL.

Pond Stocking and Management. Pond Management In-service Training. 2006. Department of Fisheries and Aquatic Sciences Gainesville, FL.

Emerging aquaculture species and production systems in Florida. St. Lucie County Ag Tour 2006. Fort Pierce, FL.

Control of sexual differentiation of freshwater prawn *Macrobrachium rosenbergii* through dietary administration of dopamine hydrochloride. Aquaculture America 2006, Las Vegas, NV.

Future aquaculture research at the University of Florida Indian River Research and Education Center. Aquaculture In-service Training. Shrimp culture techniques. 2006. Indian River Research and Education Center Fort Pierce, FL.

Florida aquaculture – new opportunities for agriculture. Indian River Citrus Seminar 2006. St. Lucie County Fairgrounds, Fort Pierce, FL.

Offshore Aquaculture. Fish and Wildlife Research Institute Community, Science, and Environmental Policy Brown Bag Discussion 2005, University of South Florida St. Petersburg, FL.

PROFESSIONAL SERVICE

Editor:

American Fisheries Society Fish Culture Section Newsletter

Reviewer:

Journal of the World Aquaculture Society

North American Journal of Aquaculture

Aquaculture Nutrition

Aquaculture International

Small Business Innovation Research: Aquaculture Grant Program

Haworth Press Inc.

Center for Tropical and Subtropical Aquaculture

Maine Aquaculture Innovation Center

WEBSITES MAINTAINED

Fish Culture Section of the American Fisheries Society: <http://fishculturesection.org>

United States Freshwater Prawn and Shrimp Growers Association: <http://freshwaterprawn.org>

Shawnee Freshwater Prawn Growers Association: <http://shawneeprawn.org>