Science Serving Florida's Coast

"Performance Counts"

Annual Progress Report for 2001
May 2002

Technical Paper 118

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1.0 INTRODUCTION

The Florida Sea Grant College Program is committed to enhancing the practical use and conservation of coastal and marine resources for a sustainable economy and environment in a state whose coastline stretches for over 1,300 miles. 2001 represents the 31st year for Sea Grant in Florida. The program operates through a statewide, research, education and extension partnership of state and federal agencies, businesses and citizens. All ten public universities, three private universities, and two private non-profit research laboratories constitute this virtual college without walls. The University of Florida serves as the host campus. Florida Sea Grant is one of 31 Sea Grant programs nationwide that together form the National Sea Grant College Program as authorized by federal legislation. It is the only university-based, statewide coastal research, education, extension/outreach and communications program in Florida.

This annual progress report for 2001 is the fourth annual progress report submitted by Florida Sea Grant under the program evaluation procedures adopted during 1998 by the National Sea Grant College Program. This report covers the year 2001, but some historical data are included to provide baseline information for subsequent annual progress reports.

Florida Sea Grant had eleven different NOAA grants in effect during 2001. This annual report covers work completed and ongoing under all eleven grants.

Florida Sea Grant awards from NOAA activities during calendar year 2001.			
Number	Keyword Identifier	Start Date	Current End Date
NA76RG-120	Omnibus research, extension, communications and management	02/01/97	09/30/01
NA06RG-0046	Knauss Fellow	02/01/00	01/31/02
NA06RG-0068	National Aquaculture	02/01/00	07/31/02
NA96OP-0114	Florida Bay	04/01/99	03/31/01
NA06RG-0435	Florida Bay	09/01/00	08/31/02
NA16RG-1076	Knauss Fellow E/ST-24	02/01/01	01/31/02
NA16RG-1075	Knauss Fellow E/ST-25	01/02/01	01/31/02
NA16RG-1074	Knauss Fellow E/ST-26	02/01/01	01/31/02
NA16RG-1720	Aquatic Nuisance	10/01/01	09/30/02
NA16RG-1298	US/Japan Natural Resources	09/01/01	08/31/02
NA86RG-0039	Aquatic Nuisance Miss/Ala Sea Grant	10/01/01	08/31/02

A summary of recent Florida Sea Grant accomplishments follows, with details for 2001 in the remaining ten sections of this progress report.

2.0 PROGRAM ACCOMPLISHMENTS AND BENEFITS

"Performance Counts"

Acceptance of Sea Grant College status places a responsibility on that college for the continued pursuit of excellence in marine research, education and extension. During 1991 a "measures of performance plan" was developed for use by Florida Sea Grant at its administrative headquarters, the University of Florida, in assessing performance. This plan has been revised and used annually to describe the achievements of Florida Sea Grant, in terms of the efforts projected for the year in its annual plan, and is intended also to serve the needs of the University of Florida in generally furthering its evaluation of academic programs. The plan includes measures of performance for both the programmatic aspects of Sea Grant and for its administrative procedures.

Measuring Florida Sea Grant performance presents a challenging task due to the unique attributes of the program. Research is funded in many universities statewide. Extension faculty are located statewide. In all cases, research and extension faculty are integrated into the appropriate academic unit and report their annual academic activities through that unit. Collecting and interpreting all these activities each year necessitates in one sense, another bureaucratic layer. But using the Sea Grant umbrella, this is accomplished. In addition, Sea Grant records annually the students funded, papers published, and accomplishments and benefits, etc., on a project-by-project basis, and obviously records its own publications and media accomplishments through its Communications Program. The Sea Grant Extension Program also completes an annual accomplishment report, and the Sea Grant administrators work with all program components on a daily basis. Some leakages do occur in our ability to track performance, however. For example, we sometimes do not know of scientific articles published several years after the end of a project, although that faculty member reports that article in his or her own achievement report to his or her academic unit. The bottom line is that even though Sea Grant has far-flung multi-disciplinary and multi-institutional programs, every attempt is made to report on performance as best possible without expending additional precious resources to accomplish that goal. Even then, Sea Grant will be viewed as an efficient, productive program that benefits the people and the coastal resources it is designed to serve.

Strategic Issues

Florida Sea Grant's Strategic Plan for 1998-2001 is organized around three major areas: (1) Economic Leadership, (2) Coastal Ecosystem Health and Public Safety and (3) Education and Human Resources. Each of these major areas contains from two to five goals. Specific tasks are then defined for each goal as a way to guide faculty and program partners over the next four years to strategically invest capital and labor in the most effective way and focused on the most critical programs. This strategic plan was adopted on 1 February 1998, with an implementation plan that defined specific tasks scheduled for completion in 1998 or 1999. The plan was revised slightly for 2000 and 2001, with a new implementation plan enacted. Thus, for this 2001 annual report, program accomplishments and benefits are reported under those goals and tasks scheduled for 2001 completion in the Florida Sea Grant Implementation Plan. Research results are shown by (faculty name: project number). Extension results are shown by (faculty name) or (name of state major program leader: name of faculty completing task).

Economic Leadership

Goal 1: Create Products and Processes from Florida's Coastal Resources Using Marine Biotechnology

1.1 A statewide faculty task force formed by Florida Sea Grant in 1998 to advance marine biotechnology will continue to operate. The goal is to partner with industry in a way that will yield both state and industry funds to support marine biotechnology research and economic growth in Florida. (Seaman/Cato)

This ad hoc group of key faculty scientists and administrators maintained the statewide network for advancing marine biotechnology research, development and education. As a result, legislation to create a Marine Biotechnology, Research, Development and Outreach Program with $2M in funding was introduced in the Florida Senate and House to fund this effort. While it passed committees, it did not get to a final vote in either chamber.

1.5 Traditional isolation methods from marine environments are thought to recover only 0.1-12.5% of the microbial community. It is thus necessary to develop and implement methods to enhance the recovery of a novel suite of microorganisms associated with deep sea sponges. This will yield new isolates, which may lead to minimizing the need for the continued collection of the host sponge. (Olson/McCarthy: R/LR-MB-11 [T-99-57])

The study was the first to examine the microbial community associated with deep-water sponges using a combination of microbiological and molecular biological techniques. It was found that recoverability of microorganisms from marine environmental samples can be dramatically enhanced through the use of various media supplements thought to provide additional aerotolerance to sensitive or stressed organisms. Although more microbial colonies were recovered, genetic analyses indicated that cultivation techniques did not permit the growth of certain groups of bacteria.

One journal article was published and another is in review. This project provided microbial extracts from deep-water marine sponges to the industrial partner (Novartis) for screening through proprietary bioassays. These samples will continue to be tested for bioactivity with the goal of discovering new human pharmaceuticals.

1.6 Marine sponges are known to produce thousands of biologically active natural products with potential as pharmaceuticals and other bioproducts. Sponges are thus targets for cell culture and aquaculture efforts to supply sufficient quantities for preclinical and clinical evaluation. DNA microarray technology will be evaluated as a novel technology for simultaneous screening/hybridization of thousands of probes and targets, increasing the probability of discovery of novel genes with commercial application potential. (Pomponi/Willoughby/Russell: R/LR-MB-13 [T-99-43])

The success of the cross-species hybridizations, i.e., sponge to human, is probably the most important single outcome of this project. The catalog of these results will be a useful tool for a diversity of marine research efforts. Overall, this project has created a new tool for marine invertebrate research. We have demonstrated that the power of microarray techniques can be applied to marine invertebrates to exploit the huge body of existing knowledge about other organisms. Indeed, since the inception of this project, the greater

community of cell biologists has realized the significance of the idea of cross-species microarray use. We have demonstrated that cross species use of microarrays can be accomplished relatively economically, even on a small scale. Based on methods developed and results obtained from this research, two proposals were submitted to the National Science Foundation. One industrial partner, Research Genetics, Inc. has produced a marine sponge cDNA library, which is being used for production, testing, and demonstration of custom sponge-specific microarrays.

1.7 A marine biotechnology summit meeting of Florida faculty and business interests will be organized, in order to establish long-range priorities for research, education and outreach. This will allow the identification of partnerships and approaches for developing national academic and commercial leadership in this field. (Seaman)

The consensus on the 2000 Florida Marine Biotechnology Summit II was to hold these meetings biannually. Thus, a steering committee is planning the next one for autumn 2002. Meanwhile, a statewide Internet list serve directory/network of 76 scientists was established.

1.8 American horseshoe crab populations are in decline. An important commercial use of horseshoe crabs is in the production of *Limulus Amebocyte Lysate* (LAL), which is used in medicine to test intravenous solutions and drugs, vaccines, body fluids and for other important purposes. The goal of this project is to develop a synthetic medicine that will support long-term culture of horseshoe crab cells. (Kimble: PD-00-8)

Two media that mimic the ion concentrations, pH and osmolarity of horseshoe crab hemolymph have been developed. Both media have been tested for their ability to support growth and development of late stage embryos through hatching and the first larval stage, and survival of the blood cells. Both media support survival of amebocytes for up to three weeks, and support survival and growth of the embryos and larvae through the first larval mold. Two manuscripts have resulted.

Goal 2: Determine Production and Management Techniques Which Make Florida's Fisheries Sustainable and Competitive

2.1 The spiny lobster, stone crab, king mackerel and snapper and grouper fisheries in the Florida Keys are harvested by the same group of fishermen and vessels on a seasonal basis. The biological and economic effects of managing these fisheries on a single species versus multispecies basis will be determined. (Milon/Lee/Adams/Ehrhardt: R/LR-E-18A, B)

Economic Results

Descriptive data on the four fisheries developed for the study were:

- Spiny lobster and snapper landings declined while king mackerel landings increased. Landings for the remaining species (stone crab and groupers) did not change over the study period, 1994 to 1998.
- Prices received do not appear to be related across species since each experienced different highs and lows and the weighted aggregate prices did not trend.
- Given the average prices, the value of the five fisheries considered can be ranked as follows: (1) spiny lobsters, (2) stone crab, (3) grouper, (4) snapper, and (5) king mackerel.
- Stone crab landings and prices are reported by size; the share of larger sized claws increased (medium and jumbo sizes in particular).
- The majority of fishing activity (trips and landings) occurs from August through January. Very few fishing trips are recorded in June and July.
- The vast majority of vessels corresponding to SPL included in this study ranged between 21 and 45 feet in length.
- Average annual harvest portfolios and trends in the portfolios over time varied by vessel size.
- Smaller vessels landed relatively more spiny lobster and snapper; larger vessels landed relatively more grouper.
- Landings and effort, in general, increased in the Everglades, Tortugas, and Fort Myers regions and declined in Marathon and Key West.
- Vessels in all class sizes reported harvesting in more areas in 1998 as compared to 1994.
- The fishing areas were less concentrated for king mackerel suggesting that the ability to harvest this species year round and in virtually any location offsets its relatively low price and greater price variability.
- Firms became more specialized as harvest portfolios became more concentrated. In particular, firms landed fewer different species.

Research Findings Were:

- The four primary fish species in the Monroe/Collier County fishery (i.e., king mackerel, spiny lobster, snapper/groupers and stone crab) all face the problems of overfishing and/or overcapitalization. To date, efforts to address these issues have been on a single-species basis. These target species have, on average, a large difference in their ex-vessel price per pound. Spiny lobster was the dominant species in terms of landings, with a mean of 4,114.1 pounds per year per firm, over the study period. In order of magnitude, spiny lobster landings were followed by snapper/grouper, stone crab and king mackerel. In this preliminary study, total number of trips taken annually

was used as the effort variable and labor was the only variable input included.

- Nonjoint production of all species and input-output separability were rejected. This implies that the quantity of landings of a particular species was dependent on the inputs used in harvesting other species. This affirms the existence of economic interactions in the production of the four key fisheries in South Florida; therefore, single species management would affect the harvest of the other species.
- The own-price elasticity of snapper/grouper was positive but very inelastic (0.209). All other own-price elasticities were negative. The positive cross-price elasticities between king mackerel and snapper/grouper indicate that these outputs are complementary (joint) in production, however, this effect is inelastic. The cross-price elasticity between king mackerel and both stone crab and spiny lobster were negative, which indicates that these species are substitutes. These relationships, however, were extremely elastic. For example, a 1 percent increase in the price of spiny lobster would cause a 22.4 percent fall in the quantity harvested of king mackerel. These results are consistent with the descriptive statistics, which showed that stone crab and spiny lobster are the two highest priced species. The bigger cross-price effect for spiny lobster may be due to the fact that although spiny lobster has the highest price, it has more than twice the volume of landings (on average) than stone crab and is, therefore, the higher-valued species. The relationship between stone crab and snapper/grouper is not consistent. The positive cross-price elasticity between stone crab and spiny lobster indicates that these species are complements. As expected, higher prices for king mackerel, snapper/grouper and spiny lobster increased the demand for labor.

Biological Results

Fleet participation in the multi-species, multi-gear commercial fishery of Monroe County is fundamentally one targeting spiny lobster with 47% of the total days fished and stone crab with 26.1% of the total days fished. The fleets also allocate about 3.2% of the total fishing days to King mackerel and 16.2% to Snapper/Grouper while only 7.6% to other species. Hence, 73% of the days fished in a season are allocated to crustacean trap fishing. The landings in the multi-species fishery correspond: 60% to spiny lobster or 63.6% of the value of the total landings, 15.1% to stone crab or 27.8% of the total value, 13% to king mackerel landings with a 4.5% of the total value, 2.2% of total landings are snapper/groupers with 1.2% of the total value and 4.8% of the landings are other species representing 2.8% of the total value of landings. Hence, 91.4% of the total value of the landings corresponds to spiny lobster and stone crab.

Reductions in spiny lobster fishing effort have been accomplished through the Trap Reduction Program (TRP) implemented in 1992. This TRP resulted in an unintended redirection of the excess spiny lobster trap effort to the open access stone crab fishery. Prior to the 1992 implementation of the TRP the spiny lobster fishery operated about 950,000 traps and the stone crab fishery about 550,000 traps. In the period 1987-1996 the combined number of traps in the spiny lobster and stone crab fishery varied at about 1.4 million traps operated per season. By the 1998-fishing season, the spiny lobster fishery operated about 500,000 traps while the stone crab fishery operated over 1.3 million traps. A high negatively correlated linear relationship (R^2=0.87) exists between the number of traps operated in the spiny lobster fishery and the stone crab fishery where 0.77 stone crab traps have been added per trap retrieved in the spiny lobster fishery through the TRP. The high interaction among the two species fisheries is further enhanced by the fact that a high percentage of the spiny lobster landings is realized in the period August-October while the stone crab fishery is closed, and conversely, the stone crab operations occur at a time when spiny lobster production is relatively low or the fishery is closed (April-May). The other fisheries do not interfere with the fishing on crustaceans. The King mackerel fishery

(representing 4.5% of the total value of landings) in South Florida occurs during a short commercial season in December and January.

Trap efficiency decreases significantly with the number of traps operated in the stone crab and spiny lobster fisheries. This trap density effect on catchability is due to interactions among traps under fixed seasonal catchable biomass. This condition has prevented biological over exploitation of the species. The present status of the spiny lobster fishery is similar to that observed in the mid-1980's and characterized by breakeven economic conditions of fishing operations. The trap numbers at maximum economic yield in the spiny lobster fishery generates some 20% less landings than at the breakeven-point -- a condition that may have economic consequences at other levels of the production chain. The number of traps in the open-access stone crab fishery is about 550,000 over the level to break even in the economics of fishing operations. At the present level of exploitation the male stone crab stock that sustains most of the landings may be potentially impacted. Hence, a trap reduction program is urgently needed in the stone crab fishery. Effort reduction is more important than annual quotas or other types of resources allocation to control the economics of multi-species fishery exploitation due to the absence of direct biological implication of fishing.

2.6 A vessel-level economic behavior analyses on the pelagic longline feet in the North Atlantic will be completed. The study is funded by the NOAA/NMFS Highly Migratory Pelagics Program. Ten federal managers will become more aware of the economic/diversification characteristics of the pelagic longline fleet. (Adams)

Data from 642 trips of the pelagic longline (PLL) fleet were analyzed. Gross revenue from swordfish, tuna, sharks and other species were determined. Yellowfin tuna, dolphin and bigeye tuna were the three top revenue procedures. Trip characteristics including the number of sets, trip length, hooks, etc., were also reported along with fishing costs. The analysis also includes information by quarter of the year and fishing region.

The analysis provides a detailed summary of recently available data on the Atlantic PLL fishery. The results confirm the existence of heterogeneity within the Atlantic PLL fleet. Although the finding of heterogeneity within this fleet may not be a surprising result, and the selection of variables and subgroups are debatable, this analysis provides quantitative evidence of just how important these decisions (as well as the choice to use gross revenues or net returns) are to the estimation of economic effects of proposed regulatory changes that are likely to affect the Atlantic PLL fleet. This research was not intended to be all-inclusive of information needed, but rather to show how the available data can be used to improve and complement previous analyses. To assure that management decisions regarding the fate of the fleet and the future of the fishery are informed and efficient, continued effort in data collection and economic analysis is paramount.

2.7 A vessel cost and earnings brochure will be developed for pelagic longline vessels utilizing logbook data as provided by NMFS. At least 20 vessel operators will have a better understanding of the financial characteristics of the pelagic longline fleet by vessel size and trip category. (Adams)

The NOAA/NMFS funded study has been completed. An article which reports the vessel level cost and earnings data has been published in the Marine Fisheries Review journal. The data from this paper will provide the basis for the extension brochure which has been planned for late 2002.

2.8 A website will be developed for the Socioeconomics Section of the American Fisheries Society. The initial website which will describe how the Section provides information and dialogue pertinent to effective fisheries management in the US. 500 individuals will become better informed as to the role of economics in developing fishery management strategies for domestic fisheries. (Adams)

A skeletal website was developed for the Socioeconomic Section of the AFS. Further development of this website was turned over to the incoming Section officers (Adams).

2.9 A web page will be developed for FL317 Sustainable Marine Fisheries in Florida. All extension faculty will become more aware of the purpose and benefits associated with SMP FL317. (Adams)

A web page for FL317 has not been developed at present. The design team members debated the merits of devoting effort to a web page that may require updating. The existing information on the IFAS SMP web site pertinent to FL317 was thought to be adequate.

2.10 A Florida Sea Grant Fact Sheet that describes the age/length relationship for several popular recreationally targeted species will be developed. Recreational fishers in Florida will become more aware of the age structure of fish populations in Florida. (Adams, Stevely, Sweat, Novak, Gregory)

The age/length fact sheet has not been developed. This fact sheet will be developed during 2002.

2.11 Educational columns will be written for the Apalachicola & Carrabelle Times newspapers. Included will be a series of at least two educational columns on the topics of fisheries management. (Mahan)

Thirty-eight educational columns have been written for the Apalachicola and Carrabelle Times Newspapers. Six of these were totally or partially related to fisheries issues. These include two columns on sharks, two on global weather patterns, and their impacts on natural resources, one on new fishing recreational regulations, and one on red tide.

2.12 The Southwest Florida fishing industry will be educated regarding the new stone crab fishery management program. (Stevely)

A Florida Fish and Wildlife Commission workshop on stone crab trap certification program was hosted. Summary comments were prepared for west central Florida stone crab fishery practices.

2.13 The Sea Grant economics specialist will serve on the Scientific and Statistical Committees of the Gulf of Mexico and South Atlantic Regional Fishery Management Councils. Ten federal and Council fisheries managers will better understand the economic consequences of proposed fishery regulations. (Adams)

Marine economics specialist served on the Scientific and Statistical Committees for both the Gulf of Mexico and the South Atlantic Regional Fishery Management Councils. Committee meetings were attended and guidance provided on the role of economics in fishery management within the region. See 2.14 for a list of meetings.

2.14 The Monroe County Sea Grant extension agent will serve on the Scientific and Statistical Committees of Gulf of Mexico and South Atlantic Fishery Management Councils. Four meetings are anticipated that will involve review and recommendations related to fishery management policy. Membership will also continue on the Coastal Pelagics Stock Assessment Panel. The Panel's Report will be presented to the Scientific and Statistical Committees and Advisory Panels of the Gulf of Mexico and South Atlantic Fishery Management Councils. (Gregory)

Gregory was an invited participant to one South Atlantic Fishery Council SSC meetings, four Gulf of Mexico Council SSC meetings, and two Mackerel and Cobia Stock Assessment Panel meetings.

- Gulf of Mexico Fishery Management Council Scientific and Statistical Committee.
  - Reviewed proposed management options for reducing shrimp bycatch in the pink shrimp fishery off West Florida. Recommended that existing BRDs did not work in the Tortugas fishery due to predominance of crustaceans in bycatch. (New Orleans)
  - Reviewed proposed regulations on the grouper and shrimp fisheries and provided advice relatively to the applicability of available science. (New Orleans)
  - Reviewed proposed charter boat permit moratorium. (Tampa)
- Attended Mackerel Stock Assessment Panel meeting. (Miami)
  - Established annual acceptable biological catch levels for king and Spanish mackerel in the Gulf of Mexico and South Atlantic populations. It was determined that the Gulf king mackerel population was no longer overfished (for the first time since 1983).
  - Reviewed draft stock assessment on cobia and recommended overfishing criteria. The panel report is currently being drafted.
  - Served as an invited participant to represent the Gulf Fishery Council Mackerel SSC in a national workshop on "Estimating Maximum Sustainable Yield in Data-Poor Situations" sponsored by the National Marine Fisheries Service in Seattle.

2.15 Two industry workshops regarding proposed fishery regulations will be held in Monroe County. One hundred fishermen will become involved in the process through testimony. (Gregory)

No workshops were held but the Monroe County Sea Grant Agent participated or provided testimony in four fisheries related public hearings and workshops.

- Testified to the Florida Fish and Wildlife Commission (FFWC) at a Key West public hearing with a suggestion that the mini-lobster season could be improved to reduce disruption to the local communities without harming the overall tourism benefit of the lobster sport diving sector. A suggested alternative was a year-round sports season that would require lobster tags to identify legally harvested lobsters and an increase in the minimum size limit to 3.25 or 3.5 inches during the summer reproductive months. The size limit increase would provide greater protection for reproductively active lobsters (females mature at 3" but males don't mature until 3.5" carapace length—current size limit is 3" carapace length).
- Participated in the Fish and Wildlife Commission's public workshops in Key West and Islamorada to discuss various sponge fishing issues. There was general agreement that the sponge fishery is biologically healthy and recent concerns raised by Upper Keys residents seemed to be due to more of a cultural discord between shore-side residents and liveaboard Cuban-American spongers.

- Participated in a one-day joint law enforcement workshop in Marathon between the Florida Fish and Wildlife Commission staff, Marine Patrol, and Monroe County lobstermen.
- Attended the FFWC meeting in Miami to observe public testimony and FFWC action pertaining to the lobster trap reduction program. The industry provided pertinent and credible testimony on the impacts of past 10 percent reductions and the FFWC agreed to modify the program to lessen negative social and economic impacts on Keys fishermen.
- Participated in a Gulf Council public hearing on a proposed moratorium for federal charter boat permits in the Gulf of Mexico.
- Testified at the Gulf Fishery Council's Reef Fish Amendment 18 Public Hearing and Essential Fish Habitat Scoping Meeting in Key West and an invited participant at the Scientific and Statistical Committee (SSC) meeting in New Orleans to discuss regulatory options for the red grouper fishery.
- Testified at the Gulf Council Shrimp Amendment 10 public hearing in Key West regarding proposed requirements for bycatch devices in the Tortugas shrimp fishery.
- Invited by Maryland Sea Grant and Chesapeake Bay Consortium to organize a Florida presentation on the lobster and stone crab trap certificate programs. Roy Williams, Florida Fish and Wildlife Commission, Greg DiDomenico, Monroe County Commercial Fishermen, Inc., and Gregory presented papers and participated in panel discussions in the Baltimore Workshop on Alternative Chesapeake Bay Fisheries Management Strategies for the Maryland and Virginia state management agencies.

2.16 Disaster relief assistance will be provided to the commercial fishing industry in Monroe County. Assistance will be provided to at least 25 fishermen seeking disaster aid for damages caused by Hurricane Georges. (Gregory)

The availability of disaster relief assistance has been delayed until November 2001 and this objective will be accomplished during the beginning of 2002.

2.17 An effective working relationship with Destin Charter boat Association will be established and maintained. At least two (per year) of their meetings will be attended. Fisheries biology and management information will be provided to elicit compliance with marine resource regulations. Programs designed to increase angling ethics and reduce by-catch mortality will be presented. (Jackson, S.)

A working relationship with the president of the Destin Charter Boat Association was established in the past year. Captain Scott Robson has been a valued resource and friend to the Sea Grant Extension program, serving on the Extension Agent's advisory committee and the Okaloosa County Artificial Reef Advisory Committee. One outreach program to explain new county reef regulations and thereby increase compliance and individual stewardship was conducted in May with light attendance from the Charter Boat community but was attended by many divers. Another is pending this fall as the tourist season ends which should allow for better participation by the Charter boat captains.

2.18 Lobster monitoring research of the Florida Keys National Marine Sanctuary Ecological Reserve in the Lower Florida Keys will be continued with one fisherman being contracted to provide data collection support to conduct both an open and closed season sample of lobster size and abundance. (Gregory)

This activity was successfully completed and an interim project report has been provided to the Design Team Leader. Seven commercial fishermen were involved in the project

this year and saw first-hand the effect of a relatively small MPA on local lobster abundance and size.

2.19 Funding will be obtained and data will be collected, analyzed and distributed on the recovery of sponge populations in the Middle and Upper Keys and scientific information necessary to evaluate proper sponge fishery management measures will be presented to the Florida Fish and Wildlife Conservation Commission. (Stevely, Sweat)

FFWC contract support was secured for 2001-2002. A poster on the project was displayed at the 2001 Florida Bay Science Conference. The field work is completed and a final report is available. Sponge fishery management proposals were provided to FFWC in late 2001. The work had a major impact on the manner in which the sponge resource is being considered for management.

2.20 A workshop for artificial reef coordinators in Citrus, Pasco, Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, and Collier counties will be held. Ten county artificial reef coordinators will increase their ability to properly plan, permit, design, and manage artificial reef programs. (Stevely, Sweat, Novak)

The workshop included 35 participants (including 18 reef coordinators) representing 10 county reef programs, fishing clubs, NMFS, FFWC, Gulf of Mexico Regional Fishery Management Council, Sea Grant, University of Florida, The Conservancy and St. Pete Community College. Training focused on evaluation techniques, new reef technology, design, planning, permitting, management, monitoring, and new research findings.

2.21 Two meetings of the Extension Artificial Reef Advisory Committee will be held in Monroe County. Ten individuals will learn the process of developing artificial reef construction grant proposals and permit applications. These individuals will assist in generating support for and knowledge about artificial reef programs. (Stevely)

These meetings were not held.

2.22 Technical support will be provided to Manatee County in construction of one inshore reef and three inshore reefs. Technical support will be provided in monitoring of three artificial reefs. (Stevely)

The assistance of Dr. Bill Lindberg (UF Fisheries and Aquatic Science Dept), the Manatee County Extension Artificial Reef Advisory Committee and the Sarasota Bay Estuary Program Technical Advisory Committee was obtained to develop an experimental design to test size and spacing of deployed material.

2.23 Two new sites will be permitted and two artificial reefs deployed in Charlotte County. Data will be collected on three artificial reefs sites. At least 1,500 fishers will receive fish venting tools and training. (Novak)

Two new artificial reef site applications were prepared and submitted to the State. The sites are located in 30 and 50 feet of water due west of Gasparilla Pass and will be used for materials from the demolition of two Highway 75 bridges. Permits are expected about June of 2002 and construction will begin in the fall. An artificial reef deployment grant application was prepared and submitted to the State but was denied since they will not fund reef construction through the University.

More that 100 reef modules were constructed by the marine agent and volunteers. These modules and additional materials (~300 ton) were deployed on Cape Haze Reef. A reef monitoring grant was obtained from the State and data were collected for Mary's Reef, the Ferry Reef and the Power Pole Reef. The Charlotte Marine Research Team and the marine agent performed seven monitoring dives on each reef over the past twelve months. Information was then submitted to the State and REEF.

More than 2,000 venting tools and brochures were distributed to fishermen as a result of venting workshops, two articles in national publications (Saltwater Sportsman and Sport Fishing Magazines), numerous newspaper articles, a radio show and a television "how to" session.

2.24 The Taylor County Reef Research Dive Team (TCRRDT) will be assisted in applying for grants to monitor existing Taylor County artificial reefs as well as construct a new artificial reef, including permitting, site surveys, and materials suitability issues. Two classes will be taught for TCRRDT (fish identification and reef research diving techniques) team members. (Aubrey)

The Taylor County Sea Grant Agent assisted the county's reef research dive team in applying for two grants (Florida Fish and Wildlife Conservation Commission Artificial Reef Construction grant and Coastal Impact Assistance Program grant) totaling $97,000 for the construction of artificial reefs. The FWC Artificial reef construction grant was awarded (Amount = $25,000 and the other grant is pending (Amount = $73,000). We have not had the opportunity to teach The fish identification and reef research diving techniques classes have not yet been taught.

2.25 Assistance will be provided the Taylor County Reef Committee in developing a comprehensive artificial reef management plan for Taylor County. (Aubrey)

A new artificial reef management plan was developed using input received from local stakeholders.

2.26 The economic impact of artificial reefs in Taylor County will be estimated using a boater's use survey. (Aubrey)

The boater's use survey was delayed until 2002.

2.27 Lee and Charlotte Counties will be aided in the planning, development, securing of grants, materials and deployment of artificial reefs. (Wasno, Novak)

The Lee County Agent assisted Rich Novak in setting up forms and concrete for an artificial reef set for deployment in early 2002. This reef will provide an additional destination point for boaters in both Lee and Charlotte Co. All other activity is reported under 2.23.

2.28 An effective artificial reef program in Okaloosa and Walton Counties will be created and maintained. Tasks will include: Service on county artificial reef advisory committees; writing and maintaining county artificial reef plans; assisting in grant writing; assisting in organization and maintenance of artificial reef monitoring programs; providing assistance and information to county personnel and potential artificial reef builders. (Jackson, S.)

The Agent served as a facilitator for the Okaloosa County Reef Advisory Committee to organize and collaborate in creating meeting agendas and goals. Additionally, with the assistance of Florida Sea Grant's Bill Seaman and Florida Atlantic University's Bill Hartt, the agent was able to assist in providing a scientific basis for the expected life of potential reef materials. The county included this information in the request to renew the large area permit sites.

2.29 An Annual Artificial Reef Workshop for recreational, commercial, and charter fisherman and divers, bait and tackle providers, and artificial reef producers will be organized and held. Local, state, and federal regulatory agency personnel will be invited to provide information and take part in panel discussions. An attendance goal of 75 individuals representing these groups from Okaloosa and Walton Counties has been set. (Jackson, S.)

An Okaloosa County Artificial Reef Advisory Committee meeting was organized with regulator representatives from the Florida Department of Environmental Protection (Mick Garrett) and the Army Corp of Engineers (Teresa Zar and Don Hambrick) in April 2001. The meeting was open to the public near the hub of the charter boat industry. The regulatory agencies discussed both public and individual reef efforts. A follow-up Sea Grant Extension program directed at individual reef participants was held in May 2001. The audience received information about recent changes in Okaloosa County's Large Area Permit materials lists. Presenters included the Extension Agent (Scott Jackson), Okaloosa County regulatory personnel (Cindy Halsey and Eric Evers), and the Army Corps of Engineers (Teresa Zar and Don Hambrick). Also present was the Bureau Chief of Marine Resources in Escambia County, Robert Turpin. The audience and presenters participated in a lively debate, mainly focusing on the county's fees and regulatory policy. Okaloosa County Commissioner, Jackie Burkett, requested that county staff review current policies and try to accommodate customers as much as possible with compromising regulatory needs. Review of this request is currently under consideration by Okaloosa County regulatory staff and county administrators. Sea Grant Extension has facilitated this issue through meetings with the county regulatory staff, county commissioner, and charter boat representatives. (Jackson, S.)

2.30 Assistance will be provided in the formation of a volunteer artificial reef monitoring program in Okaloosa and Walton Counties. Data collection training, and data management and reporting will be provided. (Jackson, S.)

Cooperation was achieved with the Florida Fish and Wildlife Conservation Commission's Bill Horn to initiate the establishment of a volunteer diving group to monitor previously deployed reefs. The team effort included formal presentation to the Eglin Dive Club in March and informal meeting with diving leaders in April. It was decided to focus upon the "Great American Fish Count" in July as a rallying project. Scuba Tech in Destin was the site of the initial volunteer training in May. A local representative for the International Hammerheads Diving Organization, Richard Burdine, has taken an interest to assist in organizing and training of volunteers to meet Okaloosa County monitoring needs. More extension programs with the collaborative support of Bill Horn. Mark Christy (ScubaTech), and Richard Burdine (Bluewater Bay Hammerheads) are planned in 2001 - 2002. The extension agent continues to assist Okaloosa County in organizing and designing data collection methods and management of these volunteer efforts.

2.31 The fish venting brochure will be revised for distribution. Fish venting tools and informational materials will be distributed at three offshore fishing tournaments. At least 60 tournament fishermen will become knowledgeable of the use of fish venting tools. Three

bait and tackle stores will collaborate in the distribution of fish venting tools and informational materials. (Stevely) Five fish venting tournaments will be officiated in Charlotte County. At least 1,500 fishers will receive fish venting tools and training. (Novak)

The Charlotte County Marine Agent officiated or worked a recessitation tank at eight fishing tournaments.

The fish venting brochure was revised and is in the process of being revised a second time. Venting tools and brochures were distributed to boat captains at two offshore (grouper) fishing tournaments and at two fishing club presentations along with instruction on use. The video was also used at fishing club presentations.

2.32 A fish venting training workshop will be held for new Florida Sea Grant marine extension agents. Eight new marine agents will become knowledgeable of the use of fish venting tools. (Stevely, Novak, Sweat, Adams)

A workshop was also held at Mote Marine Lab in Sarasota to "train the trainers" on the proper use of the venting tools. A total of 28 participants from Florida Sea Grant (one from another state), FFWC outreach, NMFS, county natural resource management departments, and fishing guides participated. Evaluation was strong. Over 90% of the participants indicated they learned about venting tools and would use the information in their educational programs. Also, venting tools were distributed to fishermen in at least 12 states and five foreign countries as a result of articles that appeared in Saltwater Sportsman and Sport Fishing Magazine. The Charlotte County marine agent also demonstrated the use of venting tools on the "Wishin I was Fishin" television show, at five fishing club meetings, two guides association meetings, and two fishing tournament captains meetings. More than 3000 fishermen received venting tools and/or training on their use.

2.33 A workshop on fish venting, circle hooks, and catch/release fishing will be organized with the Greater Miami Billfish Tournament. Venting tools will be constructed and distributed along with brochures to recreational fishermen and charter boats in the Miami-Dade County area. (Crane)

Three fishing tournaments were provided with information on catch and release techniques, fish venting practices, circle hooks. From that, 40 venting tools were distributed to South Florida anglers who sought a need for this tool. Venting tools and educational materials have been distributed through several venues: offshore fishing tournaments, newsletter and newspaper articles, and educational fishing facility attractions. The Miami-Dade Department of Natural Resources, International Game Fishing Hall of Fame, FFWC Law Enforcement officers, and marine advisory committee members provided assistance in this effort.

2.34 A new fact sheet will be developed: "How Old is the Fish I Caught?" (Stevely, Sweat, Adams)

The proposed fact sheet has not been developed (see 2.10).

2.35 A new fact sheet will be developed: "Does Catch and Release Work?" (Stevely, Novak, Adams)

The fact sheet has not been developed. However, the fact sheet SG047 “Release Techniques for Marine Fishes” has been reprinted. This fact sheet is now available on EDIS, a publication distribution system of the University of Florida Extension.

2.36 Two educational seminars will be conducted on catch and release fishing techniques, venting fish, circle hooks, and pelican conservation. Videos and/or brochures will be distributed to recreational and commercial fishermen and boaters. About 100 recreational and commercial fishermen and boaters will become more aware of the use of catch and release techniques, venting of fish, use of circle hooks and pelican conservation methods. (Crane)

Several marine facilities, recreational parks, and fishing tournaments have received educational materials and information on fisheries conservation through attending educational seminars and/or filed visits. Fish ID posters, catch and release brochures, fish venting brochures and video, and Tackle Box guides were disseminated to about 100 recreational fishermen and educators within Crandon Park, Mast Academy, International Game Fishing Hall of Fame, Biscayne Nature Center, Bill Braggs State Park, Miami Sea Aquarium, Youth Fishing Tournament and the Yamaha Miami Billfish Tournament.

2.37 Technical support will be provided to the Sebastian Inlet Fishing Tournament. (Combs, Creswell)

The marine agents served as weighmaster at the annual Blue Water Open Fishing Tournament, held at Sebastian River Marina in Micco. A total of 77 vessels participated in the tournament.

2.38 Recreational fishermen will be educated on catch and release techniques, use of circle hooks, and marine conservation. Approximately 500 recreational fishermen will be educated in the use of circle hooks and catch/release techniques. (Novak)

Programs were presented to five fishing clubs/conservation organizations, two guides associations and two fishing tournament captains meetings regarding the benefits of catch and release fishing, the use of circle hooks, and marine conservation. More than 700 fishermen were in attendance at the sessions.

An additional 2000 fishermen received information on catch and release at presentations to fishing clubs, articles in local newspapers and through distribution of a brochure (Release Techniques for Marine Fishes) written by the marine agent in cooperation with the Florida Fish and Wildlife Conservation Commission. The marine agent also made a presentation on catch and release and fish venting at the Gulf and Caribbean Fisheries Institute Conference in Turks and Caicos.

2.39 Training on marine education will be provided to Charlotte County youth. Approximately 600 youth will be introduced to concepts of marine conservation. (Novak)

More than 500 Charlotte/Lee County youth received information on marine conservation at two youth fishing days and training sessions for the regional Envirothon.

2.40 The annual Pier Fishing Tournament will be conducted in St. Petersburg. 250 youth and their adult sponsors will receive with an introduction to fisheries conservation and fishing ethics. (Sweat)

The 13th Annual Kids Fishing Tournament was held at the St. Pete Pier. Youth with adult sponsors received an introduction to fisheries conservation and fishing ethics. Over 265 youth participated in the highly successful event.

2.41 Approximately 300 boat owners will become familiar with the Boaters and Anglers' Pledge Program and will join the effort to clean up Florida's coastal waters. (Sweat)

Approximately 500 boat owners were provided materials and became familiar with the Boater's and Angler's Pledge program. These materials were made available at the St. Pete Boat Show and various local seafood festivals.

2.42 Information on fishing ethics and fisheries conservation will be distributed at five youth fishing tournaments. Over 250 kids and their adult sponsors will gain knowledge on fishing ethics and conservation. (Crane)

Information on fishing ethics and fisheries conservation was distributed to youth at fishing tournaments. Over 100 youth and their adult sponsors gained knowledge on the concept of fisheries conservation and became more familiar with proper catch and release techniques.

2.43 The need for the development of an urban fishery program in Okaloosa County will be determined. Information gathered will be for a future program to increase the participation by non-traditional resource users, specifically minorities or women. (Jackson, S.)

The search for a target group continues. In collaboration with 4-H Camp Timpoochee, a grant for fishing gear required for this program was submitted in September 2001. The camp also has a large pontoon boat that can use in this program. Additional support for this programs was promised from Elaine Courtney (Okaloosa County FCS Extension Agent) to provide instruction and programming for seafood and fish preparation in 2002.

2.44 The organizing committee of the 2001 Cortez Commercial Fishing Festival will be assisted. (Stevely)

The 2001 Cortez Commercial Fishing Festival raised $40,000 for the purchase of environmentally sensitive land adjacent to the Village of Cortez. Approximately 15,000 people were educated concerning environmental and commercial fishery management issues in Tampa Bay area.

2.45 Educational programs will be provided at the grand re-opening of the Centennial Park Fishing Pier in Lee County. Youth will learn about bait casting, fishing and rigging techniques, as well as fishing ethics. An educational kiosk will be developed to provide basic fishing concepts, rules, regulations and fish ethics. (Wasno)

The Centennial Park Fishing Pier was re-opened during Boat Fest 2001. The Lee County Professional Guides Association conducted 10 fishing workshops for approximately 635 local citizens. All attendees had the opportunity to try out their new skills on the pier. The marine agent assisted with the demonstrations in addition to helping permanently install an educational kiosk.

2.46 The Lee County Department of Parks and Recreation will be assisted to develop a duplicate pier enhancement project (similar to the Centennial Park Fishing Pier) in North Fort Myers. Activities will focus on the planning and permitting aspects of the project. (Wasno)

A grant application to duplicate the Centennial Park pier kiosk was prepared but not funded. Funding from alternative sources will be pursued.

As part of the pier enhancement project, permits were secured to place artificial reef material under the terminal end of the pier. In conjunction with a City of Fort Myers seawall rip-rap project, 200 tons of material were placed under the two piers. This material will provide habitat for sport fish and enhance the overall fishing experience.

Goal 3: Develop the Food and Hobby Segments of Florida's Marine Aquaculture Industry

3.3 Almost all of the 3000 species of marine fishes and invertebrates marketed in the aquarium industry, valued at over $7.2 billion annually worldwide, are collected from coral reef systems. Extensive and improper collection techniques can damage reef systems. Over 18 species of marine shrimps are harvested. The effects of different broodstock diets will be tested on two species of ornamental shrimps. The long-term goal is to produce aquarium shrimp in culture and reduce wild harvest. (Lin/Creswell: R/LR-A-31 [TAQ-99-16])

The effects of four types of frozen adult *Artemia* biomass (regular and enriched San Francisco Bay and Canadian brands), and frozen hard clam (*Mercenaria mercenaria*) as broodstock diet on the reproductive performance of *Lysmata wurdemanni* were compared. There is no significant difference among the five diet treatments in fecundity, relative fecundity, egg dry weight, egg percent ash, and total length of newly hatched larvae. Egg volume was significantly higher in the San Francisco Bay regular *Artemia* treatment than those of other treatments. Survivorship from zoea 1 to zoea 2 was higher in the San Francisco regular *Artemia*, Canadian enriched *Artemia*, and hard clam treatments. Overall, there is no clear difference among the five test diets on the shrimp's reproductive performance.

For *Stenopus scutellatus*, four broodstock diets were tested: San Francisco regular and enriched adult *Artemia* biomass, frozen hard clam, and the mixture of clam and regular *Artemia*, on the reproductive performance. Relative fecundity in the mixed diet and enriched *Artemia* treatment were significantly higher than that in the regular *Artemia* treatment, which in turn is higher than that in the clam treatment. Although the clam treatment had the lowest relative fecundity, it had significantly larger (but not heavier) eggs than those of the other three treatments. Overall, the mixed diet tended to result in better reproductive performance.

A market analysis shows that there has been an increase in demand for *Lysmata wurdemanni* in the marine aquarium industry. This is because *L. wurdemanni* is an attractive ornamental species and that the shrimp can effectively control the glass anemone *Aptasia pallida*, a plague in marine aquariums.

In addition to the proposed diet study, an experiment was conducted to examine the reproductive biology of *Lysmata wurdemanni*. At least some *Lysmata* species are unique (and puzzling) among the Decapoda and Malacostraca crustaceans in displaying a protandric simultaneous hermaphrodite reproductive system. Understanding the sexual system has significant implications in both practical and basic research. The biggest challenge for commercialization of marine ornamental aquaculture is the long larval duration.

Two journal articles resulted from the work and a third is in review. Presentations on the project and results were made at the 2000 and 2001 meetings of the World Aquaculture Society.

3.4 The First International Marine Ornamentals Conference 1999 was held in Hawaii in late 1999. Over 300 attendees discussed the collection, conservation and culture of marine ornamental fish. Attendees voted to hold the second conference, Marine Ornamentals 2001 in Florida. Florida Sea Grant will assume the lead role in organizing the conference. (Cato)

The conference was successfully held during the scheduled time. A total of 19 sponsors joined in making the program a success. They were:

Major Sponsors	Co-Sponsors	Contributors
Florida Sea Grant	Hawaii Sea Grant	FAO, Rome
Division of Aquaculture, Florida Dept of Agriculture & Consumer Affairs	Living Seas at WDW	Florida International Univ.
	Miss/Ala Sea Grant	Hawaii Aquaculture
National Sea Grant	Oregon Sea Grant	Louisiana Sea Grant
	Tropical Fish Hobbyist Magazine	Maryland Sea Grant
	UF/IFAS	North Carolina Sea Grant
	Virginia Sea Grant	Ornamental Fish International
		Texas Sea Grant
		New York Sea Grant

A total of 336 participants attended conference activities. Participants came from 23 different countries:

Argentina	Ireland	Portugal
Australia	Israel	Puerto Rico
Canada	Italy	Solomon Island
Denmark	Malaysia	Taiwan ROC
Fiji	Monaco	Thailand
France	New Zealand	United Kingdom
Germany	Nigeria	United States
Indonesia	Philippines	

A trade show was held with 13 companies or organizations participating. They were:

Aquarium Systems/Marineland	Marine Specialties International
Aquatic Eco-Systems, Inc.	New Life International, Inc.
Dolphin Fiberglass Products, Inc.	Ocean Dreams, Inc.
Frigid Units, Inc.	Pacific Aqua Farms
Keeton Industries	Segrest Farms
Marine Aquarium Council	Signature Coral Co.
Marine Biotech, Inc.	

A survey of conference attendees indicated that the conference achieved its goals. The questions and evaluations are below:

Question	Response (%) Poor	Fair	Good	Very Good	Excellent
1. Pre-conference communication and registration assistance	2	3	12	28	55
2. On-site staffing and registration			5	24	71

	assistance					
3.	Availability of information on the conference web site	2	2	16	28	53
4.	Overall courtesy and helpfulness of conference staff				22	78
5.	The conference met my expectations for learning		7	28	29	36
6.	Insights gained were applicable to my situation		3	24	45	28
7.	Quality of session content		3	29	43	24
8.	Opportunities for informal interactions with speakers			19	37	44
9.	Opportunities for informal interactions with attendees			9	43	48
10.	Length of sessions		5	19	48	28
11.	Extent of topic coverage		10	21	45	24
12.	Abstract submission process			32	41	27
13.	Quality of abstract book		2	24	38	36
14.	Effectiveness of electronic voting process for establishing research priorities			22	34	44
15.	Restaurant and lounge facilities	2	6	25	44	23
16.	Hotel recreational facilities		2	24	44	29
17.	Front desk service		8	19	37	35
18.	Affordability of guest room rate	19	38	26	13	4
19.	Quality of guest room accommodations		11	31	33	24
20.	Group meal functions		5	16	28	51
21.	Meeting facilities		5	12	37	46
22.	Audio visual equipment operation		7	25	37	30
23.	Overall hotel rating		7	30	47	17
24.	Overall benefit provided by exhibits at the trade show	4	7	35	39	16
25.	Usefulness of the New and Exciting Species Display	4	7	37	24	28
26.	Behind-the-Scenes Tour of The Living Seas	4	4	9	61	22
27.	Island Reception at Sea World of Florida			14	33	52
28.	What is your OVERALL rating of this			11	54	36
29.	How did you initially hear about this conference?					
	Conference Website	10%				
	Email Announcement	13%				
	Conference Brochure in the Mail	35%				
	Organizing Committee Member	12%				
	Newsletter or Publication Advertise	6%				
	Other	25%				
30.	Were you able to access the conference website?					
	Yes	98%				
	No	2%				
31.	This conference should be:					
	Re-designed	9%				
	Continued as is	46%				
	Expanded	45%				
32.	Do you plan to attend Marine Ornamentals ’03?					
	Yes	67%				

No	0%
Undecided	33%

A survey to determine research and education priorities was also conducted at the close of the conference. Nine questions solicited information on the background of attendees. The next set of questions ranked priorities from Marine Ornamentals '99. The final set of questions added and ranked new priorities from this conference. A complete set of rankings was sent to all attendees, and is available at the conference website, http://conference.ifas.ufl.deu/mo/, as is all information and details about the conference. This website will be maintained.

The conference organizer and program committee chair are editing a Blackwell Science Press book, with chapters written by about 25 authors selected from papers presented at the conference. This book should be published in late 2002 or early 2003.

The marine ornamentals industry, regulatory agencies and research scientists now have the most up-to-date information available regarding the collection, culture and conservation of marine ornamentals. Tentative plans are underway by a group in Hawaii to organize Marine Ornamentals '03. A network of participants from 23 countries is now established to focus attention on this industry.

3.7 The American bay scallop is a commercially important species along the U.S. east coast. However, commercial fishing for wild stocks has declined in many states and is banned in Florida. Ten commercial fishermen will be provided juvenile bay scallops and taught the technical growout, economic feasibility and marketing potential for bay scallops as a cultured species. (Blake/Sweat: R/LR-A-33 [TAQ-99-15])

Five fishermen expressed an interest in furthering their knowledge of bay scallop aquaculture. Each of these fishermen were provided 30 cages for the first period of growout. Because of total loss of the cages as a result of Hurricane Gordon and the lack of interest by the state of Florida to encourage scallop aquaculture, the fishermen chose not to continue with the project.

A total of 75,000 scallops were made available for growout. Of these, 45,000 were provided to fishermen. Another 5,000 were used to evaluate various growout densities on bare bottom, grass, and suspended in the water column. Growth during the spring and early summer exceeded 1.5mm per week but slowed dramatically in July and August. The cause of the decline in growth is not clear but salinity at the growout areas exceeded 37 ppt in the late summer of 2000. Similar growths were observed in 2001 even though the salinity was lower. Overall growth rates of 3.3-3.5mm per month during growout were observed.

Fishermen were met at the lease area on seven occasions from March - August 2000. They were advised about stocking densities, expected growth rates, mortality, and the need to limit cage fouling. Estimates now suggest that fishermen can grow scallops for $.12-.19 per scallop. This does not include the $20-23 per cage investment which must be amortized over 3-5 years of cage use. Hurricane Gordon prevented the continuation of marketing studies in 2000. Vacuum packing and freezing showed great promise in increasing the shelf life of the product and also increasing its potential area of marketability. Before scallop aquaculture can be successful in Florida, more effort needs to be exerted by state agencies to encourage its development to promote the markets. In the meantime restorational efforts, indirectly resulting from this project, have been promising and a new proposal has been submitted to Saltonstall-Kennedy.

Three presentations have resulted from the project. These have been made to the general public during the Fish and Wildlife Commission scallop hearing, a Homosassa homeowners association and the Academy of Environmental Sciences, a magnet school within the Citrus County school system.

3.9 Overharvesting, adverse environmental conditions, oyster diseases and human health related diseases from oyster consumption have lead to overall industry declines. The goal of this project is to determine Dermo (*Perkiusus marinus*) tolerance or resistance of the Caribbean oyster and compare the tolerance to that of the American oyster. If successful, these traits can be hybridized from the Caribbean oyster to the American oyster for use in culture. (Scarpa/Bushek: R/LR-A-32 [OD-99-47])

Neither experiment, the laboratory challenge, nor the flow through tank exposure, appear to indicate that the Caribbean oyster *Crassostrea rhizophorae* is much more resistant than the American oyster *C. virginica* to infection by *P. marinus*. Efforts to use *Crassostrea rhizophorae* as a genetic resource for directly improving resistance of *C. virginica* to *P. marinus* are unlikely to yield productive results. There are, however, at least two ways in which the species may still benefit efforts to improve resistance in American oysters. The first is through comparative studies of pathogenesis between the two species along with comparisons of resistant species. The second is through the potential use of a *C. virginica* X *C. rhizophorae* hybrid as a bridging species. By assembling a novel set of genes in a hybrid, barriers to hybridization with other species may be broken.

The demonstration that Dermo-free oysters can be produced in Florida, where *Perkinsus* is widespread, is very significant. First, it demonstrates that it is not necessary to rear oysters in waters where the parasite is not known to occur, but could conceivably spread, to obtain Dermo-free oysters. More importantly, the ability to produce and rear SPF oysters in Florida with only slight modifications to existing hatchery technology has tremendous implications for the shellfish industry. Presently, several states have regulations against importing clams or oysters from hatcheries in Florida unless they are certified to be free of *Perkinsus*. For out-of-state customers, Florida hatcheries should be able to virtually guarantee a supply of Dermo-free seed. Managers may want to consider the implications of this for hatcheries that market seed within the state and the protection of natural stocks and populations being grown in aquaculture operations.

3.10 A principal barrier for the development of a solid marine fish aquaculture industry in the U.S. is the consistent, large-scale production of fingerlings. Previous research and development aquaculture techniques for mutton snapper and greater amberjacks will be refined, the technology transferred to industry and the feasibility of producing commercial quantities of fingerlings tested at Grassy Key, Florida. (Benetti/Feeley/Mader: R/LR-A-35 [TAQ-99-108])

Progress and results in hatchery and growout technology of mutton snapper (*Lutjanus analis*) greater amberjack (*Seriola dumerili*) achieved during the period of this project were described. Advances in maturation, spawning, larval husbandry, nursery, fingerling production and growout of these species were made. In addition, wild-caught broodstock mutton snapper were induced to spawn using hormone injections. Greater amberjack ranging in size from 10-20 kg were caught in the wild, transported to the hatchery, exposed to prophylactic treatment and held in quarantine. Subsequently, fish were acclimated and stocked in state-of-the-art maturation tanks for conditioned voluntary spawning. Results of maturation, spawning, larval rearing and fingerling production of

these species are now available. During the Fall of 2000 and Spring and Summer of 2001, numerous spawning events occurred in both naturally conditioned and hormone-induced spawnings, resulting in the production of several million eggs. Fish were conditioned to spawn through the manipulation of environmental parameters, hormone injections and implant techniques. Voluntary spawning of mutton snapper in maturation tanks using environmental cues alone was an unprecedented achievement for this species. Of a total of over 50,000 post-metamorphic larvae (post-larvae) mutton-snapper produced during the period of this project, approximately 20,000 reached the juvenile stage (10g) and were mostly used for growout and feeding trials. Furthermore, the aquaculture performance of mutton snapper raised in floating net cages has been assessed by measuring their growth, survival and feed conversion rates. Fish grew from an average weight of 12.25 g to over 300 g in nine months, indicating that the commercial size of 0. 5 kg (over 1 lb) can be achieved within a 1-year period. At stocking densities of 25 fish/m^3 (3.2 kg or 6.0 lb/m^3) and 5 fish/m^3 (0.72 kg or 1.4 lb/m^3), estimated survival rate was over 70%. Feed conversion ratio (FCR) was 1.4, ranging from 0.79-3.4. Besides, a preliminary assessment of the environmental impact of the operation in the ecosystem was conducted. Water quality parameters measured upstream and downstream from the site of the cages did not show any evidence of a negative environmental impact caused by the cage operation in the lake. The University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS), the Aquaculture Center of the Florida Keys, Inc. (ACFK) and Snapperfarm, Inc. joined efforts to develop an offshore aquaculture project off the Island of Culebra, in Puerto Rico. Results indicate that mutton snapper has very good potential for commercial aquaculture development in net cages in the U.S. and the Caribbean. Preliminary work was also conducted with greater amberjack with respect to their potential use in offshore cage culture operations.

This project represents the technology component of one of the first major attempts from the private sector to develop a commercial hatchery for producing high-value marine finfish in the U.S.. The private sector is investing a total of over one million dollars in state-of-the-art facilities for developing this project. Through this grant, Sea Grant supported a strong commitment from the private sector to invest in academic efforts, setting the example for other corporate investments in universities and research institutions. Unavailability of fingerlings is the main problem hampering the development of commercial marine aquaculture in the U.S.. There is an outstanding opportunity to exploit an existing market (e.g., Snapperfarm, Inc. of New York requires approximately 250,000 fingerlings for stocking submerged cages off the Island of Culebra in Puerto Rico). Approximately 10% of the total 200,000 fingerlings of mutton snapper required to support the development of the industry were produced during the first two years of operation of the ACFK hatchery. This was a main step towards the development of cage culture operations in the U.S. This grant was crucial in supporting 18 months of research and development and technology transfer to this project. The long-term goal of this operation remain to produce one million fingerlings per year, with estimated total sales of $1-$2 million per year. In addition, seven technical articles/publications are completed or in process, 12 presentations were generated, and four graduate students from RSMAS University of Miami worked on the project.

3.12 The shrimp industry in Nicaragua has been decimated during the last two years by natural disasters such as hurricanes and virus contamination. Research and training will be initiated that focuses on the economic feasibility of shrimp culture techniques that minimize virus contamination possibilities and that focus on making shrimp safe for seafood consumption. This work will be conducted as part of a USAID funded activity involving Michigan and Puerto Rico Sea Grant. Fifty shrimp growers and lenders in Nicaragua will become aware of the financial characteristics of culturing shrimp in zero exchange

systems. (Cato:Adams/Otwell/Garrido)

Shrimp Safety

A selected cadre of expertise from existing Nicaragua shrimp commerce, regulation and academia were given specific training and materials to prepare them to contribute a higher level of expertise to the shrimp industry. The participants were selected based on recommendations of the Nicaragua shrimp industry, pertinent regulatory agencies and the prominent academic program at Universidad Centro Americana based in Managua. The 24 participants included representatives from the Nicaragua agency governing food safety and commerce (5), the prominent shrimp farmer associations (5), the leading shrimp processors (11), and the established academic technology transfer program (3) (Table 1). These individuals are now prepared to provide satisfactory regulatory, farming and processing skills and to teach others what they have learned.

A series of training programs were provided for all cadre participants.

- **The HACCP training course** was provided in accordance with the internationally recognized "Seafood HACCP Alliance" program and certified by the Association of Food and Drug Officials (AFDO) of North America. This course is the nationally recognized Hazard Analysis and Critical Control Point (HACCP) course for seafood processors as judged by the US Food and Drug Administration. All participants received certificates of course completion recorded and filed by AFDO in York, Pennsylvania with individual certification numbers and dates to evidence training by the standardized program. Course materials were provided in English and Spanish as cited at the end of this report, with the Spanish version attached (1).

- **The Sanitation Control Procedures training course** was provided with similar certificates of completion issued by AFDO. This course is the sister training program for HACCP as prepared by the national 'Seafood HACCP Alliance' and recognized by the US Food and Drug Administration. Course materials were provided in English and Spanish.

The Latin America Shrimp School was conducted August 13 – 16 in Chinandega, Nicaragua, the center of the industry and the site of the Universidad Centro Americana shrimp culture demonstration project conducted as part of the overall project. The school included lectures and numerous hands-on training sessions. Trainers included representatives from the European Union, the US Food and Drug Administration Office of Seafood, and Florida Sea Grant, University of Florida. All participants completing the course received a certificate issued by the University of Florida/Florida Sea Grant.

Specific training materials were prepared in English and Spanish. The project prepared these materials for subsequent use in-country by those trained. Materials included:

- Farm-Raised Shrimp: Good Aquacultural Practices for Product Quality and Safety.
- Training Units assembled to support continuing education (5)
  - Shrimp Decomposition Analysis
  - Shrimp Filth Analysis
  - Shrimp Sulfite Analysis
  - Confronting Problems with Imports to European Union

In conjunction with the specific training courses and materials, a series of mini-labs were

taught and materials provided to key programs to support the application of their training in their places of work. The mini-lab materials were custom assembled to support the typical analytical work for the respective locations. Labs were located in the lead regulatory agency (MAGFOR), the established academic support program (UCA), and the two prominent processing firms. These materials remain in Nicaragua to help advance expertise in monitoring and judging shrimp quality and safety and are in ongoing use by the four locations.

The participants were asked to complete a questionnaire concerning the effectiveness of the training. The response clearly indicates all training was rated very effective (87.5%) or effective (12.5%). 100% of the 24 participants indicated they would use the information during the next 12 months.

Economic Analysis

The main objective of this project was to compare traditional and zero water-exchange shrimp culture systems. Thus, a zero water-exchange system using actual production rates from the demonstration project was designed to achieve a production level of 1,033,661 pounds, an average level of production for existing Nicaragua shrimp farms. A 26-hectare zero water-exchange system would be required to generate this level of production. Total investment requirements for feeding equipment, permanent equipment, and other costs associated with the construction of a 26-hectare zero water-exchange farm (52 one-half-hectare ponds) amounts to US$2,815,622 or US$108,957 on a per hectare basis. Total annual depreciation for this system is US$386,152 and per hectare depreciation cost equals US$14,943. Total initial investment requirements may vary from producer to producer. For instance, earthwork cost could increase or decrease depending on the existing land characteristics. Utilizing the levees of an existing farm system would decrease the cost of pond construction. The per hectare cost of building a pond system utilizing the semi-intensive technology has been estimated to be between US$4,000 and US$10,000.

The assumptions used for estimating production costs and revenues for the hypothetical zero water-exchange farm and the typical semi-intensive farm are shown in Table 1. It was estimated that the 20,000 pounds/hectare cycle-production level might be achieved if optimum production management practices for the zero water-exchange intensive technology are employed. The total area utilized by each of the two systems was determined dependent on the production objective (1,033,661 pounds annually) and the production variables after implementing the corresponding production strategies. With the zero water-exchange technology, a 26 hectare farm with 52 one-half-hectare ponds is needed to produce the desired annual production with a survival rate of 55 percent and average harvest size of 13.50 grams(heads-on). In contrast, a 324 hectare farm using the semi-intensive technology will be required to produce the 1,033,661 pounds annually. For the semi-intensive farm, survival rate is 31.68 percent and average harvest size is approximately 13 grams (heads-on). Stocking density varies as well between the two systems: 122 PL/m² for the zero water-exchange system and 18 PL/m² for the semi-intensive system. The selling price used in this comparison is US$3.00 per pound of shrimp.

Table 1. Production assumptions for the 26 hectare zero water-exchange farm and the 324 hectare semi-intensive farm.

	Zero Exchange System	Semi-Intensive System
Production (lbs/ha/cycle)	20,000	1,536
Cycles	2.00	2.04
Total Production (lbs/ha/yr)	40,000	3,133
Total Area (ha)	26	324
Number of 1/2 ha ponds	52	-
Survival Rate (%)	55.00	31.68
Stocking Density (PL/m2)	122	18
Average Harvest Size (g)	13.50	12.98
Shrimp Price US$/lb (heads-on)	3.00	3.00

Costs vary between the two systems mainly due to the total area needed to produce the desired production. The costs for each system are compared on a total, per harvested pound of shrimp, and per seeded hectare basis (Tables 2-5). The cost of post larvae (PL) per pound harvested for the zero water-exchange system is lower than for the semi-intensive technology. However, PL cost per hectare is greater for the zero water-exchange system since stocking density (PL/m²) is much higher. Feed cost, on the other hand, is greater in both per pound harvested and per seeded hectare for the zero water-exchange system. The estimated value was calculated using the feed conversion ratio of 2.44; however, this ratio should decrease significantly if more efficient production strategies, such as a better assessment of the actual survival rate, are used. The cost of chemicals and fertilizers per pound harvested is lower and on a per seeded hectare basis this cost is much greater for the zero water-exchange system. When considering this cost in total U.S. dollars, the zero water-exchange system costs less than the semi-intensive system. Direct labor for the hypothetical farm using the zero water-exchange technology is always greater (on per seeded hectare, per harvested pound, and in total U.S. dollars) than for the semi-intensive system. With respect to indirect costs, it was not accurate to make a comparison between the two systems since the variables included in this cost category vary for each system. Nevertheless, total operating costs clearly indicate that the zero water-exchange system can be more cost efficient than the semi-intensive system.

Table 2. Annual financial comparison for the 26 hectare zero water-exchange farm and the 324 hectare semi-intensive farm.

Financial Item	Zero Exchange System Total	Semi-Intensive System Total
Annual Production per ha.	40,000	3,133
Total Area (ha)	26	324
Pounds Harvested	1,033,661	1,033,661
Shell-On Price (US$/lb)	3.00	3.00
Total Revenue US$	3,100,983	3,100,983
Total Operating Expenses US$	1,964,535	2,069,834
Gross Profit US$	1,136,449	1,031,150

Table 3. Detailed annual operating expenses for the zero water-exchange and semi-intensive systems (on a per harvested pound basis).

Operating Expenses	Per harvested Lb.	
	Zero Exchange System	Semi-Intensive System
Postlarvae US$	0.32	0.47
Feed US$	0.65	0.46
Chemicals/Fertilizer US$	0.03	0.06
Direct Labor US$	0.28	0.06
Indirect Costs US$ including Fuel	0.62	0.95
Total	1.90	2.00

Table 4. Detailed annual operating expenses for the zero water-exchange and semi-intensive systems (on a per seeded hectare basis).

Operating Expenses	Per Seeded Ha.	
	Zero Exchange System	Semi-Intensive System
Postlarvae US$	6,372	720
Feed US$	13,069	713
Chemicals/Fertilizer US$	626	91
Direct Labor US$	5,600	96
Indirect Costs US$ including Fuel	12,344	1,456
Total	38,011	3,076

Total revenue, total operating costs and gross profit summarized per harvested pound and per seeded hectare for the two systems are also estimated (Table 5). Even though the zero water-exchange system provides a small profit (10 cents) difference on per harvested pound when compared to the semi-intensive system, gross profit generated by the zero water-exchange technology on per hectare basis is significantly higher. Annual profit per seeded hectare for the zero water-exchange system was US$21,989, whereas the same value for the traditional system was US$1,532.

Table 5. Annual financial comparison for the 26 hectare zero water-exchange farm and the 324 hectare semi-intensive farm (per harvested pound and per seeded hectare).

Cost and Revenues	Zero Exchange System		Semi-Intensive System	
	Per Harvested Lb.	Per Seeded Ha.	Per Harvested Lb.	Per Seeded Ha.
Annual Production per ha.	40,000		3,133	
Total Area (ha)	26		324	
Pounds Harvested	1,033,661		1,033,661	
Shell-On Price (US$/lb)	3.00		3.00	
Total Revenue US$	3.00	60,000	3.00	4,608
Total Operating Expenses US$	1.90	38,011	2.00	3,076
Gross Profit US$	1.10	21,989	1.00	1,532

Disadvantages

The zero water-exchange system requires a very large initial investment which may discourage many potential investors from considering the system as a profitable alternative to traditional semi-intensive shrimp farming. This may be particularly true for those semi-intensive farmers who might wish to retrofit a portion of their existing farms.

Given the relatively large initial investment, the financial risk associated with a crop failure is much higher with the zero water-exchange system.

Advantages

The zero water-exchange technology can result in sustained higher yields. The yields are higher due to high survival rates because of the biosecurity practices implemented and the high stocking density. The zero water-exchange system also reduces the amount of nutrients released into the environment since no water is exchanged.

These technical advantages can lead to lower operating costs in total U.S. dollars and per pound harvested. The feed conversion ratio should be better for the zero water-exchange system due to high levels of aeration, which creates a current that suspends solids for shrimp grazing. Thus, feed costs should be reduced.

Another advantage of the new system is the use of less land to produce the same desired production objective. This should result in lower annual concession fees.

Due to lower operating costs, the zero water-exchange system generates slightly higher profits per pound harvested, but much higher profits on a per hectare basis when compared to the semi-intensive technology.

Another advantage of the zero water-exchange system is the reduction in the amount of time required to prepare pond water for stocking. By using both the recycled water and the ponds lined with plastic, restocking can take place as soon as five days after a pond is harvested. A more efficient use of the available growing season is allowed.

To workshops were held to provide adequate training and adequate exposure to interested shrimp farmers and bankers. The workshops were held at the Universidad Centro Americana shrimp culture demonstration farm at the site of the intensive shrimp culture demonstration project at Puerto Morazan, Nicaragua on December 4 and 5, 2001. One workshop was held for bankers, lenders and agency representatives and one was held for shrimp farmers. However, a mixture of each attended each day. The workshop was presented in Spanish and all workshop materials were distributed in both English and Spanish.

Twenty-five people attended the first workshop and 16 attended the second.

Evaluation forms were distributed at the conclusion of the workshop (second day only) and 13 people completed an evaluation form. Eighty-five percent said they would use the information at their workplace during the next year and 15 percent said they would not. 100 percent said the course materials were very effective or effective and 100 percent indicated the instructors knew the materials well. The workshop and information was also covered by the media. An article in the Managua, Nicaragua newspaper appeared two days after the workshop. A copy of the internet version of the coverage is attached along

with a partial copy from the print version.

The USAID project to determine the financial feasibility of culturing shrimp with zero water exchange technology in Nicaragua was completed. The analysis suggests that under certain market conditions and system performance, the technology is financially viable.

About 40 prospective investors and lenders in Nicaragua have a good understanding of the zero exchange technology and the economic potential of its application.

3.13 Clam growers on Florida's west coast have reported high mortalities of seed planted just hours before one of many recurring decreases in salinity. Adjacent adult clams and previously planted seed were unaffected, making crop insurance claims difficult to substantiate. Salinity change tolerances for newly planted seed clams need to be known in order to make informed planting decisions. (Baker, S., Baker, P., L. Sturmer: PD-00-7)

The project examined the short-term impacts of strong but gradual salinity declines (Trial I), or immediate salinity declines (Trial II), of several magnitudes on the mortality and condition index of juvenile clams. In Trial I, seed clams proved resistant to all salinity drops except for the largest drop (28.5 ppt to 4.5 ppt) for the longest duration (6 days). Condition index declined significantly under these conditions, and observed mortality at the end of 6 days was 17%. In Trial II, seed clams experienced 100% mortality at the 20 ppt drop after 8 days of exposure, but mortality in the 10% drop treatment was low and did not differ from the control. If salinity drops do account for short-term commercial clam seed mortalities, effects may be compounded or mitigated by other factors, such as other environmental conditions or handling effects. it is expected that this project will directly benefit Florida hard clam farmers both through changes in management practices regarding field planting of seed clams and better understanding of the role of salinity in assessing contributing factors to seed loss. It is also expected that this project will directly benefit the USDA Cultivated Clam Crop Insurance Pilot Program by providing scientific data to support decision-making processes regarding "unavoidable damage."

Laboratory trials were also planned and conducted to assess short-term impacts of rapid salinity declines on hatchery-produced clam seed. Water quality data collected continuously during 2000-1 at a lease area in Cedar Key (Levy County) revealed that short-term salinity fluctuations are greater than suspected and corresponded with reports of high seed mortalities by growers. A program development award of $3,515 from Florida Sea Grant was used to fund this laboratory study. Information generated from laboratory salinity trials may be used by clam growers in Levy and Dixie Counties to make informed decisions about when to plant and transfer seed during periods of fluctuating salinities. The results were presented to the clam growers.

3.14 Worldwide sea urchin fisheries are declining at a time when demand is high. In some cases harvesting techniques have resulted in catastrophic changes to the ecosystems, causing irreversible damage. This project will determine the fishery and aquaculture potential of the short-spinned sea urchin *Lytechinus variegatus* in the Gulf of Mexico. This is a regional project with Mississippi-Alabama Sea Grant. (Lawrence: R/LR-A-21PD)

Based on the findings, more complete information is available on the populations of *Lytechinus variegates* found on the central Florida Gulf coast. Prior information was restricted to shallow, nearshore waters and more is known about the reproductive cycle and the variability in the cycle. For the first time, the increased rate of growth of small sea urchins fed artificial feeds has been demonstrated. This raises the possibility of decreasing

the time to marketable size. Work continues on establishing the qualitative requirements for artificial feeds for the growth of small sea urchins to marketable size. Sea urchins fed artificial feeds will produce fertilizable gametes in the laboratory that will continue through larval development to metamorphosis. This opens the possibility of aquaculture beyond roe production.

3.15 An existing study on the economic feasibility of small-scale culture of hard clams in Florida will be updated to reflect current practices and costs. This revised extension document will provide information to those interested in entering the business to make informed financial decisions. Three hundred commercial hard clam growers will become aware of the updated financial feasibility characteristic of clam culture in Florida. (Adams, Sturmer)

A study on the economic feasibility of small-scale culture of hard clams in Florida was not updated this year. The existing document was distributed as part of an informational package to 51 people interested in entering this business.

3.16 The financial characteristics of small-scale bullminnow culture will be described. The data to be utilized in this study have already been compiled at the UF Mitchell Aquaculture Facility in Blountstown, FL. The analysis will be featured in an IFAS EDIS publication. Twenty-five prospective marine bait culturists will become aware of the potential profitability of culturing bullminnows for commercial purposes. (Adams, Lazur)
The culturing of live marine bait fish may be a viable commercial aquaculture activity in Florida. Mudminnows, in particular, may hold promise as a candidate species. Recent research has shown a strong market demand for mudminnows by recreational saltwater anglers. In virtually all regions of the state where mudminnows are used as a bait, the supply is not able to keep up with the demand. And, the supply now available is obtained entirely from wild catch. Although the market price varies considerably around the state, the breakeven price from the existing technology is well above the current wholesale prices for mudminnows. Thus, for both a 5-acre and 10-acre culture facility, the projected annual net returns are positive. Although this analysis suggests that commercial culture of mudminnows may be profitable, a more comprehensive assessment of the market is needed. In addition, additional research is needed to identify the most efficient culture techniques (free spawn versus egg transfer), shipping methods to reduce deadloss, and holding tank designs that would improve water quality. Only after these issues have been addressed will potential investors in mudminnow culture be able to make a truly wise investment.

An assessment of the financial characteristics of small-scale bullminnow culture was described in an IFAS EDIS report (FE-309). This publication is now up on the IFAS website and available for perusal by interested clientele.

3.17 Science and vocational/technical teachers in the St. Lucie County Public School District will increase their general knowledge of aquaculture and develop topic specific teaching demonstrations that address the transferable skills for aquaculture outlined in the Florida Department of Education “Student Performance Standards – Aquaculture”, Program Number 812000. (Creswell)

Lack of funds to renovate the St. Lucie County School District Aquaculture Facility precluded teacher training programs. The ability to provide “hands-on” aquaculture education requires facilities and equipment to maintain living aquatic organisms.

Reconstruction of the facility is subject to current state budget appropriations.

3.18 Ten new clam aquaculture industry members holding leases in the Indian River Lagoon will implement up-to-date culture practices and demonstrate knowledge of applicable Florida Department of Agriculture and Consumer Services regulations through compliance.

Shellfish lease owners received instruction on general biology, aquaculture and regulatory policy during two workshops. To date, 27 lease holders have successfully begun their operations and planted seed stock for growout to market.

3.19 Research results on restricted and satiate feeding of two genetically isolated strains of juvenile channel catfish *Italurus punctatus* reared on 28 and 32 percent protein diets will be presented to the World Aquaculture Society in Orlando, Florida. (Jackson, S.)

Abstract was presented at the Annual Meeting of the World Aquaculture Society Meeting in Orlando, Jan, 2001.

3.20 The Third Annual Franklin County Oyster Industry Workshop will be held. (Mahan)

In lieu of conducting the Annual Oyster Industry Workshop in 2001, the seafood dealers and the Franklin County Board of County Commissioners requested that the Franklin County Agent attend the Interstate Shellfish Sanitation Conference's (ISSC) *Vibrio vulnificus* (*Vv*) Subcommittee Meeting in Biloxi, MS., the ISSC's *Vv* Education Subcommittee Meeting in Waveland, MS., the ISSC's Annual Gulf & South Atlantic Regional Meeting in Biloxi, MS., and the ISSC's Annual Meeting in Norfolk, VA to provide technical support to oyster industry representatives participating in the meetings. In addition they asked that the Agent provide the FL oyster industry with update reports on *Vv* issues before the ISSC. The updates were provided during four reports to the Board of County Commissioners and six small group and one-on-one meetings with key oyster industry representatives. As a result of this effort, technical support was provided to the Gulf of Mexico oyster dealers on *Vv* and the FL oyster processors and fishermen were kept up-to-date on the *Vv* issue as it moved through the ISSC's rule making process. In total, 207 people attended and participated in these meetings.

3.21 Regional and national Interstate Shellfish Sanitation Conference meetings will be attended to provide technical support to the Gulf oyster industry. (Mahan)

At the request of the FL oyster industry and the Franklin County Board of County Commissioners, the Franklin County Agent attended the Interstate Shellfish Sanitation Conference's (ISSC) *Vibrio vulnificus* (*Vv*) Subcommittee Meeting in Biloxi, MS., the *Vv* Education Subcommittee Meeting in Waveland, MS., the Annual Gulf & South Atlantic Regional Meeting in Biloxi, MS., and the ISSC's Annual Meeting in Norfolk, VA to provide technical support to the Gulf of Mexico oyster industry representatives participating in the meetings. As a result of this effort the Agent provided technical support and information to the oyster industry representatives attending the meetings so that they had a better understanding of *Vv* issue as it moved through the ISSC's rule making process. In total, 207 people attended and participated in these meetings.

3.22 Volunteer members of the Franklin County Aquaculture Task Force that oversee development of the clam aquaculture industry in Franklin County will be recruited and

organized. (Mahan)

In 2001, the Franklin County Extension Agent with the assistance of the UF-IFAS Multi-County Clam Aquaculture Agent recruited an advisory committee of five clam farmers to represent the 46 new clam aquaculture lease holders in making decisions for the group on issues related to developing a new calm farming industry in Franklin County. As a result of this effort five clam farmers were selected by the new farmers to the Task Force to represent them in the development of the clam farming industry in the county. The first task completed by the committee with the assistance of the Extension Agents was the devolpment of the scope of work and survey specifications for a “request for bids” which was sent to survey firms in the Panhandle area to get the new high density lease area surveyed. As a result of this effort, the “bid packets” have been mailed out and are due in January 2002.

3.23 A statewide extension effort that will support the emergent shellfish aquaculture industry in Florida by working in counties where clam farming is either on-going or has significant potential for growth will be continued. A marine agent educational network will be established that focuses on the targeted areas within Brevard, Indian River, Charlotte and Lee Counties. (Sturmer, Combs, Creswell, Novak, Wasno)

Efforts by the Multi-County Clam Aquaculture Agent focused on developing liaisons with marine agents in the counties of Brevard (Chris Combs), Charlotte (Rich Novak), Franklin (Bill Mahan), Indian River (LeRoy Creswell), and Lee (Bob Wasno). Each of these agents have hosted and participated in industry meetings within their county, provided local support, and assisted in identifying specific industry issues of concern within their areas. A network was established in those counties where clam farming is ongoing by working with county marine agents. This will strengthen the interaction between extension and the emergent shellfish aquaculture industry by providing a "local" contact as well as providing resources to that agent.

3.24 The current multi-county shellfish aquaculture advisory committee will be expanded to an industry-wide advisory committee that will assist in needs assessment and identification of educational programs and materials. (Sturmer)

A multi-county advisory group, the Big Bend Shellfish Aquaculture Advisory Committee, has been in place since 1996 and serves to provide input into extension program efforts from a regional perspective. At their annual meeting held on October 25 in Cedar Key, committee members were informed of the expansion of the Shellfish Aquaculture Extension Program. It was suggested that maybe a representative from each of the clam-producing regions of the state could meet annually. A statewide advisory committee has not been formally established and may be impractical from a logistical standpoint. Instead, regional committees or the utilization of committees already in existence may be options. Nonetheless, by meeting with industry members across the state at workshops, as well as individually, the mechanism with which to establish methods of receiving local input into program priorities was initiated.

3.25 Seventy-five percent of shellfish growers in eligible counties (Brevard, Dixie, Indian River, and Levy) will participate in a pilot crop insurance program and contribute to improving policy provisions during this initial evaluation period. (Sturmer)

304 growers, representing over 90% of the clam growers in the eligible counties, enrolled in the crop insurance program for the crop year 2001. This represents an increase of 27%

in participation over the first program year. Total crop liabilities exceeded $12 million. The pilot program is to be continued for the crop year 2002. A partnership was developed among risk management and extension faculty at the University of Florida and Clemson University to enable the USDA Risk Management Agency in making improvements to the clam crop insurance policy during the pilot phase. A proposal entitled Test, Evaluate, Recommend, and Implement Changes to the Cultivated Clam Pilot Crop Insurance Program was submitted by the UF and Clemson team to USDA Risk Management Agency for funding. This will allow policy provisions to be evaluated during 2002-3.

3.26 The Clam Lease Assessment, Management, and Modeling using Remote Sensing (CLAMMRS) project will be implemented with the assistance of University researchers and state agency staff. This 4-year, $860,000 project funded by the U.S. Department of Agriculture will establish remote water quality monitoring systems in various Florida locations. CLAMMRS will gather real-time data important for shellfish production. (Sturmer)

A four-year project, Clam Lease Assessment, Management, and Modeling using Remote Sensing (CLAMMRS), was initiated this year. After an extensive bid process, water quality monitoring equipment and weather stations were purchased. These units will be deployed early in 2002 at various lease sites in the Big Bend region and in other clam-producing counties of the state. Industry partners were consulted to identify appropriate sites to locate the "real time" water quality monitoring stations within 4 lease areas in Levy and Dixie Counties.

3.27 Sixty percent of shellfish growers in six counties (Brevard, Charlotte, Dixie, Indian River, Lee and Levy), where remote water quality monitoring systems and weather stations (CLAMMRS) will be deployed at lease areas, will understand the benefits of a continuous database system that will assist them to identify trends in environmental conditions that are important to clam health and production. (Sturmer)

With equipment on loan from the UF Tropical Aquaculture Lab and field assistance from the DACS Shellfish Environmental Assessment Section staff and growers, two water quality monitoring systems were operated at lease areas: one in Levy County and one in Dixie County. These data loggers provided continuous information on water temperature, salinity, and dissolved oxygen. Resulting monthly data were posted at the Shellfish Extension Office in Cedar Key and provided to growers upon request. About 10% of the active growers in the Big Bend area reviewed the continuous water quality data and began to identify trends in environmental conditions critical to clam health and production. This information will let the industry begin to refine and improve management practices, such as allowing growers to make informed decisions about when to plant and transfer seed. Ultimately, this can lead to improved production and profitability. Water quality data provided by continuous monitoring systems were used in documenting 8 out of the 14 crop insurance claims made to date in the Big Bend area. By beginning to compare crop losses with water quality events, substantive evidence can be provided to both growers and insurance companies.

3.28 Thirty percent of shellfish growers in Brevard, Charlotte, Dixie, Indian River, Lee and Levy Counties will understand and adopt record-keeping in their activities. They will learn to use computerized spreadsheets to maintain crop inventories, record planting and harvesting activities, calculate yields and crop times, and track farm income and expenses. (Sturmer)

A simplified spreadsheet software program, Computer Logbook and Management (CLAM), was developed and refined for use as a business tool for clam growers. The software program was field tested with several clam growers during an evening workshop to gain their input and incorporate their suggestions into the program. A users guide that discusses the need for record keeping and serves as a manual for the spreadsheet software program is being developed and will be disseminated in 2002. Training in using these spreadsheets to growers in counties where the pilot crop insurance program is implemented will be conducted in 2002 through workshops and consultations with growers on an individual basis.

3.29 The 4th annual Hard Clam Growers Conference to discuss latest regulations, research findings, production and harvest techniques will be held. (Sturmer)

In collaboration with representatives from the Department of Agriculture and Consumer Services (DACS) Bureau of Seafood and Aquaculture Marketing and the DACS Division of Aquaculture, as well as faculty from the Department of Food Science and Human Nutrition (Steve Otwell and Gary Rodrick), the 5th Annual Hard Clam Industry Meeting was organized and hosted with a focus on product quality and marketing issues. About 75 members of the industry, primarily wholesalers, from across the state participated in the meeting. Industry topics presented and discussed during this full day meeting included dry tempering validation, reduction of red tide toxins in clams, clam size minimum limits in northeastern states, and federal and state regulatory issues. The program also included a panel of invited national seafood buyers who gave their perspectives on clam marketing. Funding support for this meeting came from a grant ($5,500) procured through the USDA Risk Management Agency. The continuance of focus meetings, now conducted for five years, has provided a forum in which industry members, primarily wholesalers, may interact with appropriate university faculty and state agency representatives on marketing and product quality issues affecting their businesses. Current information on key issues affecting clam commerce was shared.

3.30 Sixty percent of Florida's shellfish hatchery and nursery operators will increase their awareness of the application of remote setting techniques and genetic selection programs by attending a genetic selection workshop. (Sturmer)

A Shellfish Genetics Workshop was held at the Brevard County Agriculture Center in Cocoa on January 20. About 23 hatchery and nursery operators participated in the full-day, interactive workshop to examine the role of genetics in the clam aquaculture industry. The invited guest speaker, Dr. Stan Allen from the Genetics and Breeding Technology Center at the Virginia Institute of Marine Sciences, gave an overview of population genetics and selective breeding principles. Funding for the workshop was obtained from a grant ($5,500) through the USDA Risk Management Agency. The Brevard County marine agent, Chris Combs, hosted the workshop and the St. Lucie County marine agent, LeRoy Creswell, participated as a discussion panel member. Over 30% of the seed suppliers in the state participated in an industry-specific workshop. In doing so, this component of the industry began to address the question of whether genetics is a problem in Florida clam culture. Eighty-five percent (85%) of those who attended rated the Genetics Workshop "high" and indicated they improved their understanding of genetic initiatives. Further, attendees endorsed a proposed project by Department of Fisheries and Aquatic Sciences

faculty to begin evaluating the genetic diversity or "health" of Florida broodstock lines.

3.31 Sixty percent of new leaseholders in Indian River and Wakulla Counties will receive information on production techniques, economic feasibility and marketing strategies so they able to make informed decisions on whether or not to enter the shellfish business. (Sturmer)

A “So You Want To Become A Clam Farmer?” workshop, which was held on May 31 in Carrabelle (Franklin County) for about 45 individuals considering entering the business. The county marine agent, Bill Mahan, hosted the workshop. A “How to Fill Out A Lease Application Workshop” was held in Carrabelle on June 11 during which over 60 individuals initiated the lease application forms. In addition, consultation was provided to 14 individuals developing their business plan through either phone calls, e-mail correspondences or office visits. Forty-five (45) individuals interested in entering the clam farming business participated in a workshop to gain an understanding of the economic and financial requirements regarding small-scale commercial clam culture. Forty-six (46) Franklin County residents successfully applied for shellfish aquaculture leases in that county. These new clam businesses have an estimated annual net profit potential of $31,000 (Adams and van Blokland 1995). Thus, clam farming has a potential of bringing in $1.4 million in new revenues for fishery dependent communities in Franklin County. It is anticipated that a small budget from the Franklin County Board of County Commissioners will provide financial assistance to Extension in providing "hands-on" experience with equipment and shellfish to new growers next spring so they may show readiness to initiate and operate their own clam growout enterprise.

3.32 The Shellfish Aquaculture newsletter that is distributed to over 600 industry members with businesses in 9 countries will be continued. (Sturmer)

A quarterly newsletter, *Shellfish Aquaculture*, specifically addressing issues concerning the clam farming industry, was continued with 4 issues (February, May, August and November) and sent to 690 producers, nursery operators, equipment suppliers, wholesalers, distributors in 11 counties, as well as to state agency representatives, elected officials, and community leaders. All clam producers in the state were provided with information to gain knowledge in current culture methods and information on new issues affecting the industry through dissemination of newsletters.

3.33 The potential for development of a new scallop fishery resource product through open-water aquaculture for the west coast of Florida that will compete as a non-traditional product will be investigated. The project will include renewing aquaculture permit/lease with DCAS; growing a minimum of 5,000 juvenile scallops to market size (40 mm) in a cage system in the off-shore waters of Crystal River; placing a minimum of 250,000 juvenile scallops in natural areas in a restoration effort; conducting taste panels that will assist in the market acceptability and marketing strategy; and continuing scallop freezing/self life studies. (Sweat)

The scallop aquaculture permit/lease was renewed with the Florida DACS. 1,500 juvenile scallops were raised to market size and were utilized in taste panels to determine the market acceptability of whole scallops. Over 250,000 juvenile scallops were placed in natural areas around the Gulf Coast of Citrus County. These restorational efforts, which go back for the past four years, have been so successful as to have the FWC lift the seasonal ban for recreational scalloping, effective July 1, 2002.

The minimum number (5000) of scallops which were to be grown out to market size will

not be met. However, half of this number are currently in cages in the Crystal River permitted site and will be harvested in late 2001. The restoration effort has been highly successful, resulting in an FFWC open workshop in Crystal River to discuss the possibilities of re-opening the area to recreational collectors. As a result, the recreational season has been re-opened for 2002, which will produce a multi-million dollar impact in the local economy.

3.34 A proposal will be made to the 2001 International Pectinid Conference to host the 14th International Pectinid Conference in 2003 in St. Petersburg, Florida. It is expected that over 130 scientists from around the world will attend the conference. This conference has only been held once in the United States. (Sweat)

A proposal presented at the 2001 International Pectinid Conference was successful in the award to host the 14th conference in St. Petersburg, FL in April 2003.

3.35 Mote Marine Lab will be assisted with the "Red Start" Program. This will be a cooperative effort to raise redfish from fry to 6-inch fingerlings for release into Charlotte Harbor. (Novak)

A meeting with Ken Leber at Mote Marine Lab was held to discuss the development of REDstart and obtain input regarding a number of needs. He also was interested in providing some juvenile snook for the project. Had a number of suggestions that will assist in setting up the facility on Sanibel Island.

Goal 4: Improve the Product Quality and Safety of Florida's Seafood Products

4.2 Preliminary tests have shown *Vibrio vulnificus* could not be detected in oysters processed using certain freezing techniques. Oyster processors and consumers are not aware of this process, which could insure the viability of the raw oyster market. Additional tests will be conducted, the potential market demand for frozen (raw) oysters determined, and the results will be transferred to processors and consumers. (McNeely/Otwell/Rodrick/Zimet: R/LR-Q-21 [GMO-99-3])

The final report for this project contains many details regarding the accomplishments for the project. Some freezing techniques did reduce bacteria levels. Consumers could detect fresh from previously frozen oysters. A survey was conducted to define the market potential for frozen oyster products and a nationwide survey documented consumer differences in five U.S. regions. Based on the results of the trade and consumer surveys, the Bureau of Seafood and the Gulf Oyster Industry Committee are marketing this new oyster product to the seafood industry and consumers. The Bureau hosted a workshop at the Aquaculture 2001 Expo in Orlando, January 2001. The Expo, which is the largest aquaculture trade show in the Western Hemisphere, was the venue for the workshop. The workshop, entitled "Safer Oysters: Research and Marketing," presented and provided an overview of the findings. Attendees had an opportunity to learn about current and future trends in the oyster industry, including research on developing a safer raw oyster. The Bureau also published a comprehensive, eye-catching report including graphics and charts which will be disseminated to much of the industry, the membership of the Gulf Oyster Industry Council, other states' seafood marketing agencies and other interested parties. The report is also on the Bureau's web site, www.fl-seafood.com/bus/ostgra.html.

This work combined with subsequent HACCP validation studies by University Florida's Aquatic Food Products Program were compiled and submitted by the Florida Sea Grant Seafood Specialist for utilization by the Florida DACS and U.S. Food and Drug Administration. The intent was to secure the use of this technology as a commercial option to suit the new prevailing federal mandate for 'post harvest treatments' necessary to reduce microbial pathogens in raw oysters. Without new processing options, this current regulatory mandate threatens closure of over 50% of Florida's oyster processing before 2005.

4.3 Based on the training needs identified by the Seafood HACCP Alliance, sanitation training has been identified as a critical need in processing plants. The HACCP Alliance will complete reorganization during 2000 to focus on training in the use of Sanitation Standard Operating Procedures (SSOPs) in commercial and regulatory programs. (Otwell: E/TP-2)

Since the initial project meeting of the Seafood HACCP Alliance in June 1994, the Alliance's work and impacts, both in terms of deliverables and implemented practice, could represent one of the most significant national, and now international training efforts ever provided by such a unique collaboration of agencies, academia and industry. The most unique and valued feature is the established network of cooperation involving every state in the nation, plus every U.S. Territory, with every Sea Grant program and the respective State and Federal agencies. Their goal was to assist the implementation of one of the most significant and challenging changes in the history of U.S. food safety regulations. The Food and Drug Administration (FDA) enacted regulations in December 1997, requiring all domestic seafood processors and importers to adopt programs with Hazard Analysis and Critical Control Points (HACCP) to identify and prevent the occurrence of

hazards that could affect the

safety of seafood products. The Alliance anticipated the regulatory and commercial consequences and responded with a national organized training program.

In simple terms, the Alliance training efforts have reached over 90% of the original projected domestic seafood processing operations, plus international regulatory programs and commerce in over 5 nations exporting to the United States. In the U.S. along, this represents an influence on over 5,000 licensed seafood processors and 5,900 seafood importers with traditional harvest for over 300 seafood species by 260,000 domestic fishermen. Adding imports and aquaculture, the total U.S. annual seafood supply exceeds 13 billion pounds. All of this production goes through some phase of processing affected by the HACCP regulation and Alliance training. By early 2002, 15,000 participants have been trained in both domestic and international settings.

A recent industry survey of 144 commercial firms located across 8 states has indicated the value of the timely Alliance training. All respondents (100%) felt the Alliance training course provided them with the basic understanding of HACCP principles, and 98% indicated that by the end of the course, they understood what they needed to do to comply. Likewise, 93% felt the industry benefited from the Alliance HACCP training and 83% indicated they would not have been able to develop a HACCP plan to comply with FDA regulations without the training course. The survey also recorded a significant commercial interests for continuing HACCP training and periodic updates.

Although the funded project is complete, Florida Sea Grant continues their leadership role in advancing the educational programs of the Seafood HACCP Alliance. The Alliance courses have been supplemented with additional processing models, videos and an internet accessible version. The training materials have been edited to meet 2002 regulatory expectations. The Florida Sea Grant editorial staff arranged for all HACCP and accompanying Sanitation course manuals (English and Spanish versions) to be available through the publication-on-demand program based at the University of Florida (www.ifasbooks.ifas.edu).

The Alliance Steering Committee remains active through annual meetings and assigned projects involving every pertinent state agency, federal program and Sea Grant Specialists in the nation. This participation involves every state in the nation, all U.S. territories and both neighboring nations, Canada and Mexico. A major “Seafood HACCP Alliance Summit” and further instructor training for the 500+ instructors has been scheduled for October, 2002 in Orlando.

The Alliance program has become “self sustaining” through regulatory support, publication costs, registration fees and voluntary service to the industry and pertinent regulatory agencies. The Alliance courses remain the national benchmark for Seafood HACCP education and the template for numerous HACCP courses for other commodities; i.e., juices, produce, retail foods, etc. and other countries (work available in 12 languages).

4.4 Assistance and support will be given to local seafood producers in developing and implementing individualized HACCP Plans. (Combs)

Several visits were made to Blue Points International Fisheries to review scallop production methods and to discuss HACCP procedures. A Brevard Community College Educational TV production was hosted to demonstrate processing techniques and HACCP. Clayton's Group Company was assisted in passing newly imposed security clearances for shipping live seafood (post September 11, 2001). Contacts were made with Delta airlines to explain the shipping issues associated with a number of seafood companies. Interaction also occurred with Port Canaveral Port Authority to assist seafood shippers in obtaining entry permits to newly restricted areas. A presentation was also made to the American Wetlands Association on how clam fisheries are upgrading sanitation devises on vessels, and implementing other procedures to protect the environment which is necessary for sustained clam production.

4.5 One Sanitation Training Program for seafood dealers and workers in Franklin County and surrounding area will be taught. (Mahan)

In 2000, the Franklin County Extension Agent assisted Dr. Steve Otwell (UF-Sea Grant) and Mr. Victor Garrido (FL Dept. of Ag and Consumer Services) with organizing, advertizing, recruiting participants and teaching two FL Dept. of Labor funded workshops to update oyster shuckers on the new U.S. Food & Drug Administration's oyster grinder and sanitation guidelines and requirements. As a result of this effort, 105 seafood workers attended the workshops. The workers reported that the workshops were very educational and they have a much better understanding of how to comply with the new regulations. This program was to continue in 2001. However, due to the resignation of Mr. Garrido and the loss of grant funding, the planned 2001 workshop was canceled.

4.6 At least two newspaper columns and/or press releases to inform/educate seafood industry of new regulations and/or educational opportunities available to them will be written in Franklin County. (Mahan)

The Franklin County Agent wrote six educational newspaper columns for the Apalachicola & Carrabelle Times Newspapers (sharks - two columns, global weather patterns - two columns, new fisheries regulations - one column & redtide - one column). In addition, the Agent prepared and distributed thirteen press releases to the local mass media, three of which targeted people interested in clam farming. As a result of this effort, an average of 62 people attended each of the three clam aquaculture workshops that were taught jointly by UF-IFAS and the FL Department of Ag and Consumer Services. Forty-six of these individuals were successful in applying for a clam aquaculture lease.

4.7 The Franklin County Airport Manager and local seafood processors will be assisted in developing a seafood processing/freezer operation at the airport. (Mahan)

This is part of a long-term effort by the Franklin County Extension Agent to provide community development assistance. In 2000, the situation looked promising to finally get this project off the ground. However, at the last minute, the key seafood dealers working on the project decided that they did not have the finances to invest in the project. As a result the idea is still alive, however, the financial support for the project has still not been secured.

4.8 Membership will continue on Florida's *Vibrio vulnificus* Risk Management Work Group to develop and implement the statewide management plan to reduce *V. vulnificus* oyster related illnesses in Florida. An annual evaluation of illnesses in Florida will be done to determine if the management plan is working. One FDACS *Vibrio vulnificus* Risk

Management Workshop will be attended to receive public comments on the management plan the work group developed. (Mahan)

The Franklin County Agent continued involvement in Florida's *Vibrio vulnificus* Risk Management Group in 2001 to develop and implement the statewide management plan to reduce *V. vulnificus* oyster-related illnesses in Florida. During 2001, the plan was finalized and adopted by the FL Dept. of Ag and Consumer Services as a voluntary plan for the oyster industry to follow until the final action is taken by the Interstate Shellfish Sanitation Conference at their annual meeting on requiring states to develop *Vv* illness reduction plans. As a result of this effort, Florida was the first Gulf of Mexico state to develop and adopt a *Vv* illness reduction plan. Both the ISSC and the U.S. Food & Drug Administration were very pleased with the Florida plan and used its outline as a model for the regulation adopted by the ISSC during their annual meeting in July 2001.

4.9 Membership on the Interstate Shellfish Sanitation Conference's *Vibrio vulnificus* Education Subcommittee will continue to develop a national education plan to reduce V.*vulnificus* oyster related illness nationwide. National illness statistics will be monitored to determine if the education program is having the desired impact. (Mahan)

See 3.21 and 4.83. Results are reported there.

4.10 Six seafood safety workshops for 200 home seafood consumers who live along the West Coast of Florida. (Sweat)

Eight seafood safety workshops were held for over 200 seafood consumers who live along the west coast of Florida.

4.11 Annual industry training sessions will be held with the assistance of county faculty . (Otwell)

4.11.1 Conduct Shrimp School, domestic processing firms, May 2001 and May 2002 for 25-30 firms. (Otwell)

The Annual 'Shrimp School' scheduled for May 2002 is the 7th successive and successful training program recognized as the leading course in the nation. Every major shrimp processing firm in the nation and over 20 international firms have attended. Increasing demand for the course is pressuring for two courses per year and the addition of a sister course, "Lobster School'. The course is "self sustaining" under Florida Sea Grant direction in the Aquatic Food Products Program with UF.

4.11.2 Conduct Shrimp School, international, 2001-Nicaragua and 2002-Vietnam for 25-30 firms. (Otwell)

The first International "Shrimp School" was completed in Nicaragua during 2001. The success of this event has attracted demand for an annual "Latin American Shrimp School" which is under consideration. Various South and Central American nations are bargaining for the next course. This first course was conducted in cooperation with USDA, USAID, NMFS, FDA and the academic, regulatory, and trade representatives in Nicaragua. A special part of the school, 'Pest & Filth Assessment' was supported by the National Fisheries Institute.

4.11.3 Conduct training for clam processors in Franklin County, July 2001 and June 2002. (Mahan)

Sea Grant fieldwork in cooperation with USDA and NMFS through 2001-2002 culminated in a publication (available in English and Spanish) that can serve as the foundation for "Good Aquacultural Practices – GAP's" for farmed shrimp. These GAP's are essential to assuring safe products from farm to plate. They offer guidance and measures of performance applicable to domestic and international standards. The GAP's are being advocated as the future mode for commerce mindful of devastating consequences such as the current concern for errant use of antibiotics, i.e. chloramphenicol, that has significantly impacted world trade for farmed shrimp.

4.12 The publication "Good Aquacultural Practices for Farmed Shrimp", will be completed to serve as the domestic and international guide to be referred by the U.S. Food and Drug Administration. (Otwell)

Sea Grant fieldwork in cooperation with USDA and NMFS through 2001-2002 culminated in a publication (available in English and Spanish) that can serve as the foundation for "Good Aquacultural Practices – GAP's" for farmed shrimp. These GAP's are essential to assuring safe products from farm to plate. They offer guidance and measures of performance applicable to domestic and international standards. The GAP's are being advocated as the future mode for commerce mindful of devastating consequences such as the current concern for errant use of antibiotics, i.e. chloramphenicol, that has significantly impacted world trade for farmed shrimp.

4.13 Shelf-life and taste panel trends for aquaculture produced sturgeon will be completed. (Otwell)

The sturgeon sensory work was omitted due to state regulatory conflicts with production.

4.14 Periodic training schools for HACCP and Sanitation Control Procedures for seafood processing and regulatory inspectors will continue. Schools will be held every six months, plus as needed in response to firms, agencies or organizations that assure 25 attendees. (Otwell)

Florida Sea Grant continues to offer annual schools in HACCP for seafood processors in all regions about Florida. The original schedule of 6 courses per year has narrowed to 3 courses per year, and additional courses based on demand. These courses are required by all state based inspectors and the regional FDA authorities. The course is expected and appreciated by all sectors of seafood commerce from production and processing to wholesale and retail/food service operations.

4.15 Leadership will be provided for numerous seafood technology organizations. (Otwell)

Florida Sea Grant Seafood Specialist Dr. Steve Otwell remains active with numerous trade organizations and committees. Current assignments 2001 through 2002:

- Southeastern Fisheries Association, Science Advisor
- Seafood Committee, Association of Food and Drug Officials (AFDO)
- Post-Harvest Technology Committee, Interstate Shellfish Sanitation Conference (ISSC)
- Seafood Division, Institute of Food Technology (IFT)

New recent assignments with national and international stature include:

- National Academy of Sciences, Committee on the 'Status of Performance Standards for Food Safety' report due 2002

- U.S. Representative to the Board of Directors, International Association of Fish Inspectors (IAFI)
- Technical Advisory, U.S. FDA delegation to Codex Alimentarius Meeting for Fishery Products, Alesund, Norway, June, 2002
- Executive Director, Seafood Science and Technology Society of the Americas. National/International Conference, October 2002, Orlando

Goal 5: Increase the Economic Competitiveness and Environmental Sustainability of Coastal Water-Dependent Businesses

5.1 Federal and state governments have recently begun encouraging or requiring local governments to prepare various plans and strategies for reducing the impact of hurricanes and for dealing with post-storm problems. Local communities have, however, been reluctant to get involved in these activities. This project seeks to develop a gaming simulation that can be used in training local officials to prepare for hurricanes and their aftermath. In addition, the simulation will illustrate the impact of policy changes at higher levels of government on local communities. The resulting simulation will be implemented throughout the state by the Florida Department of Community Affairs. (Deyle: R/C-P-22)

This project developed and successfully tested a new gaming simulation as a training tool for disaster recovery and mitigation. Workshops based on "Simulation Training on Recovery and Mitigation" (STORM) were attended by 78 local officials and 24 State agency staff. However, the agency that had committed to use the training materials statewide, lost its positions scheduled to do this in state budget reductions.

5.2 Continued growth of the boating industry cannot be sustained unless conflicts are reduced among urban baywater resource users and the impact of marine facility development on coastal resources is minimized. The legal and institutional framework for regional coastal waterway management in Southwest Florida will be developed and implemented. (Hamann/Ankersen: R/C-P-23)

As a result of this project, anchorage management plans that reflect the principles of anchorage management developed by the Southwest Florida Regional Harbor Board with assistance from this project are being considered for several of the most conflicted anchorages in Southwest Florida. The legal research provided to back up this effort has enhanced the credibility of the Regional Harbor Board (RHB) as it addresses issues of anchorage management with individual local governments.

An indirect but significant benefit of this project has been to facilitate the development of additional expertise at the Center for Governmental Responsibility in the area of waterway management and marine resource policy. This in turn has enabled the Principal Investigators to pursue additional related projects. These have been accomplished under the auspices of the University of Florida Conservation Clinic, an interdisciplinary environmental law clinic that provides students with opportunities to pursue applied law and policy project under the direction of the Clinic Director, Thomas T. Ankersen and faculty advisors. Expertise and contacts developed through this project enabled the Clinic to gain a contract from the Florida Marine Research Institute to examine aspects of marine resource management in Southwest Florida through its "Blueways" project. In addition, the Clinic has been working under contract from the U.S. Army Corps of Engineers as facilitators for a series of public meetings involving the restoration of spoil islands in Southwest Florida and in Dade County.

Work has continued under separate contract to assist the West Coast Inland Navigation District with the development of a five-year comprehensive plan. One element of that plan refers to waterway management. Within the Waterway Management element, a supplement was prepared concerning anchorage management. The RHB reviewed the agreement and approved it in principle. Final approval remains at the discretion of the

WCIND and work is continuing with WCIND on this and other elements of their strategic plan.

The Model Harbor Management Ordinance was approved by the RHB, and at the June 1, 2001 meeting the RHB voted to send the ordinance to the Tallahassee office of the Florida Department of Environmental Protection as the RHB's recommended strategy for anchorage management throughout the State of Florida. As noted below, one municipality has used the model ordinance as the basis for its own ordinance creating a harbor management plan.

At least two individual anchorages have formally adopted anchorage management plans that conform in part to the RHB's regional strategy, which this project assisted in developing.

Town of Fort Myers Beach -- Has jurisdiction over the Matanzas Pass Anchorage, one of several the RHB identified as requiring "active management' pursuant to the principles of anchoring drafted for the RHB. The Town recently adopted a harbor management ordinance that in large part tracks the model ordinance described above. Several key meetings were held with town officials in an effort to encourage the Town to pursue the RHB's anchorage management strategy.

Sarasota Sailing Squadron -- This group has been pursuing the regional strategy at its own anchorage. The squadron is a private non-profit institution. The squadron and the City of Sarasota have recently sought a submerged lands management agreement from FDEP based on an anchorage management plan which conforms to the regional strategy.

The legal and institutional history of the West Coast Inland Navigation District (WCIND) has been completed. This report was prepared to assist District staff and counsel, as well as the interested public, in understanding the statutory origin of the WCIND and its growing mandate to address all aspects of regional waterway management. The final edits are in process for submission to WCIND.

The technical publication "Anchoring Away" has received -- and continues to receive -- considerable attention and widespread distribution. This publication will be followed with a compendium of subsequent reports and memoranda that waterway managers have advised have been useful to them. Accordingly, a final version of the Model Harbor Management Ordinance and related legal memorandum is in process as a Sea Grant technical publication.

In addition, the work of Jody Brooks, a student assistant under this and related grants won 3rd place in the Florida Bar's annual Dean Maloney Memorial Writing Contest, a competition among state law schools. The publication is entitled "Tranquil Waters: Federal, State and Local Governments Authority to Restrict or Exclude Vessels in Florida Waters." A condensed version was published in the Section Reporter of the Florida Bar's Environmental and Land Use Law Section.

Some of the documents that have been generated during the course of this project are on the website of the UF Conservation Clinic, the applied legal education course in the Environmental and Land Use Law Program at the College of Law. (http://conservation.law.ufl.edu)

In 1999, a highly successful continuing education program with the Florida Bar entitled “Recreational Boating and the Environment” was held. A number of requests from the boating community in Southwest Florida have been received to repeat this event. Many of the issues discussed in the 1999 workshop such as personal watercraft and manatee protection have had significant further developments, and several new issues have emerged. Accordingly, discussions have begun with the Bar and others concerning offering this curriculum again, perhaps in Southwest Florida. This was completed in winter 2002.

5.3 This effort builds on a number of Florida Sea Grant research projects to address bay water management issues by functionally integrating physical, biological, social and economic components of coastal ecosystems to promote sustainable use. It provides for an extension education program to facilitate non-regulatory, environmentally sensitive management of Florida’s waterways. These program activities will be undertaken with federal (NOAA/Coastal Service Center, NOAA/Coast Survey), state (Florida Department of Environmental Protection), regional (inland/inlet navigation districts), county/municipal, and private sector (boating organization, homeowner association) participation through Memoranda of Understandings (MOUs) for anchorage and waterway management. (Swett, Sidman, Fann: E/CSC-4; SGEP-12)

5.3.1 An Advisory Council that will assist the Urban Bay Management Program to clarify and prioritize issues, develop program objectives, identify and establish partnerships with governmental entities, and evaluate program activities will be organized. (Swett)

An advisory committee is being formed to guide the implementation of county and state level policy recommendations that result from research to improve the utility of the Florida Vessel Title Registration System to characterize Florida’s boating population. The research, funded by Sea Grant and the Florida Marine Research Institute, will be completed by May 2003. The advisory committee will form the basis for a broader Advisory Council to help to the Urban Boating and Bay Water Management Program prioritize issues, develop program objectives, identify and establish partnerships, and evaluate program activities.

5.3.2 Thirty community leaders and citizens will be educated through three workshops, one extension bulletin, five meetings with state and local governments, and 15 individual consultations and meetings. (Swett, Sidman, Fann)

1) A Regional Waterway Management System workshop was held in October 2001 to instruct the Lee County Natural Resources Manager and five of his staff, and the Executive Director of the West Coast Inland Navigation District, on the methods used to collect field data, the information content of the GIS datasets delivered, and the analytical results obtained. The Lee County Division of Natural Resources uses, on a daily basis, the Florida Sea Grant Regional Waterway Management System and the accompanying geographic information data sets to prioritize their management activities, the siting of waterway signs, and planning for maintenance dredging in the most ecologically sensitive and cost-effective manner possible.

2) Three Regional Waterway Management System instructional workshops were held for personnel from the Florida Department of Environmental Protection (FDEP), including the Environmental Administrator, Aquatic Preserve managers, Environmental Specialists, and Biologists; the Executive Directory of the West Coast Inland Navigation

District; and county representatives. The workshops instructed participants in Regional Waterway Management System methods and the use of the GIS data contained on CD-ROM's. The FDEP has adopted the regional waterway management system protocol through a memorandum of understanding. An outcome of the system will be to reduce maintenance dredging permitting delays and expense while minimizing environmental impacts. Based on the management protocol, the FDEP is in the final stages of granting the West Coast Inland Navigation District a general permit to perform maintenance dredging on 51 severely restricted boat source areas in southwest Florida. This effort is a concrete example of how Sea Grant research and extension programs can positively affect public policy.

3) Florida Sea Grant participated in a Marine Protected Areas Needs Assessment focus group facilitated by the NOAA Coastal Services Center. The goal of the focus group was to identify current needs of and possible roles for a National Marine Protected Areas Center.

5.3.3 Field surveys for five Florida Anchorages will map sea grasses, bottom characteristics, and water depth and produce large-scale photomaps of each site for resource managers and for boaters. (Swett, Sidman, Fann)

Mapping of five additional Florida anchorages is scheduled for 2002-2005, contingent on obtaining funding.

5.3.4 Expert scientific services will be provided to local, regional and state governments, in implementing anchorage management plans. (Swett, Sidman, Fann)

The "Model Harbor Ordinance" (Tom Ankersen et al., 2000), developed in conjunction with the Center for Governmental Responsibility, has been used by the Sarasota Yacht Club, Sarasota, Florida, to implement a mooring plan. In addition, the city of Venice, Florida, is using the Model Harbor Ordinance as the basis for its anchorage management plan. Increased awareness and interest in anchorage management and planning is evidenced by the success of the FSG/CGR sponsored Waterway and Anchorage conferences held in Ft. Myers (2002).

5.3.5 A one-year monitoring program at three locations using social and bio-physical management criteria for recreational water-use zoning will be completed and results reported to state and local authorities. (Swett, Sidman, Fann)

Boat traffic at three popular anchorage sites was monitored over the course of one-year (1999). GPS and a laser rangefinder successfully mapped the frequency, type and spatial extent of boating activities in near shore areas to support southwest Florida Regional Harbor Board anchorage management efforts. Methods and results were reported in the Florida Sea Grant Technical Paper 105 titled, "Evaluating Recreational Boating Patterns at Selected Sites in Southwest Florida for Regional Anchorage Management" (2000) and were presented to the southwest Florida Regional Harbor Board.

5.3.6 A management analysis of 90 miles of waterways in Manatee County will be completed. Products will include large-scale maps for planners, managers and users. (Swett, Sidman, Fann)

FSG completed a regional waterway management analysis of 153 miles of waterways in Manatee County (Swett, Antonini and Schulte, 1999, TD-2). Products include three, 1:2,400-scale map atlases for signs, derelict vessels, moorings, and trafficsheds; a neighborhood waterway analysis showing level of accessibility to open bay for each boat, with draft restrictions at 0.5' intervals, Regional Analysis Atlas, 1:24,000-scale, identifying water depth of access channels, feeder canals, basins, open water areas, boating facilities and boats, habitat (sea grass, mangrove).

5.3.7 A management analysis for 100 miles of waterways in south Lee County will be initiated with WCIND funding. Products will include large-scale maps for planners, managers and users. (Swett, Sidman, Fann)

Florida Sea Grant completed a regional waterway management analysis of 335 miles of waterways in Lee County (Swett, Fann, Antonini, and Alexander 2000 TD-3; 2001 TD-4). Products include 1:2400-scale map atlases for planners, managers, and users; GIS data layers of boats, depths, signs, derelict vessels, moorings, and trafficsheds; a neighborhood waterway analysis showing level of accessibility to open bay for each boat, with draft restrictions at 0.5' intervals, neighborhood waterway analysis showing location and extent of channel depth restrictions at 0.5' intervals; Regional Analysis Atlas, 1:24,000-scale, identifying water depth of access channels, feeder canals, basins, open water areas, boating facilities and boats, habitat (sea grass, mangrove). The Lee County Division of Natural Resources is daily using the Florida Sea Grant Regional Waterway Management System and the accompanying geographic information data sets to prioritize their management activities, the siting of waterway signs, and planning for maintenance dredging in the most ecologically sensitive and cost-effective manner possible.

5.3.8 A regional dredge-and-fill GIS database for Manatee and Sarasota Counties will be developed with WCIND funding. Historical data (digitized) for Charlotte and Lee Counties will serve as a basis for extending the historic waterway analysis to the southern sector of the southwest Florida coast. (Swett, Sidman, Fann)

The West Coast Inland Navigation District contracted with Taylor Engineering, instead of FSG, to develop a dredge material management plan for Manatee and Sarasota Counties.

5.3.9 Three in-service training workshops and tutorials in the utilization of GIS and GPS technology in addressing coastal management issues will be given for 30 local, regional and state government staff. (Swett, Sidman, Fann)
Practical Training in the use of Geographic Information System (ArcView GIS) for marine and coastal resource applications was held in June 2001 for six participants, including marine and county extension agents and the Jupiter Inlet District director. Since the course, the Jupiter Inlet District has obtained ArcView GIS and is interested in contracting with Florida Sea Grant for additional training. Additional GIS/GPS courses have been cancelled due to budget limitations.

5.3.10 A 60-page blueways atlas under the auspices of the Sarasota Bay Heritage Trail Program will be published. The Florida Marine Research Institute (FMRI) will be assisted to develop a conceptual, analytical framework of the human-use component of the Florida Blueways Initiative. (Swett, Sidman, Fann)

Nearly 5,000 copies of Volume one of "A Historical Geography of Southwest Florida Waterways-Anna Maria to Lemon Bay" (SGEB 47) have been distributed to the public, libraries, and local and state officials throughout the state (Antonini, Fann and Roat, 2000). This region-based publication provides a historical perspective on Florida's coastal waterway environment and development history. This benefits a large portion of the tourists and residents who recreate and live along Florida's coastal waterways and are newcomers to the state. Often, these newcomers have little understanding of Florida's unique natural environment, nor an awareness of Florida's developmental history. With greater understanding and awareness, people are better able "self-regulate" themselves and make decisions that will help maintain the quality of Florida's waterway environment.

5.3.11 The second revised edition of the Guide to Anchorages in Southwest Florida will be published. (Swett, Sidman, Fann)

Approximately 800 copies of the second edition of "A Guide to Anchorages in Southwest Florida" have been distributed. The guide promotes safe navigation and fosters sustainable use of coastal resources.

5.3.12 The accessibility and information content of the Florida Sea Grant anchorage web page will be enhanced by using the latest map server technology. (Swett)

This has not been accomplished due to funding constraints.

5.3.13 Collaborate will occur with the NOAA Marine Chart Division (MCD) in the design and product evaluation of a prototype photochart (NC11425) based on recreational boater needs and chart-reading skills. (Swett, Sidman, Fann)

NOS small-craft navigational chart 11425 was re-designed to meet boater needs, based on input during focus group workshops and a profile survey of 828 boaters in southwest Florida. A random sample of 130 persons, who participated in the boater profile survey, tested the effectiveness of the prototype nautical chart during a product evaluation survey. The results presented by NOAA have resulted in the development of new products by the Marine Charting Division (Antonini, West, Sidman, and Swett, 2000, TP-87)

5.3.14 Local public and private sectors will be aided in developing partnering arrangements to sponsor the printing and distribution of these photomap products for the recreational boaters. (Swett, Sidman, Fann)

See 5.3.10 and 5.3.17.

5.3.15 Under a cooperative agreement with the West Coast Inland Navigation District, (WCIND) a valuation study will be designed that will assess the waterway infrastructure investments in Manatee and Sarasota County waters. (Swett)

The West Coast Inland Navigation District decided not to proceed with this task.

5.3.16 Scientific advisement and program support to WCIND in implementation of their five-year comprehensive Regional Waterway Management Plan will be provided. **(**Swett, Sidman, Fann**)**

Florida Sea Grant completed, in December 2001, a Five-Year Strategic Plan, developed for the West Coast Inland Navigation District (WCIND). The plan presents 2002 -2007 goals and objectives for priority areas that encompass the broad range of WCIND responsibilities to the Southwest Florida community as mandated in Florida Statues, Chapter 374 (2000) and Florida Laws 98-526 (1998). The document was developed with the dual purpose of providing 1) agency planning guidance, and 2) the public with an easy to read and understandable document that describes the many community benefits derived from maintaining waterways and beaches.

5.3.17 The historical waterway analysis will be extended south into Charlotte Harbor, Pine Island Sound, Caloosahatchee River, Estero Bay and the Imperial River. **(**Swett**)**

Volume two of the historical geography series titled "A Historical Geography of Southwest Florida Waterways – Charlotte Harbor to Cape Romano" is in progress and will be completed in 2002. This region-based publication provides a historical perspective on Florida's coastal waterway environment and development history.

5.3.18 An ArcView GIS decision support system for use by resource managers that incorporates methodology developed for the Regional Waterway Management Systems (RWMS) conducted in Lee, Manatee, and Sarasota Counties will be developed. (Swett)

Completion of an ArcView GIS decision support system for use by resource managers that incorporates methodology developed for the Regional Waterway Management Systems conducted in Lee, Manatee, and Sarasota Counties is contingent on outside funding obtained during 2002-2005.

5.3.19 A survey of methods for characterizing recreational boating in Charlotte Harbor will be completed. (Sidman, Fann)

The recreational boating characterization, completed in 2001, compared three survey methods for obtaining boat and boater information (aerial reconnaissance, telephone and mail surveys, and expert meetings). The results of this project are report in the Florida Sea Grant Technical Paper 109 entitled "A Survey of Methods for Characterizing Recreational Boating in Charlotte Harbor, Florida" (Sidman and Flamm, 2001). Project results were presented at the Charlotte harbor Summit (February 3-5, 2002) and in a manuscript entitled "A Regression-Based Approach to Estimate Preferred Boating Destinations in Charlotte Harbor, Florida" (Sidman and Fik, 2002) submitted to the Coastal Management Journal. Publication of these research results will further legitimize the State's Blueways initiative. Additional boat characterization work has been funded by the Florida Marine Research Institute and is now in progress.

5.3.20 Presentations on boating related coastal waterway management will be made at the Biennial Coastal GeoTools '01 Conference in Charleston, South Carolina and for a National Sea Grant sponsored panel at the 12th Bienniel Coastal Zone '01 Conference in Cleveland, Ohio. (Swett, Sidman, Fann)

At Coastal GeoTools ’01, FSG presented, findings from the NOAA-sponsored project to develop a new-generation navigational chart. In addition, two posters were presented. One outlined a method to georeference historical hydrographic and terrestrial sheets developed in the late 1800’s. The second presented a GIS method used to evaluate anchoring patterns for the establishment of temporary and permanent mooring fields. The St. Johns River Water Management District in now interested in collaborating with FSG on a project that will develop historical shoreline and bathymetric data. Florida Sea Grant presented the Regional Waterway Management System during a National Sea Grant sponsored panel at the 12th Biennial Coastal Zone ’01 Conference in Cleveland, Ohio. These presentations provided national exposure of Florida Sea Grant activities to an audience of coastal and marine resource managers.

5.4 Nature-based tourism providers in Taylor County will be assisted in the development of tourism activities relative to sustaining the natural resources (i.e., infrastructure required, planning, species inventories, and ecosystem processes). (Aubrey)

Agent resigned.

5.5 Taylor County’s boater’s use survey will be conducted to help determine the economic impact of fishing, diving, and boating as well as evaluate the efficiency of dollars spent by the county. (Aubrey)

Agent resigned.

5.6 2,500 Taylor County boater’s guides will be produced. (Aubrey)

Agent resigned.

5.7 One hundred recreational boaters will gain knowledge and adopt methods to conserve fuel when boating by receiving a fact sheet on Fuel Conservation Techniques. (Crane)

Fact sheet has been developed and submitted to Sea Grant Specialists for review and approval before distribution to boaters. (Crane)

5.8 A Boater’s Guide to address boating safety, access, fishing conservation, and recreational localities within Biscayne Bay will be produced. (Crane)

Boater’s guide is pending due to funding constraints. Information is still being collected to produce guide. Funding is currently being investigated from other possible sources.

5.9 Fifty boaters will gain knowledge about pollution prevention and adopt alternatives to using non-toxic boat cleaning products. (Crane)

Through the Clean Marina Program, progress has been achieved for knowledge gained on pollution prevention. Forty-five interested marina managers, boatyard owners, Coast Guard Auxiliary staff, and recreational boaters became familiar with alternative non-toxic cleaning products through receiving Clean Boater Habits booklet. In addition, the Miami-Dade County Sea Grant printed an article on “Eco-friendly Clean Boating Habits” in the bi-monthly newsletter. Adoption of clean boating habits will be evaluated by personal interviews and/or mailed surveys within the upcoming year.

5.10 One marina in Escambia County will begin the certification process in the state’s “Clean

Marina Program" as measured by program guidelines. (Diller)

Two marinas and one boatyard were certified in the State of Florida Clean Marina and Clean Boatyard programs in Escambia County. Florida Sea Grant, one of the members of the Clean Boating Partnership, assists these facilities in voluntarily finding the materials and products needed to achieve this designation. These facilities have reduced or eliminated pollution from entering the water at their location.

5.11 Technical assistance will be provided for development of a Bradenton Beach anchorage management plan. (Stevely)

Results of Sea Grant Marine Extension Program survey of the Bradenton Beach anchorage were presented to City and County elected officials and staff. The governments of Manatee County and Bradenton Beach are currently working on a management plan and cooperative agreement.

5.12 Fifty resource managers and elected officials will more effectively manage anchorage resources (Regional Harbor Board Anchorage Management Plan) through Sea Grant's involvement and continued participation on the Regional Harbor Board in Southwest Florida. (Stevely)

See 5.3.2, 5.3.8, 5.3.9 and 5.3.10.

5.13 A regional MarinaNet meeting will be attended to explore future educational program activities. (Jackson, D.)

The MarinaNet meeting was the final official activity under the grant administered by Texas Sea Grant. This concluded a 6-year effort that has resulted in several studies by MarinaNet partners. Florida Sea Grant was responsible for an educational component, which resulted in 10 low power radios being placed in marinas. (See Item 5.18) MarinaNet will continue as an informal forum. The next activity under this now unfunded effort will be participation in the national Clean Marina/Boatyard meeting scheduled for Fall, 2002.

5.14 State Clean Boating Partnership Advisory Council meetings will be attended to develop training programs for Florida's marinas and boatyards. (Spranger, Jackson, D.)

Florida Sea Grant has been represented at all Clean Boating Partnership Advisory Council meetings. Assignments by the Partnership have resulted in curriculum development and presentation of workshops throughout the state. (See Item 5.16) With our participation, there are now 35 Clean Marinas and 5 Clean Boatyards certified by the State of Florida, with 150+ marinas and/or boatyards working toward certification. The programs are models for other states.

5.15 Best Management Practices for Boatyard Resource Kits for new Clean Boatyard Program will be developed. (Jackson, D.)

Resource kits for Best Management Practices for Boatyards were developed and distributed at workshops throughout Florida. These kits are updated regularly and distributed to presenters, interested boatyards, to several other states, and also serve as a resource kit for marinas working toward certification. To date, over 250 copies have been distributed.

5.16 Curricula and two training programs will be conducted on “Preparing the Presenters” for the new Clean Boatyard Program. (Jackson, D.)

The curriculum for Clean Boatyard workshops was developed and five formal “Prepare the Presenters” sessions were delivered. Sixty-five boatyards or marinas were represented at these five sessions and these people are now presenting one-on-one workshops to fellow owners and operators. This has been a good example of the multiplier value by Sea Grant preparing a small cadre of industry people and their subsequent expansion and exposure to many more boatyards.

5.17 An evaluation of the new Clean Boatyard Training Program will be completed. (Spranger)

Evaluation of the Clean Boatyard Training Program is underway. Results will be available by June 2002. (Jackson, D.)

5.18 Ten low power radio units will be placed in 10 marinas around the state to test the effective of this new technology in conveying important marina and boating safety information. (Jackson, D.)

Low power radios were placed in 10 marinas throughout Florida. This experiment was a MarinaNet inspired project. Informal feedback to date indicates that most radios (8) are highly successful in reaching marina patrons, and others (2) have not been rated as well. Marina operator enthusiasm for placing messages of interest, and changing them with some frequency is the biggest factor in success. A full report will be distributed to the Sea Grant network and to interested industry groups by fall, 2002.

5.19 The Pensacola Bay Boater’s Guide will be reprinted and distributed to Santa Rosa County citizens. (Verlinde)

Data collection was done in preparation for the reprint of the Pensacola Bay Boater’s Guide. The guide has gained approval and funding from the Santa Rosa County Board of County Commissioners Marine Advisory Committee, printing will take place in 2002.

5.20 The Boaters Guide To Lee County will be revised, printed and distributed to boaters. This guide provides a concise depiction of regulated water zones, navigation channels, sea grass meadows, artificial reefs and boat ramp locations. (Wasno)

Lee County Natural Resources has decided to produce the Guide within Lee County, rather than provide funding for Sea Grant. A $1,000 donation to the Fl Marine Mammal Stranding Network thru a local boat dealership was secured for consideration of depicting their boat on the cover.

5.21 The Fort Myers Yacht Basin will be assisted in expanding their mooring field to allow transient vessels safe harborage for short or long-term anchoring. (Wasno)

This past year, the City of Fort Myers completed permitting and installation of mooring buoys on City owned bottom lands of the Caloosahatchee River. The City installed 25 mooring buoys on permanent anchors with the ability to withstand Category 3 hurricanes for a vessel 60 feet in length.

5.22 Five hundred “Don’t Splash Your Trash” signs will be distributed to over 40 marinas and boatyards in the Miami-Dade County region. (Crane)

Four hundred and eighty-seven “Don’t Splash Your Trash” signs have been distributed to various marinas, boatyards, fishing piers, boat ramps, waterway bridges, and educational facilities. Additional funds are being pursued from Boat U.S.’s Clean Water Grant for an additional 250 signs to post at marinas, bridges, and fishing piers. Members of the Miami-Dade Marine Advisory Committee assisted in the distribution and posting of these signs.

Coastal Ecosystem Health and Public Safety

Goal 6: Protect and Enhance Coastal Water Quality and Safety

6.3 When wastewater contaminates coastal waters there is an increased risk of infection by human pathogenic microbes, including viruses, bacteria and protozoans. This could affect water-based industries, which create multi-billion dollar economic impacts in Florida. This project will improve enteroviral detection methods for use in coastal waters, to ensure the safety and quality of human uses of these waters, and to provide a method that can be used to improve water quality. (2000) (Paul/Rose: R/LR-MB-12 [T-99-55])

A rapid and sensitive method has been developed for the quantitative detection of pathogenic human enteroviruses from environmental waters using Taqman® One Step RT-PCR with the model 7700 ABI Prism® Sequence Detection System. Nine of fifteen sample sites in the Florida Keys were found to be positive for pathogenic human enteroviruses with quantities ranging from 17.5 to 70 viral particles per ml of marine surface waters. Three strains of enveroviruses were identified. An alternative lower cost technique for the rapid identification of enteroviruses was also developed using RT-PCR and DGGE. One journal manuscript was submitted and three conference presentations were made.

6.4 Restoration and long-term sustained quality of the Florida Bay ecosystem and dependent economies involves major expenditures of public and private funds. More than 100 research projects focused on Florida Bay. Scientists will contribute data vital to the description, understanding and prediction necessary for management of the Florida Bay ecosystem. But ultimately the success of management will depend on the awareness and knowledge of citizens, businesses and organizations in the Florida Bay region. The purpose of the Florida Bay Education Project is (1) to provide a communication link between South Florida citizens and the research community working toward ecosystem management and thus empower citizens to make science-based decisions on issues that affect Florida Bay and (2) to serve as the education arm of the Florida Bay Program Management Committee, the multi-agency research coordination body overseeing scientific research in Florida Bay. This program will be continued, but phased out at the end of 2001, if continuation funding is not found. (Gregory, Engleby: E/COP-1, E/COP-2, E/COP-3)

The Florida Bay Education Project assisted the Program Management Committee (PMC) with organization and logistics of six workshops. The Ecosystem Modeling Workshop, held in late 1999, included both predictive and ecosystem modelers to discuss model development appropriate for Florida Bay management. The Seagrass Topical Research Team, including over 25 scientists from throughout the U.S. met in November 2000. Another 138 scientists were invited to a Biscayne Bay Science Workshop on September 18-19 with a registration process developed to track presenters, posters, and abstracts. The Higher Tropical Level Topical Research Team meeting was also organized.

The Florida Bay Education Project and University of Florida organized 1999 Florida Bay Science Conference held November 1-5 in Key Largo, Florida. Approximately 250 scientists and managers attended the annual conference which focused on linkages between adjacent systems, synthesizing the results of research and model simulation, and introducing ecological performance measures to guide ecosystem restoration. The

conference included presentations from scientists researching Biscayne Bay and the Florida

Keys National Marine Sanctuary and featured a special synthesis session designed for ecosystem managers. The Program Management Committee decided to not have a conference during 2000 and the next conference was held in 2001.

The Education Project regularly attended the monthly meetings of the PMC to report on accomplishments to date and to obtain guidance for future education efforts. Research results were actively communicated to the outreach community and the public through distribution of the quarterly 'Seahorse Sentinel' newsletter, distribution of Project Profiles, electronic mail updates, the Florida Bay Education Project web site http://monroe.ifas.ufl.edu/flbay.htm, and Florida Bay Watch Reports. A mailing list of about 900 individuals, agencies and community organizations currently exists.

To further outreach to a broader audience of resource managers, the PMC was assisted with their presentation of Florida Bay accomplishments to the *South Florida Ecosystem Restoration Task Force Working Group* with distribution of 60 copies of a compilation of the Florida Bay Education Project publications that have been distributed to the public and outreach partners.

Outreach partners have received a complete set of Florida Bay Project Profiles, the Florida Bay Resource Directory, the quarterly newsletters, and the Florida Bay Watch Reports. In most cases, the organization received a notebook containing the full set of profiles. Extra copies of the products are provided, upon request, to partners, interested persons, volunteers, residents, and visitors. Specific partnership building activities are highlighted below.

Seagrass Summit Outreach Partnership. The interagency Seagrass Summit Outreach Partnership initiated in Year Two continues to expand each year. This partnership focuses on reducing boating impacts to seagrass habitat. The Project organized participants to promote a unified message about boating impacts to seagrass, subsequent impacts to fisheries, and how to boat more responsibly in shallow seagrass areas. The Seagrass Summit Outreach Partnership met throughout the year and organized a major media awareness campaign in March 2000. This combined effort resulted in the Monroe Board of County Commissioners designating March 2000 as Seagrass Awareness Month. To kick off the month-long awareness program, over 35 local news media attended a morning seminar devoted to the topic hosted by the Partnership. In support of this intensive effort, four radio public service announcements were developed for local radio stations and a Microsoft PowerPoint slide presentation about seagrass protection that has been aired on the Monroe County government cable channel since March 2000. Two newspaper articles were also written and appeared on the US1 Radio "Morning Magazine" talk show to discuss seagrass protection efforts.

The *Florida Bay Research and Education Resource Directory* has been revised and updated and was published prior to the April 2001 Florida Bay Conference. It was distributed to outreach/educational partners, media contacts, ecosystem managers, and other persons interested in learning more about research projects in Florida Bay. The revised directory includes a directory of Florida Bay related internet addresses.

Development of the partnership network has been continuous. Outreach efforts now directly go to about 900 people, 100% more contacts than in the previous year. The contact database is organized into the following categories: media contacts, educational/outreach partners, fishing interests, research scientists, ecosystem managers, program participants and the general public.

A statistically sound *needs assessment* was designed and conducted in April 2000. The survey instrument was developed with the assistance of the University of Florida/IFAS Program and Evaluation Office. This assessment surveyed South Floridians in Martin, Palm Beach, Broward, Miami-Dade, and Monroe Counties to find out more about their knowledge levels, familiarity with Florida Bay issues, and preferred methods of communication. A summary of the needs assessment results related to the South Florida Ecosystem Restoration was presented in July 2000 to the National Marine Educators Association Conference in San Diego, California.

In collaboration with The Nature Conservancy, a revised series of *Florida Bay Watch Reports* that focus on Florida Bay research were completed.

The newsletter, the *Seahorse Sentinel*, was produced and distributed on a quarterly basis. The newsletter is distributed to outreach educators and the public by mail and is available on the Florida Bay Educational Project web site.

The glossy color brochure titled *"Florida Bay Connections"* containing information about research and restoration in Florida Bay was revised, published, and distributed to outreach partners and to the public through various public events.

An active *mass media* effort has been maintained with eight news articles about Florida Bay issues submitted to five newspapers in the Florida Keys and Miami-Dade areas and each article was published in at least one of the newspapers.

Regular appearances on Monroe County based radio talk shows by Florida Bay Education Project staff highlighted timely issues about Florida Bay. At least eight appearances were made on the Lower Keys US1 Radio "Morning Magazine" show that has an estimated 4,500 daily listener audience.

As a part of the March Seagrass Awareness Month, radio PSA's and a PowerPoint presentation on seagrass protection were developed and aired on local radio and cable access television within the County. Seventy press offices throughout South Florida were contacted with information on Florida Bay research to encourage them to use information in their own stories. During August media (newspapers and radio) were contacted to announce the Discovery Channel's "Science Live" program that featured Florida Bay Research activities.

6.5 Thirty 4-H participants and adults will participate in the UF/IFAS program Project Coast. Baseline data and the long-term outlook of Taylor County's water quality derived from these programs will be disseminated to the public. (Aubrey)

Agent resigned.

6.6 Taylor County residents will be educated on the effects of their practices on water quality through newsletters, public media, and workshops. (Aubrey)

Agent resigned.

6.7 Input regarding design of the collecting devices and assistance in a shoreline cleanup effort will be given to the Brevard County Monofilament Recovery and Recycling Program (MRRP). (Combs)

The Brevard Marine Agent was invited to serve as Weighmaster in the sixth annual Blewater Offshore Fishing Tournament. All vessels were provided printed information (in Captains bags) and verbal information (at mandatory Captains meeting) on the Brevard County Monofilament Recovery and Recycling Program (MRRP), and asked to participate in achieving the goals of the program.

6.8 Participation in the State of the Indian River Lagoon Conference and the Melbourne Harbor Festival will provide the opportunity to give information concerning Sea Grant programming to 400 visitors. (Combs)

The Indian River Lagoon Conference is now held only every two years, and was not held during 2001. The Melbourne Harbor Festival is no longer supported by the Melbourne Chamber of Commerce (too costly to the city). The Grant Seafood Festival provided ample opportunity to provide to the public information about Sea Grant programs. A public display on Clean Boating programs, and on invasive exotic species and impacts on marine environments was presented, and viewed by 1,000 visitors.

6.9 Dr. Mikhail Shilin will be given long distance assistance in developing a system of Science Fairs in Russia, and developing a Russian component to the Internet-based International Math Program. (Combs)

Internet contact with DR. Shilin was sporadic due to system problems in Russia, but this is an ongoing project that is expected to continue. Brevard Sea Grant purchased books and brochures concerning Science Fair operations and methodologies that are intended for Dr. Shilin's use. Sea Grant also continues a long tradition of judging Science Fairs, and is compiling materials that can be used by Dr. Shilin. There are both standard practices and local variations used in local Science Fairs, so this variety can be used to demonstrate to Dr. Shilin how to adapt to local school or regional differences while maintaining standards suitable for (eventual) international competition.

6.10 Fifty boaters will gain knowledge about pollution prevention and adopt alternatives to using non-toxic boat cleaning products. (Crane)

Through the Clean Marina Program, progress has been achieved for knowledge gained on pollution prevention. Forty-five interested marina managers, boatyard owners, Coast Guard Auxiliary staff, and recreational boaters became familiar with alternative non-toxic cleaning products through receiving Clean Boater Habits booklet. In addition, the Miami-Dade County Sea Grant printed an article on "Eco-friendly Clean Boating Habits" in the bi-monthly newsletter. Adoption of clean boating habits will be evaluated by personal interviews and/or mailed surveys within the upcoming year.

6.11 Thirty percent of the homeowners in one identified neighborhood whose storm water enters Bayou Texar will adopt yard and garden practices that reduce the amount of fertilizer in runoff as measured by pre and post surveys. (Diller)

The Florida Sea Grant marine extension agent co-hosted a "Waterfront Living Workshop" with the Escambia County horticulture agent. Agents taught thirty residents methods to maintain their homes and yards while protecting local waters from stormwater pollution. The homeowner's association has since utilized non-herbicidal methods to reduce invasive plant growth and initiated contact with the University of Florida's Project Lakewatch to learn to monitor water quality.

6.12 Fifty boaters will adjust their cleaning, fueling, and maintenance methods to reduce pollutants entering local waterways. (Diller)

Clean boating methods were presented at the first Escambia County Marine Safety Expo, during a "Waterfront Living Workshop" for local residents, and at a meeting of the Pensacola Beach Leaseholders Association. Together, these events and distribution of the Clean Boater handbook educated over 1,000 people on methods to reduce pollution while boating.

6.13 Two programs will identify water quality and habitat problems and solutions for Okaloosa/Walton County residents. (Jackson, S.)

Several educational program taught Okaloosa and Walton County residents solutions and options to address water quality and habitat issues. Most notable were the programs "Living with the Bay" sponsored by the Choctawhatchee Basin Alliance and "Are We Polluting our Coastal Dune Lakes" sponsored by the South Walton Community Council. Approximately 180 residents attended these events with additional news media coverage an additional audience of 19,950. (Jackson, S.)

6.14 Three meetings of the Sarasota Bay National Estuary Program Technical Advisory Committee will be coordinated. (Stevely)

Florida Sea Grant Extension Agent John Stevely chaired five meetings of the Sarasota Bay National Estuary Program, Technical Advisory Committee. The committee developed the Estuary Program's long-range work plan, and reviewed all ongoing research projects and habitat restoration projects. The work plan will provide guidance for the expenditure of approximately $1,100,000 annually for implementation of the Comprehensive Conservation and Management Plan.

6.15 A research project designed to estimate the economic impact of Red Tide will be assisted. (Stevely)

The emphasis on this project was moved to another area of the state, outside the agents work area.

6.16 Three hundred boat owners will receive beach cleanup materials and "Boaters & Anglers Pledge Program materials. (Sweat)

Over 400 boat owners became familiar with the Boaters and Anglers' Pledge Program and joined the effort to clean up Florida's coastal waters.

6.18 A public information (warning) poster on the Green Mussel, an exotic species that has

been found in Tampa Bay will be developed and distributed. (Sweat)

A public information poster on the Green Mussel, an exotic species recently found in Tampa Bay, was developed by the Florida Marine Research Institute and distributed throughout the Tampa Bay area by the marine agent.

6.19 Florida Yards and Neighborhood Program workshops will enable at least one waterfront community to obtain knowledge on water quality issues, resulting in changes that will improve the quality of water in their area. (Tavares)

Neighborhoods along the North Fork of the New River were identified for this objective, and Florida Sea Grant Extension attended many public meetings for the North Fork of the New River Restoration Project, and spoke to 34 members of the public on waterway debris issues. An offer was made (by Florida Sea Grant/Florida Yards & Neighborhoods in Broward County), to attend advisory council, homeowners association, community group, and school group meetings, to raise awareness, and to educate on just how water quality was influenced by everyday household practices. Residents were encouraged to, “act locally, and think globally”, and to become an active part of the community restoration effort.

6.20 One hundred boaters will learn about and adopt environmentally friendly boating practices that encourage healthy sea grass communities. (Tavares)

There was a shift in the target audience due to unforeseen circumstances. Seventeen 4H Leaders, 23 adults and 33 children learned about the seagrass ecosystem and its functions, through workshops, field trips, interactive presentations and discussions.

Goal 7: Protect, Restore, and Enhance Coastal Ecosystem Habitats

7.1 A web site for the nation's 20 most invasive non-indigenous aquatic plants will be developed. The site will include information for identification, eradication and native replacements. Seven plants will be documented during 1999 and 13 plants will be added during 2000. (Ramey: E/NS-1 [ANS-99-107])

A web site on each of 24 species of invasive aquatic plants has been completed. The web site may be found at http://plants.ifas.ufl.edu. (In upper left hand column, click on "24 Aquatic/Wetland Invasive Plants".) The web site is part of and served by the APIRS system of the Center for Aquatic and Invasive Plants. (APIRS is the Aquatic, Wetland and Invasive Plant Information Retrieval System.)

For each of the 24 species, the most important original scientific literature on the plant has been compiled, synthesized and listed, and complete nomenclature and identification information provided, including original photographs and line drawings. In addition, management information for each plant and restoration methods have been reviewed and presented where such information is known (published in the scientific literature).

7.6 The brown macroalga *Dictyota* presently dominates the Florida Keys reef tract. However, little is know about the related abundances of each morphology in this area, and little is known on how this bloom is impacting resident macrophytes, invertebrates and fishes. This pilot project will begin to answer this question and lead to more developed research proposals in this area. (Walters: PD-99-10)

Reefs in the Florida Keys have changed in the past two decades from being dominated by corals to being dominated by macroalgae. However, very little is known about the biology of the dominant alga on many reefs, the brown alga *Dictyota*. Of particular interest is the fate of small fragments created by water motion or herbivores. Other research has shown fragmentation is an important component of the life-history of many green and red macroalgae; this is the first demonstration of the importance of fragmentation in a brown alga. It also adds weight to the argument that this type of a sexual reproduction may be critical for macroalgae to dominate subtropical or tropical habitats.

7.7 A number of National Estuarine Research Reserves now exist around the coastal areas of the U.S. The goal of this study is to determine appropriate techniques to manage recreation use in the research reserves. The Rookery Bay reserve in Florida will be used as a model for development information that can be transferred to other reserves. (Stein: PD-99-11)

This research represents the first attempt to apply recreation user studies traditionally conducted for land-based recreation to an estuary. These results show that wildland recreation management strategies do apply to estuary recreation areas, but issues such as *crowding* and *conflict between motorized and non-motorized* should not serve as the foci of management as they have done for past wildland recreation management. Instead, this project shows that perceptions of environmental impacts and the behavior of boaters should lead management direction in the Rookery Bay area.

7.8 Aquatic nuisance species are a major problem nationally and in Florida. Yet, few scientists at Florida universities have developed interests in this area, and few have taken advantage of national funding opportunities. The goal of this project was to send three

faculty members to the Second International Conference on Marine Bioinvasions to learn about scientific needs and opportunities, and then to provide leadership to a statewide faculty group in order to formulate a statewide university approach to research in marine aquatic invasive species. (Baker, S., Baker, P., Walters: PD-01-2)

Faculty from the University of Central Florida and the University of Florida provided trip reports with detailed information on invasive coastal species impacts and the responses of other states to them. This material helped organize a statewide scientific advisory panel in October 2001, which in turn provided guidance to expansion of the FSG effort in this field.

7.9 Workshops on the exotic Zebra Mussel and green mussel will be conducted in order to heighten awareness of this serious economic and environmental threat. (Combs)

Presentations were made to the Barefoot Bay Garden Club on invasive exotic species, and their impact on Florida's Environments (100 attendees), to the Eau Gallie Yacht Club Marine Summer Camp on invasive species (75 students) and to 150 commercial clammers in four workshops about how to recognize green mussel species if they are observed during clamming activities.

7.10 Invasion of Brazilian peppers in mangrove communities continues to cause loss of mangrove habitat and reductions in juvenile fisheries habitat associated with mangrove roots. Four public presentations, and four Sea Grant displays at public events, such as the Brevard County Fair and Melbourne Harbor Festival will be made. (Combs)

A public display on Clean Boating programs, and on invasive exotic species and impacts on marine environments was maintained at the Grant seafood festival with 1,000 visitors viewing the display.

The "Invasive Exotic Species" public display was enhanced during 2001 by adding new information about the green mussel invasion of Tampa Bay, and the Australian spotted jellyfish which was discovered in the Indian River. Handouts were prepared using Sea Grant information from the Internet, and made available at the display, concerning how invasive exotics, such as the green mussel (from Indonesia), and Zebra mussel (from Europe), and the Australian spotted jellyfish are transported in ship's ballast water.

7.11 Ten local decision-makers, such as County Commissioners and City Councilmen, will be provided Sea Grant coastal ecosystem publications and information that is based on university research results, in order to assist them in making science-based management and planning decisions. (Combs)

The Brevard County Sea Grant Marine Agent continues to attend, as a guest, monthly meetings of the Brevard County Commission Marine Advisory Committee (BMAC), and to provide input. The BMAC is informed of activities in the Clean Marina/Clean Boatyard Program, to work with the Florida Inland Navigation District (FIND), and the St. Johns River Water Management District (SJRWMD) in developing a simplified Indian River Lagoon Boater's Guide (presently proposing a single large foldout map with useful keys, e.g., marinas with pump-outs, boatyards, dry storage, and other details).

7.12 Two hundred volunteers will participate in the Annual International Coastal Beach Cleanup to reduce trash on beaches and to record the number and types of marine debris found. (Crane)

The Annual International Coastal Beach Cleanup for September 16th was postponed due to Nation's terrorists attack on September 11th. The date was rescheduled for October 20th. Attendance was low with 75 participants due to rescheduling of date. Over 345 pounds of marine litter was removed from the shoreline. Volunteers recorded the types of trash collected. Sponsors from Coca Cola, Publix, Winn Dixie, and University of Miami donated over 100 cases of drinks for volunteers. Additional beach or waterway cleanups were conducted throughout the year where over 150 volunteers participated. These cleanups consisted of Baynanza Beach Cleanup, 4-H Waterway Cleanup, and 4-H Bear Cut Beach clean-up.

7.13 Two hundred marine facilities will receive "Don't Splash Your Trash" signs to increase the communities awareness of the impacts of marine debris. (Crane)

Two hundred "Don't Splash Your Trash" signs have been delivered to marine facilities. Members of the Miami-Dade Marine Advisory Committee assisted in the distribution and posting of these signs.

7.14 One hundred boaters will learn the impacts of marine debris and adopt practices to minimize it by receiving educational brochures. (Crane)

One hundred "Don't Splash Your Trash" brochures in English and Spanish were distributed during one boat show, two boating seminars, and two fishing seminars. Evaluation methods are being developed to assess practices adopted by boaters to reduce marine debris.

7.15 Thirty percent of beach residents will turn their beach-front lights off during sea turtle nesting and hatching season as measured by pre and post season lighting surveys by volunteers. (Diller)

Over 1,500 adults and children were educated on sea turtles and their beach habitat during 2001. Ways to protect sea turtles including reducing artificial lighting, protecting dune systems, and reducing marine debris were discussed. Follow-up surveys were written to indicate that all respondents remembered at least one way to protect sea turtles and beach habitat three weeks after participating in a coastal habitat and endangered species program.

7.16 Fifteen Gulf-front homeowners will be trained to plant dune vegetation to increase dune height between their homes and the gulf as measured by successful transplanting (plants survive and grow). (Diller)

To protect beachfront homes and habitat from coastal erosion, Sea Grant marine extension agent Andrew Diller and the Escambia County Chief of Marine Resources coordinated a dune restoration project on Pensacola Beach. Dr. Michael Kane donated approximately 1,500 sea oat plants, valued at $3,000, from a Florida Sea Grant supported research project at the University of Florida. Residents were taught how to plant sea oats and to redirect foot traffic to restore and preserve primary dune systems. This dune project became the frontline of protection for a townhome complex as waves battered the area during the 2001 hurricane season.

7.17 Local television, radio, and newspaper media (monthly) will be used to provide information to clientele regarding marine habitat and water quality issues, fishing ethics, “Essential Fish Habitat”, fisheries regulations and management, and county artificial reef programs in Okaloosa and Walton Counties. (Jackson, S.)

Local radio was used (March 2001) to teach area residents about artificial reefs. The radio station has an approximate audience of 10,000 listeners. A radio program, (October 2001), featuring fall fishing, information regarding Pompano, Spotted Seatrout, Flounder, and Red Drum and focusing on the biology, fishing opportunity, regulation, and ethics was completed. The listening audience was approximately 12,000 listeners. Camp Timpoochee provided the opportunity to reach approximately 500 youth and their families. Some campers received Florida Fish and Wildlife Conservation Commission Fishing information and Florida Sea Grant’s Tackle Box Guidebook. Approximately 120 campers participated in an artificial reef education and offshore fishing program during state open marine camp held in July.

7.18 At least 100 shoreline area residents in Okaloosa and Walton Counties will implement environmental landscape practices in their yards. (Jackson, S.)

The title of an article in the July-September issue of The Alliance, a quarterly newsletter of the Choctawhatchee Basin Alliance, read "Choctawhatchee Living with the Bay Program a Huge Success." Approximately 150 people attended at least a portion the seminar. Additional coverage was reported in a full page article in the De Funiak Herald / Beach Breeze, giving a summary of the recommendations and information presented at the event. A similar article appeared in the Niceville Bay Beacon. The combined cirriculation estimates for these three publications are 19,950. Ninety of the ninety-nine “signed-in” participants responding to a post seminar evaluation reported they plan to make changes in their landscaping/lawn care practices as a result of what they learned. A few of the planned changes listed included: calculate fertilizer used, incorporate more native plants, measure salinity of well, patronize native plant vendors for hardier plants, water lawn only in the morning hours, give my neighbors copies of fact sheet on "Conserving Water in the Home Landscape.", calibrate irrigation system, turn off auto sprinkler and water as needed per instructions.

A few of the participant's comments on the most important thing they learned from this seminar include: how to measure the amount of water being applied to a lawn, information on estuaries, the bay and water management, the importance of keeping the bay healthy, determining how common landscape practices impact the environment, about the volunteer water testing program.

7.19 A water quality monitoring program for the fifteen coastal dune lakes in Walton County will be established. (Jackson, S.)

Coastal dune lakes are a rare ecosystem found only in the Florida Panhandle, Madagascar, Australia, and New Zealand. Worldwide, there are only few similar lakes and Walton County has 17. Depending on the proximity to the Gulf of Mexico, these lakes contain representatives of both fresh and saltwater ecosystems, some functioning as mini-estuaries with periodic connection through the beach to the ocean. Protection of these treasured assets in concert with new development has been a priority of county government and residents. The Coastal Dune Lakes Task Force is a local advisory board and serves the County

Commissioners of Walton County. It has no authority to enact ordinances independently. Its' function has been to:

- Seek out expertise and information regarding management of the lakes
- Development of outreach programs to provide residents and tourists with information on how to minimize impacts to the water bodies.
- Provide regulatory suggestions to the Commissioners.

University of Florida Sea Grant Extension Agent, Scott Jackson, has served on this taskforce since the initial day of work in the county (August 2000). The Agent brought together partners to support efforts to preserve water quality and develop educational products. These efforts have been very successful. Partners include the Choctawhatchee Basin Alliance (CBA) and the Walton County Health Department. University of Florida Lakewatch is also providing an integral role. Citizen volunteers are now monitoring 10 Walton County Coastal Dune Lakes. Water quality in Stallworth and Oyster Lakes are monitored by families from Walton County Homegrown Kids 4-H Club through Florida Lakewatch. The 4-H club learned about bays and estuaries, and opportunities with Lakewatch in a presentation by the extension agent earlier this year. The Agent has supported local collaborative efforts by assisting with the recruitment volunteers, presentations at volunteer appreciation events, and by providing facilities for volunteer training. CBA and Lakewatch have trained over 50 new water quality volunteers for monitoring Choctawhatchee Bay and Coastal Dune lakes in Okaloosa and Walton Counties. CBA has raised an additional 25,000 dollars in grants and private contributions, supporting extension education programs for the coastal dune lakes, purchasing water testing equipment, and providing a volunteer coordinator. Lakewatch has given additional support through materials and information used in an extension presentation; specifically for living with the coastal dune lakes and application of collected water quality data.

In his autobiography, Walton County pioneer, Walker H. Reddick, Sr., describes how his family always thrilled with anticipation when traveling to Oyster Lake for summer fun in the early 1900s. Now, years later our Walton County 4-H families look forward to preserving these lakes for future generations to enjoy for many years to come. The timeless intrigue of these rare jewels continues under caring eyes of our local county residents. University of Florida programs and Cooperative Extension resources are playing a vital support role in these altruistic efforts.

7.20 Local government and other entities in Okaloosa and Walton Counties will be assisted in distributing will be assisted in native dune plants for at least 25 residents. (Jackson, S.)

This has not occurred yet. The agent is partnering with the South Walton Tourist Development Council which is putting all of its Coast Impact Assistance Program funds toward restoring critically eroded beaches including private property. Some of this effort was supported through dissemination of educational materials to beach front property owners regarding the benefits of multi-species restoration instead of just sea oats. Plant distribution to individuals should began to occur in the next 6 – 12 mos.

7.21 At least 15 shoreline residents in Okaloosa and Walton Counties will restore wetland vegetation. (Jackson, S.)

One resident restored wetland/shoreline vegetation based recommendations in 2001. As more residents become aware of extension resources, this number will definitely increase.

7.22 Two plantings of native plants for either restoration or stabilization using area youth will occur in Okaloosa and Walton Counties. (Jackson, S.)

Twenty-nine students from Walton High School participated in a service learning exercise, “Stewardship of Coastal Dunes”. Students restored dune vegetation at Miramar Beach County Park. Hurricanes in previous years destroyed the dunes leaving park infrastructure and adjacent roadways at higher risk for damages if storm event were to return. Students planted nearly 10,000 plants. Walton County Association of Retarded Citizens who heard a program broadcast on WZEP radio (audience 7500) provided additional assistance. Panama City television stations and local newspapers providing the message of coastal dune stewardship to 100s of thousands of area residents provided additional news coverage.

In separate events at 4-H Camp Timpoochee, the Choctawhatchee Basin Alliance secured a Florida Department of Environmental Protection grant to buffer the shoreline at the camp. Walton County 4-H Club Homegrown Kids, and parent sponsors provided labor to install the native shoreline plants. The Sea Grant Agent presented educational activities to explain the unique environmental of Choctawhatchee Bay and the role of vegetation in protecting shoreline from erosion. These activities were repeated for one week of 4-H County Camp and with Eckerd’s Environmental Rehabilitation Campers.

7.23 The knowledge of at least 50 Master Gardeners in Hillsborough, Manatee, and Sarasota counties (and as requested by other counties) in water quality issues and coastal plant identification and ecology will be increased. (Stevely)

A total of 52 Master Gardeners from Manatee and Sarasota counties demonstrated an increased knowledge of water quality issues and estuarine resource management issues as measured by a post class evaluation.

7.24 A Coastal Environment and Water Quality Design Team will be established. (Jacoby)

A new design team was formed, in late 2001, and will function under a newly hired faculty member.

7.25 An editorial team of extension agents and campus faculty will be formed together to review and revise the “What is an Estuary” publication, and to identify other educational needs that focus on Florida’s estuaries. (Spranger, Jacoby)

An editorial team met on June 8, 2001 to discuss the revised citizen’s guide to Florida’s estuaries and other educational needs. The extension specialist is developing an outline of the citizen’s guide and continues work on suggested in-service trainings and other publications.

7.26 A meeting between Florida Sea Grant extension agents and Florida Yard and Neighborhood staff in South Florida will be coordinated to explore future joint educational

activities and development of educational materials. (Spranger)

Two meetings were held in Fort Lauderdale in 2001 between FYN staff and county-based Sea Grant faculty to share information and discuss future joint program opportunities. A listserve was established to foster communication between the two groups. Following the second meeting, it was decided that collaborations between two groups should begin at the local level within individual counties. Additionally, a pilot project involving FYN and Sea Grant that focuses on "canal communities" in Southwest Florida is being explored, with potential sponsorship by the West Coast Inland Navigation District. Pilot project may begin in summer of 2002.

7.27 Coordination with the Greater Fort Lauderdale Marine Protected Area Committee, a coalition of dive operators, volunteer organizations and citizens, to hold three public hearings on developing a Marine Protected Area in waters off Broward County will be achieved. Planned activities will include publicizing the meetings and serving as host and facilitator. (Tavares)

A preliminary workshop (January 2001), and three public meetings on the proposed Greater Fort Lauderdale Marine Protected Areas were held by Ocean Watch Foundation, and facilitated by Florida Sea Grant Extension Agent in Broward County. The meetings were held at three different locations: Pompano Beach Civic Center, Pompano Beach (May 16), Broward County Main Library Auditorium, Fort Lauderdale (June 21), Jarvis Hall, Lauderdale-By-The-Sea (July 19) – all coastal cities in Broward County. All meetings received both newspaper (on file) and television coverage. Notification of these meetings was made through email, postings in public buildings, newspaper articles and through direct mailings.

7.28 One hundred and fifty residents and tourists will participate in underwater, rivers and coastal cleanup activities that are co-sponsored by Florida Sea Grant. (Verlinde)

2001 was the 17th annual Northwest Florida Rivers Clean-up. This is coordinated effort between Santa Rosa County Sea Grant Extension, the Santa Rosa Clean Community System Rivers Watch group, local canoe liveries, and natural resource managers. Canoes are provided by liveries free to participants of the clean-up. This year, 348 people participated and 11 pick-up truck loads of litter and trash were collected!

125 Santa Rosa County volunteers participated in the 16th International Coastal Cleanup. Sites were located along Blackwater Bay, Santa Rosa Sound and the Gulf of Mexico. Four dumpsters of trash were removed from the local shoreline.

Goal 8: Prepare and Respond to Coastal Storms

8.6 Florida's extensive coastline and rapid urbanization is placing more people and property at risk. The goal of this project is to determine the performance of advanced transducer systems in monitoring of actions on coastal structures during strong wind events. It is a pilot study. (Pinelli, Subramanian: PD-00-6)

A prototype remote sensing data system was developed, which enables the entire data acquisition to perform from inside a house. This also eliminates the problems of intricate wiring. The accompanying data processing software enables on/off-line visualization and mapping of the collected data. The program itself, together with the user manual and sample data files can be downloaded from the Internet. A new two-year project is beginning in 2002.

Education and Human Resources

Goal 9: Produce a Highly Trained Workforce

9.1 A minimum of two qualified applicants will be submitted annually to the Sea Grant John A. Knauss Marine Policy Fellowship national competition. Over each five-year period, an average of one Knauss Fellow per year (of 30 nationally) will be from Florida. (Cato)

For the 2001 Class of Fellows, four applicants were submitted. Three students were chosen: Christopher Yates - UF
Eileen Alicia - UM
Audra Livergood - UM

From 1998 - 2001, a five year period, five Fellows from Florida have been selected, or an average of one per year.

9.2 At least one national Sea Grant Industrial Fellow candidate (of 2-4 per year nationally) will be successful every three years. (Cato)

This goal was not met. It has been difficult to attract Florida students to this program. No applicants have been submitted from 1998-2001. Extra emphasis will be placed on this program during future competitions.

9.3 At least 25 percent of the annual Florida Sea Grant federal core program research budget will be used to support graduate students. (Cato)

For 2001, 27 percent of all research funds supported graduate students (see section 7.0).

9.4 A minimum of five graduate students will receive scholarship funding through private funds in cooperation with the Aylesworth Foundation for the Advancement of Marine Science and the Old Salt Fishing Club. (Cato)

Four students began new scholarships in 2001 for a total of eight on active scholarships during the year.

9.5 One high school student will receive a college scholarship through the Chuck Skoch Florida Sea Grant Scholarship. (Cato)

One high school senior received a one-year scholarship and enrolled as a freshman at the University of West Florida.

9.6 A minimum of $400,000 per year in non-national Sea Grant CORE program funding will be received from extramural funding sources to support Sea Grant programs. (Cato)

A total of $793.9 thousand in non-core Sea Grant funds were received in FY 99-00 (see section 3.0).

9.7 Florida Sea Grant will participate in National Strategic Investment, National Outreach and National NOAA/Sea Grant proposal competitions when available. Funding data will be analyzed to measure the success rate of Florida Sea Grant against the other Sea Grant programs. (Cato)

This competition began in late 2001, with results not known until 2002.

9.8 At least 15 different academic disciplines and six different Florida universities and research laboratories will receive Florida Sea Grant funding in each proposal cycle. This can only be achieved through the encouragement of competitive proposals from many participants because peer review determines actual funding. At least six institutions participating in Florida Sea Grant will be visited each year to meet faculty and students to keep a high level of participation in Florida Sea Grant. Six faculty progress reports will be distributed annually to 800 faculty statewide to inform them of Sea Grant activities and opportunities. (Cato/Seaman)

For the 2000-2001 core Florida Sea Grant two-year program, eight of the 15 participating universities are receiving funds.

Florida Atlantic University
Florida Institute of Technology
Florida International University
Florida State University
Mote Marine Laboratory
University of Central Florida
University of Florida
University of Miami

A total of 19 different academic departments and 12 different disciplines are receiving funds.

Biological Sciences (FSU)
Biological Sciences (FIT)
Biological Sciences (FIU)
Biology (MML)
Biology (UM/RSMAS)
Cell Biology (FIT)
Chemistry (FIT)
Chemistry and Biochemistry (FAU)
Civil and Coastal Engineering (UF)
Environmental Horticulture (UF)
Fisheries and Aquatic Sciences (UF)
Florida Museum of Natural History (UF)
Food and Resource Economics (UF)
Food Science and Human Nutrition (UF)
Oceanography (FIT)
Oceanography (FSU)
Pharmacology and Therapeutics (UF)
Soil and Water Science (UF)
Veterinary Medicine (UF)

A total of ten campuses were visited, with the visits ranging from meeting faculty to discussing funded research or potential research to attending FSG seminars or presenting seminars on FSG opportunities. A focus this year was seminars on FSG graduate student opportunities. They were University of Florida, University of South Florida, University of Miami, Florida State University, Florida A&M University, Florida Atlantic University, Florida International University, Nova Southeastern University, University of Central Florida, and the University of North Florida.

Six bi-monthly faculty progress reports were written and distributed.

9.9 An average of four Florida Sea Grant supported seminars will be funded annually as a way to increase the skills of faculty and students in ocean and coastal related academic disciplines. (Seaman/Cato: PD-00-1)

Speakers from Clemson University, Scripps Institution of Oceanography, University of North Florida, Rutgers University, Harvard University, University of South Florida, U.S. Environmental Protection Agency, University of Arizona and the U.S. National Marine Fisheries Service presented seminars on topics ranging from marine microorganisms as a pharmaceutical resource, to the ecology of coastal seagrasses and muds, to ocean property rights, at seven Florida institutions. These scholars helped faculty and students develop teaching and research efforts.

9.10 A minimum of two qualified applicants will be submitted to the NOAA Coastal Services Center Competition each time it is held. (Cato)

No applicants expressed an interest in this program in 2001.

9.11 The process to become certified by the American Fisheries Society "Fisheries Biologist" will be initiated American Fisheries Association Florida Chapter Meeting will be attended. (Mahan)

This was a program objective for the Franklin County Extension Agent to complete. However, the American Fisheries Society was in the process of reviewing and updating the guidelines for the "Fisheries Biologist" certification. As a result, the Agent elected to wait for the new guidelines to be finalized and begin the process in 2002. Also, the Agent was not able to attend the FL AFS Chapter Meeting this year due to a program conflict.

9.12 Annual in-service training for Florida Sea Grant Extension faculty that provides administrative updates, reviews current Sea Grant research and extension activities, and program planning efforts will be organized. (Spranger)

The annual in-service training workshop for Florida Sea Grant Extension faculty was held in October on the University of Florida Campus (Lake Wauburg). Attendance included all FSGE faculty and administrators. Outside speakers included Vice-President of UF/IFAS, Dean of Extension, Extension state specialists and coastal engineer from University of South Alabama.

9.13 Working with NOAA's Ocean Services Center, in-service training for Florida and Alabama Sea Grant faculty and governmental agency staff will be provided on effective meeting management, dealing with conflict and controversy and facilitation skills. (Spranger)

"Navigating Through Rough Seas: Dealing with Public Issues and Controversy" in-service training was held in Pensacola in March, 2001. Attendees included FSGE faculty, Alabama Sea Grant Faculty, University of West Florida Faculty, Florida Department of Environmental Protection staff, Escambia County agency personnel, and several non-profit groups.

9.14 A regional Sea Grant Extension faculty meeting with program leaders from South Carolina, North Carolina and Georgia will be held. It will provide in-service training on and provide opportunities to explore regional collaborations. (Spranger)

A regional Southeast Atlantic Sea Grant Extension meeting was held in Brunswick, Georgia in Spring 2001. Attendees included Sea Grant faculty, program leaders and Sea Grant Directors from North Carolina, South Carolina, Georgia and the East Coast of

Florida. In-service training was provided on conflict and mediation. In addition, each

program shared information and discussed future collaborative activities.

9.15 A regional Sea Grant Extension faculty meeting with program leaders from Texas, Louisiana, Mississippi and Alabama will be coordinated that will provide in-service training on and provide opportunities to explore regional collaborations. (Spranger)

A regional Gulf of Mexico Sea Grant Extension meeting was held in New Orleans, Louisiana in October 2001. Attendees included Sea Grant faculty, program leaders and Sea Grant Directors from Texas, Louisiana, Mississippi, Alabama and the West Coast of Florida. The meeting was held in conjunction with the Gulf States Marine Fisheries Commission meeting. Each program shared information and discussed future collaborative activities.

Goal 10: Create a Scientifically and Environmentally Informed Citizenry

10.1 A number of educational activities are implemented under the previous goals. The following areas cross many goals and are implemented in general.

10.1.1 High quality publications that effectively communicate the results of Florida Sea Grant activities to both general and specialized audiences will be produced. This includes Sea Grant Reports, Sea Grant Extension Fact Sheets and brochures, Sea Grant Technical Papers, books, book chapters, staff papers, conference proceedings, newsletters, posters and videos. The exact number will depend on the work plans and research results of faculty. (Kearl/Zimmerman)

The following productions were completed. Section 6.0 of this report contains more details on publishing.

Sea Grant Reports	1
Sea Grant Extension Publications	18
Sea Grant Technical Papers	11
Book Chapters	5
Staff Papers	6
Extension Newsletters	5
Books	1
Conference Proceedings	1

10.1.1 At least ten print news releases will be produced. (Kearl/Grantham/Zimmerman)

More than 10 news releases were produced and issued to media, syndicated news services, and outdoor writers covering Florida and the Southeast. These provided information related to Sea Grant research and outreach activities in topical areas including rip current awareness, hurricane preparedness, safe seafood processing, spiny lobster research, safe boating and anchoring, marine ornamentals aquaculture research, estuarine ecology, and scholarship opportunities. Press releases were also prepared to announce conferences and to publicize recipients of awards related to Sea Grant programs.

10.1.2 The existing Florida Sea Grant Internet home page will be upgraded and maintained. (Grantham/Zimmerman)

Web design and maintenance has been distributed from one individual to a three-person group to facilitate updates of content across the areas of management, extension, and research. The transformation to a new software was completed during the year, and the three-person web group completed a training course to use software. Also, changes in the existing web structure were made to improve accessibility, enable individual page bookmarking, and improve search engine capability.

A web-based, photographic digital archive premiered during the year. It was developed to serve agents, specialists and research collaborators with their graphic needs for publications and presentations, and as a means to systematically assess and archive photographic holdings. Features of the Sea Grant web site continued to be upgraded, and regular site maintenance ensured that current material was available. Similarly, a consistent effort was maintained to establish direct links to Sea Grant partners and

collaborators. Publications and presentations are regularly published on the site. Most major publications are routinely saved into pdf format at the time of production, and subsequently incorporated onto the website under relevant headings or sections. In addition, more than 15 Florida Sea Grant publications have been similarly prepared for the UF/IFAS electronic publication database EDIS (Electronic Data Information System). Administratively, the web site is routinely used for interactive forms that relate to requests for proposals in the grant application process.

Two of the more visited areas of the web site, Anchorage Management and Fisheries Conservation, were enhanced with new material. Additionally, a proposal was drafted to re-structure the Anchorage Management web site to deliver information and resources derived from the urban boating and small-craft navigation research to audiences beyond the traditional recreational boater, including resource managers and local governments.

The Florida Sea Grant website may be viewed at www.flseagrant.org.

10.2 Taylor County adults and youth will be educated in terrestrial and marine navigation techniques. (Aubrey)

Agent resigned.

10.3 A National Association of State Boating Administrators boating safety class will be developed and taught to 50 Taylor County youth. (Aubrey)

Agent resigned.

10.4 Through 4-H program activities, 50 Taylor County youth will be educated on coastal ecosystems and the effects of man's activities on those ecosystems. (Aubrey)

Agent resigned.

10.5 Local school programs in Brevard County will target the involvement of 100 minority youth in environmental programs. 4-H Agents will be assisted in educating fifty 4-H youth about local marine environments. (Combs)

The week-long 4-H Marine Day Camp instructed about 25 students per day in such activities as ecotours and dipnetting. An additional 60 4-H students were supervised and instructed in the 4-H State Marine Ecology Contest. The Brevard County Sea Grant Marine Agent provided coral specimens, seashell specimens, coralline algae specimens, fresh seagrass specimens, and logistical support.

The Science Fair Judge (South Regional 2/2, 2/3), (Jupiter 2/22), (Mims 3/22), (Space Coast Regional 3/22), (Area Elementary Finalists, 4/28). A total of 250 total projects were judged by Brevard Sea Grant at the South Regional Fair in Jupiter.

10.6 Twenty children in Miami-Dade County will acquire knowledge of marine debris and be able to list the sources, types and impacts. (Crane)

Marine debris programs were presented to 319 students in 6 schools, and 11,560 learned about marine debris through attending Sea Grant exhibit stations at school fairs and community festivals. Results from three schools that were post-tested (174 students), indicated 153 students (87%) gained knowledge on the different types and impacts marine

debris has on the environment and wildlife communities.

10.7 Technical assistance will be provided for the Smithsonian Ecosystem exhibit in St. Lucie County in the design and fabrication of living exhibits and life support systems; to coordinate collection, quarantine and transfer of live specimens to the exhibit; and to serve as member of the review committee for contributed static displays. (Creswell)

The St. Lucie County Marine Science Center **-** St. Lucie County in partnership with the Smithsonian Institution, the City of Fort Pierce, St. Lucie County School District, Indian River Community College, the South Florida Water Management District, and a host of other governmental agencies and private interests constructed a 5,141 square foot marine educational facility available to the public and the school children of St. Lucie County. The exhibit features a Caribbean coral reef ecosystem, sea grass, mangrove, and fish communities, as well as a unique deepwater reef habitat unique to east central Florida. The Sea Grant agent was responsible for the design, fabrication and installation of the "life support systems" for the exhibit. Working with volunteers, as there were no county employees with this expertise available, this included: installation of pumps, filtration systems, aquarium lighting, plumbing fixtures, and a variety of other technical components. Additionally, the Sea Grant agent collected abiotic (e.g. sediment, coral rock, structural material) and living specimens (e.g. seagrasses, macroalgae, intertebrates and fishes) which constitute the exhibit.

After over a year of construction, exhibit fabrication and collection of live specimens to house the exhibit, the St. Lucie County Marine Center opened on August 27, 2001. It has become the centerpiece for marine education and outreach for St. Lucie County and the Treasure Coast. Equipped with a classroom, Internet access, and distance learning capabilities, now serves the Sea Grant agent as a teaching venue (see Indian River Lagoon lectures series).

Since the opening of the St. Lucie County Marine Center, over 120 tours and 12,400 visitors were provided educational materials and information describing the Indian River Lagoon and its unique importance to the coastal residents of the Treasure Coast of Florida.

10.8 St. Lucie County science teachers will receive instruction on marine ecology at the New Smithsonian Ecosystem exhibit. One hundred students in high schools of the St. Lucie County School District will improve their knowledge of marine science, general ecology and the Indian River Lagoon as defined by the performance standards in "The Florida Sunshine State Standards and Instructional Practices". (Creswell)

Seventh grade students in St. Lucie County took **"**part in a three part multi-media lecture series based on the history of the Indian River Lagoon, its ecology, flora and fauna, and human impacts which will affect its ability to sustain marine life. Over 150 students have completed the Indian River Lagoon Lecture Series, with field trips to the St. Lucie County Marine Center. Students and teachers were provided printed materials to supplement the lecture series.

A total of 480 4th grade students learned to take benthic (core) samples, and identified at least two groups of infaunal marine invertebrates as part of "Lagoon Days" at the Environmental Learning Center.

10.9 One hundred of middle and high schools science educators in the St. Lucie County School

District, marine science educational facilities, 4-H club leaders, and other educational programs in St. Lucie and Indian River counties will receive “The Directory of Marine Science Education Resources of the Treasure Coast”. (Creswell)

The Directory of Marine Resources for the Indian River Lagoon is approximately 75% completed. Most of the principal educational institutions have submitted their information, which has been compiled and formatted with images using desktop publishing software. The agent is currently submitting grant proposals to fund the cost of printing and distribution of the materials to secondary education science teachers in St. Lucie, Indian River, Martin and Brevard counties. Subject to available funding the Directory of Marine Resources for the Indian River Lagoon will be available in CD and/or printed form during fall 2002.

10.10 One hundred students enrolled in St. Lucie County School District vocational/technical programs will increase their general knowledge of aquaculture and 200 students enrolled in St. Lucie County School District college preparatory program will increase their general knowledge of aquaculture. (Creswell)

A total of 182 high school student learned about the general concepts of aquatic animal husbandry, the types of systems used to culture aquatic organisms, and the similarities between aquaculture and terrestrial agriculture as part of an organized program, “What is Aquaculture?” Prior to the program, a survey indicated that less than 20% of the students understood the term, whereas at the conclusion of the program approximately 80% of the students indicated a fundamental understanding of the subject. Multi-media presentations included:

WLX - Channel 13 - St. Lucie County School District Distance Learning Center - What is Aquaculture? (2 two part series).

WPSL (25 minute radio presentations: circulation 150,000); Shrimp Aquaculture; The History of Hardshell Clam Aquaculture in Florida; Hatchery Production of the Hardshell Clam; Hardshell Clam Nursery and Growout Production.

Two hundred sixty-four 4-H youth and adults participated in hands-on interactive programming on topics focused on nutrition, aquaculture, genetics, taxonomy, and physiology as part of “Aquaculture and the Ecology of the Indian River Lagoon”. Youth viewed exhibits and demonstrations of ongoing marine research projects, discussed life cycles of marine fish and invertebrates, and were provided fundamental information regarding the characteristics of fish “farmed in captivity”. An understanding of the natural habitat was demonstrated by seining, where youths collected, identified and discussed the relationships of marine animals living in coastal ecosystems. A particular emphasis is made on the relationship between form and function. Finally, youth learned that by being stewards of the marine environment they can benefit from a thriving and healthy coastal environment.

Participants were pre- and post-tested for basic knowledge in areas of instruction, consisting of 20 questions. The average pre-test score was 42%, while the average post-test score was 97%, demonstrating a significant knowledge level increase.

10.11 Three 4-H marine science institutes, with two hosted at the Timpoochee 4-H Center and one at the Citrus County Crystal River Marine Lab, will be conducted. (Culen, Diller, Jackson, S., Mahan, Verlinde)

Two state marine science institutes were supported at Camp Timpoochee. Florida Sea Grant faculty presented fish venting and fist tagging on deep sea fishing trips in the Gulf of Mexico. Campers and deckhands learned how to use venting tools on each trip. Campers also learned many salt water fishing techniques.

The first issue of *Emerald Currents* was sent via e-mail to many recipients. The newsletter was well received and many folks have responded that they would like to receive additional newsletters in the future. The newsletter was also placed on the World Wide Web. (Verlinde, Jackson, Diller)

10.12 A statewide Marine Ecology contest for 4-H youth will be held. (Culen, off-campus faculty)

A statewide Marine Ecology Contest was held at Camp Ocala in the Fall, 2001. Dr. Maia McGuire and Chris Combs assisted in the contest. Another statewide marine ecology contest is planned for 2002.

10.13 Curricula relating to aquatic and marine ecosystems to support 4-H and school enrichment programs will be developed. (Culen)

Dr. Maia McGuire is assisting Dr. Jerry Culen in the development of marine educational materials and a CD on marine species identification that will be used by participants in future marine ecology events.

10.14 One hundred local government officials, media, educators, 4-H leaders, homeowners, commercial fishermen, port and marina personnel, and members of environmental groups will become aware of the Sea Grant/marine Extension program and its services in Escambia County. (Diller)

Marine agent Andrew Diller introduced Florida Sea Grant extension programming to a wide variety of groups and organizations in Escambia County. This includes marine resource presentations to various groups reaching over 1,500 people, educational displays at environmental festivals, appearances in television and newspaper media, the Escambia County Marine Extension website, and attendance at civic, volunteer, and governmental meetings. Feedback from individuals and groups contacting the marine agent reveal these activities and word of mouth are succeeding in notifying clientele of Florida Sea Grant extension services.

10.15 Eleven local educators, homeowners, developers, commercial fishermen, port and marina personnel, and Chamber of Commerce members will form the Escambia County Marine Extension Advisory Committee to advise the marine agent of current problems/concerns and provide direction for programming. (Diller)

Eight Escambia County residents have stated their interest in becoming members of the county Marine Extension Advisory Committee. Selection of additional members, formal commitment, and first meeting of the committee will occur during the spring of 2002.

10.16 Fifty teachers and 4-H leaders will utilize marine information at the Escambia County website for educational purposes. (Diller)

The Escambia County Marine Extension web site opened July 3, 2001. More than 50 educators, 4-H leaders, and home school instructors were informed of the web site and the educational material it contains. Over 500 hits were registered during the final six months of the year.

10.17 Ten master gardeners, office assistants, extension agents, and the horticultural technician will be able to assist clientele in receiving current marine extension publications in a timely manner due to the updating of the Escambia County marine publications and files. (Diller)

The Escambia County marine publications and files were updated by removal of outdated materials. New materials are being filed for easy access of staff and volunteers to assist clientele with marine resource requests for materials.

10.18 Two hundred 4-H youth in Escambia County will improve their knowledge of endangered species utilizing local beaches and ways that they can help protect these species as measured by group projects designed to “Save our Species”. (Diller)

Marine extension agent Andrew Diller presented sea turtle, endangered species, and beach habitat programs to over 1,000 youth in 2001. Follow-up surveys at marine camps indicated that these programs were popular with youth and that participants were willing to volunteer for activities designed to protect these species and beach habitat.

10.19 Twenty-five teachers in Escambia County and 4-H leaders will utilize a “Sea Turtle Science” website monthly with their students to increase knowledge of and decrease human impact on turtles nesting in the region as measured by pre and post turtle quiz games with students. (Diller)

Marine extension agents Andrew Diller, Chris Verlinde, and Scott Jackson gave sea turtle and beach habitat presentations to more than 30 teachers and their students. Presentations included information about the sea turtle education and tracking section of the Escambia County Marine Extension web site. Teachers and students can obtain educational information as well as map sea turtle migration with latitude and longitude data from turtles tagged with satellite transmitters. Over 500 hits were recorded at the web site during its first six months of operation. Expansion, usage, and evaluation of the web site and project will continue as additional turtles are tracked in 2002.

10.20 An annual “Take a Kid Fishing” Program, targeting minority and under-served groups will be held in Okaloosa and Walton Counties. Four sponsoring agencies and businesses will be obtained and fishing techniques, target species, fisheries licensing and regulations, and angling ethics will be taught to 100 attendees. (Jackson, S.)

This was a goal of a former agent the County. The new agent elected to include of areas for priority, and the goal was not accomplished. (Jackson, S.)

10.21 At least ten public and private educators will be provided age appropriate materials and presentations to assist with the study of marine ecology and coastal resources stewardship in Okaloosa and Walton Counties. (Jackson, S.)

Service to science educators received special attention during the past year.

Coastal Dune Stewardship - Walton High School, DeFuniak Springs, Florida -- An in classroom education program was presented on the importance of dunes and associated habitats and ecology. Students took a field trip and restored a County park destroyed by Hurricane Opal in 1995. Press coverage exposed the community to the information these young people retained and presented during these reports.

Okaloosa County Schools - Sea turtle biology was taught to students at two elementary schools over 5 consecutive days with Sea Grant Extension Agents Andrew Diller and Chris Verlinde. An age appropriate power point presentation for these programs was prepared by Diller and a video from a South Walton Turtle Watch nest assessment was prepared by Jackson.

A field trip to camp Timpoochee was organized for students from Holmes County who had participated in Marine Science Bowl. The goal was to learn how to apply knowledge gained from these activities into the "real world" of the marine environment. The students sampled with seining equipment, and learned about artificial reefs and water chemistry.

A field trip to camp Timpoochee was organized for students from the Marine Science classes at Walton High School. The students sampled with seining equipment and learned about water chemistry. The students also visited a nearby freshwater slew and learned about wetlands function and ecology.

10.22 Several 4-H camps in Okaloosa and Walton County will be held during the summer months. Marine resources training will be provided to camp staff so that they can be more competent in this field. Camps emphasizing marine ecology will be held in July. (Jackson, S.)

Three marine camps were held at 4-H Camp Timpoochee during the month of July. Two open camps allowed campers to be involved with 4-H activities, many for the first time. District 1 Marine Camp was mainly comprised of 4-H members from the immediate area. Intertwined with traditional camp songs, games, and crafts, all camps had intriguing learning events packed with fun! Camp programs included astronomy and star gazing, aquatic sampling of wetlands and salt marshes, artificial reefs, fish identification, sea turtles, deep-sea fishing, survival skills and edible plants, and lots of swimming and canoeing. Over 260 campers ages 8-14 participated along with camp staff and Extension Agents. University of Florida 4-H staff participating included Jerry Culen - Director of Camping Programs, Kim Gumbiner - Business Manager, Bob Walker - 4-H Camp Timpoochee Director, and Kathy Hunter - 4-H Camp Timpoochee Program Director. Extension Agents participating included Kay Brown - Escambia County 4-H, Paula Davis - Bay County 4-H, Bill Mahan - Franklin County Sea Grant, Chris Verlinde - Santa Rosa County Sea Grant, Andrew Diller - Escambia County Sea Grant, and Scott Jackson Okaloosa / Walton Counties Sea Grant.

47 campers and counselors were surveyed

100% rated their overall camping experience as good to excellent

When asked to indicate which of the following activities would you consider participating in the future, results were:

Beach Clean Up (Litter Control) Yes 9 No 12 Maybe 26

Water Testing (Lake Watch) Yes 20 No 10 Maybe 17

Sea Turtle Monitoring Yes 30 No 7 Maybe 10

Shoreline Plant Restoration Yes 16 No 9 Maybe 20

83% Indicated they intended to share information they learned at camp with their friends and family

Support and training was also provided to 4-H Camp Timpoochee staff. Staff members were supported in their educational programs and assisted in learning fish and animal husbandry.

10.23 After the completion of 4-H camp, a goal of establishing two new 4-H clubs in South Walton and/or Okaloosa counties will be pursued. (Jackson, S.)

The goal of new 4-H clubs is being coming a reality. Camp Timpoochee initiated a new Okaloosa County Club. A special project for Walton County 4-H has been initiated revolving around aquaculture and other aquatic activities.

10.24 Collaborative work with North West Florida Sea Grant agents will result in a quarterly newsletter devoted toward topics on sea turtles, hurricanes, marine debris, artificial reefs and other timely topics. (Jackson, S., Verlinde and Diller)

A cooperative newsletter was authored by Sea Grant Agents Chris Verlinde, Andrew Diller, and myself. Over 500 printed copies were distributed in Okaloosa and Walton Counties along with over 400 total website hits.

10.25 At least ten youth in Franklin County will be involved with at least one “environmental” community service project (i.e. Don’t kill pelicans with kindness, Center for Marine Conservation’s Annual Coastal Cleanup). (Mahan)

The Franklin County Agent recruited fifteen members of the Eastpoint 4-H Wildlife Savers Club to participate in the Annual Center for Marine Conservation’s Coastal Cleanup. The 4-H’ers and their leader cleaned up a popular boat launching site called Cat’s Point. As a result of their effort, the club was recognized for their community service efforts in the county and received both local newspaper and radio coverage. (Mahan)

10.26 The Health & Human Resources Task Fore (Health Fair, Seafood Festival), Juvenile Justice Council and the WINGS (educational activities) programs will be assisted to offer Franklin County youth a variety of youth enrichment opportunities. (Mahan)

Due to the formation of the legislatively mandated School Readiness Coalition in 2000, the Franklin County Health & Human Resources Task Force disbanded. (Mahan)

10.27 Sessions at the District I Marine Science Camp will be planned, organized and taught. (Mahan)

The Franklin County Agent worked with fellow Sea Grant Agents (Andrew Diller, Scott Jackson & Chris Verlinde) and 4-H Agents Kay Brown & Paula Davis to plan, organize, and teach this year's District I 4-H Marine Science Camp at Camp Timpoochee. The Franklin County Agent taught four two-hour classes on "Hurricane Houses" and conducted the "Hurricane House Blow-Off" at the end of camp to test the Hurricane Houses that the campers made against a "wind storm." In addition the Agent assisted with the teaching of marine biology activities throughout the week. Seventy-two people attended the camp. Survey results from the camp indicated that 100% of the campers increased their knowledge of marine sciences, 75% reported that they would like to get involved with a marine-related community service project when they return home, and 60% of the campers reported that they were going to share some of the information they learned with their friends and/or family members.

10.28 Teachers and students will expand participation in and the sophistication of the Franklin County High School Aquaculture programs. (Mahan)

The Apalachicola High School Aquaculture Program was terminated during the 2000 school year due to a lack of fish available from the UF-IFAS Sam Mitchell Aquaculture Farm. However, the teacher and the students would like to continue the program if or when fish become available.

10.29 A program that features proper seafood handling and safety for the Franklin County FCE Club will be held. (Mahan)

The Franklin County Agent taught a seafood safety class for the county Family & Community Educator's Club at the Carrabelle Senior Center. The program featured safe cooking/handling instructions of *Tilapia*. In addition, several different dishes featuring *Tilapia* were prepared and sampled. As a result of the program 10 club members learned how to properly handle and cook *Tilapia*. Five of the members reported that it was the first time that they had ever eaten *Tilapia* and all ten members reported that they enjoyed eating the fish. (Mahan)

10.30 Assigned projects by the Board of Franklin County Commissioners will be planned and implemented (i.e., Clam Aquaculture Task Force & DEP Liaison to the Board). (Mahan)

At the request of the Board of County Commissioners, the Franklin County Agent attended the Franklin County Agent attended the Interstate Shellfish Sanitation Conference's (ISSC) *Vibrio vulnificus* (*Vv*) Subcommittee Meeting in Biloxi, MS., the *Vv* Education Subcommittee Meeting in Waveland, MS., the Annual Gulf & South Atlantic Regional Meeting in Biloxi, MS., and the ISSC's Annual Meeting in Norfolk, VA to provide technical support to the Gulf of Mexico oyster industry representatives participating in the meetings. As a result of this effort the Agent provided technical support and information to the oyster industry representatives attending the meetings so that they had a better understanding of *Vv* issue as it moved through the ISSC's rule making process. In total, 207 people attended and participated in these meetings.

In addition, as the Franklin County Board of County Commissioners appointed the Franklin County Agent as their official liaison with the FL Department of Agriculture and Consumer Services in dealing with shellfish harvesting & clam aquaculture issues. As a result, the Agent was very involved with providing information to the general public and the County

Commissioners on bay closures due to excessive rainfall and a red tide. Also, the Agent

was very involved in providing guidance, technical support and advice on the development of the clam farming industry in the county.

10.31 One thousand residents in Southwest Florida will be taught about local fishery resources and how they are harvested. (Stevely)

An estimated 1,200 people participated in a commercial fishing dockside presentation and an estimated 400 people viewed a film on local history of fishing industry at the Cortez Commercial Fishing Festival. Approximately 10,000 people attended the two-day Festival. A total of $35,000 was raised to help purchase 95 acres of environmentally sensitive land adjacent to the village.

10.32 Sponge research results will be presented by a poster exhibit at the Florida Bay Science and Adjacent Ecosystems Science Conference. (Stevely, Sweat)

Results of a ten-year sponge survey project were presented at the Florida Bay Science and Adjacent Ecosystems Science Conference. Approximately 200 Florida Bay researchers increased their knowledge of the effects of extensive sponge die-offs on hard bottom habitat communities. (Stevely) Sponge research results were presented by a poster exhibit at the Florida Bay Science and Adjacent Ecosystems Science Conference. (Sweat)

10.33 One-hundred Pinellas to Citrus County coastal residents will receive science-based informational materials through seminars, workshops, and mass media channels that will teach them the importance of the fragile marine and coastal ecosystem. (Sweat)

Workshops were held for over 100 coastal residents which taught them the importance of the fragile marine and coastal ecosystem.

10.34 Two hundred youth and their adult sponsors will receive an introduction to conservation and fishing ethics, and provide marine educational materials and information at an Annual Kid's Fishing Tournament at the St. Petersburg Pier. (Sweat)

The 13th Annual Pier Aquarium Kid's Fishing Tournament was held. 265 youth with adult sponsors received an introduction to fisheries conservation and fishing ethics.

10.35 Two hundred 4-H members and school children will learn about marine resources, their value and sustainable use through environmental fairs and workshops. (Tavares)

Through environmental fairs, workshops and other presentations, 1,031 4-H members and school children have gained exposure to, and a better understanding of mangroves, seagrasses, coral reefs, estuaries, and sharks as valuable marine resources.

10.36 One hundred and fifty 5th Graders will increase their knowledge about the beach ecology system along the Santa Rosa Sound and Gulf of Mexico in Sea Grant sponsored field trips. (Verlinde, Diller)

A beach ecology field trip was organized for 55 fifth grade students, teachers and parents along the north shore of Santa Rosa Island. Activities included: sea turtle nesting and habitat needs, fish and dune system plant ID, and seining tidal pools and seagrass beds. The field trip was enjoyed by all participants and plans for another are being made. Following the field trip one of the teachers and a parent called and said how educational and exciting the field trip was. The parent was amazed at the diversity of the north side of

the island. She could not wait to bring friends and neighbors to this wonderful place.

10.37 Two hundred and fifty Santa Rosa County residents will increase their knowledge of local river and estuarine ecology, history, management issues, and protective measures by attending the 2001 Rivers Symposium. (Verlinde)

The Santa Rosa County Rivers symposium featured presentations on the history, biology, problems and issues concerning local rivers and estuaries. In addition, afternoon events featured hands-on activities for participants to learn every day practices that will allow them to have less impact on our water resources. The SRC Rivers Symposium was a great success, as more than 200 people attended. Participants were eager to learn about the water resources of our area. There were many opportunities to learn about local natural resources and most people took time to visit and gain new knowledge. More than 20 agencies and public groups participated in the symposium. The event was coordinated by Santa Rosa County Sea Grant Marine Extension, Santa Rosa County Clean Community System Rivers Watch, Pensacola Junior College (Milton Campus), Gulf Coastal Plain Ecosystem Partnership, and the Bay Area Resource Council. Surveys from the SRC Rivers symposium showed that participants enjoyed the program and would implement some of the practices they learned at the symposium.

10.38 One hundred homeowners will increase awareness of shoreline protection and enhancement practices, recycling, household chemical use reduction and non-point source pollution prevention by attending coastal living seminars in Santa Rosa County. (Verlinde)

Fifty-nine people attended two coastal living seminars at native nurseries in Santa Rosa County, FL and Baldwin County, Alabama. Topics included: use of native plants, identification of invasive plants, integrated pest management, impacts to our coastal areas and waterways, hurricane preparedness, and pass along plants. Surveys from participants indicated that participants were happy with the programs and planned to implement some of the practices they learned.

The Northwest Florida Homeowner's Guide to Shoreline Protection and Restoration was published and distributed to many Panhandle residents. The guide is a great resource. Information is included concerning what types of plants to use in various planting zones and salinities, conditions to consider in a restoration project, permitting requirements and local contacts for additional information.

10.39 The Florida Marine Mammal Stranding Network – Southwest Region will be assisted to develop educational materials and assist in stranding events that involve rescuing injured or entangled marine mammals. (Wasno)

The FMMSN continues to provide volunteer support for recovery and rescue for stranded marine mammals in Collier, Lee and Charlotte Counties. Two representative biologists from the Network attended the Marine Mammal Conference in Gainesville, April 4 - 6th. Members have worked 12 stranding events in 2002.

10.40 A brochure on manatee biology and life history that targets the recreational boater in Brevard County will be developed. (Combs)

Because the Florida Department of Environmental Protection (DEP) manatee regulations in 2001 were being challenged in court by Citizens for Florida's Waterways (CFW), and the Save the Manatee Club (SMC) the Brevard County Manatee Protection Plan is unfinished. Because manatee life history details are being debated in the proceedings, it was decided to delay production of a manatee brochure until court actions were resolved. The brochure will be produced during 2002, and will include reference to existing regulations as they are based on what is currently known about manatee biology and life history. As part of conducting background research for this effort, the Brevard Sea Grant Agent participated in several activities concerning manatee regulations. These include two public hearings.

10.41 A three-year grant proposal with Alabama, Louisiana and Mississippi to conduct regional teacher training programs on aquatic nuisance species will be completed. If funded, project will begin in 2001. (Spranger)

The regional proposal was funded for two years. In 2002, FSGE is working with the Florida Aquarium to develop training programs on marine invasive species utilizing the Aquarium's resources. A new exhibit on "Florida's marine exotics" will open at the Florida Aquarium in May, 2002.

10.42 Co-sponsorship and participation will occur for an Environmental Education Institute for 40 Florida 4-H agents that will be held at Camp Ocala. (Spranger)
35 county agents and program assistants attended the Environmental Education Institute in October, 2001 at Camp Ocala. These individuals represented 4-H, Energy, and Natural Resource Programs. Dr. Mike Spranger provided closing remarks that centered around environmental stewardship. A similar program is being proposed in the spring, 2002 in the Florida Panhandle (Camp Timpoochee) that will have a marine/coastal focus. FSGE will be a sponsor in this program.

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