Science Serving Florida's Coast

"Performance Counts"

Annual Progress Report for 2000
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Technical Paper 115

UNIVERSITY OF
FLORIDA

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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. 2000 represents the 30th 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 2000 is the third 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 2000, but some historical data are included to provide baseline information for subsequent annual progress reports.

Florida Sea Grant had five NOAA grants in effect during 2000. This annual report covers work completed and ongoing under all five grants.

Florida Sea Grant awards from NOAA activities during calendar year 2000.			
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	07/31/01
NA96OP-0114	Florida Bay	04/01/99	03/31/01
NA06RG-0435	Florida Bay	09/01/00	08/31/01

A summary of recent Florida Sea Grant accomplishments follows, with details for 2000 in the remaining ten sections of this progress report.

SCIENCE SERVING FLORIDA'S COAST

Sea Grant Florida

The Florida Sea Grant College Program is committed to enhancing the practical use and conservation of coastal and marine resources to create a sustainable economy and environment. Now in its 30th year, Florida Sea Grant is the only statewide university-based coastal research, education, extension/outreach and communications program in Florida. One of 30 Sea Grant programs nationally, it is a partnership program among the National Oceanic and Atmospheric Administration, Florida's universities and Florida's citizens, businesses and governments.

Participation

Florida Sea Grant operates through an advisory board of 15 members, each appointed by the President of ten public and three private universities and two research laboratories in Florida. From 1997-2001, faculty and students at ten participating institutions (FSU, UF, UM, USF, FIT, MML, HBOI, FAU, FIU, NSU) have received federal Florida Sea Grant funds based on competitive awards. A coordinated statewide program involving all universities is required by the National Sea Grant College Program in order for each state to participate in the national program. The Florida Sea Grant Management Office (UF) is the portal through which this occurs.

Student Support

Since 1997, 23 graduate students per year have received assistantship support. Over 30 percent of Florida Sea Grant's research funds support graduate students on research projects. Since 1986, 75 additional students at nine Florida universities (UF, USF, FIT, FSU, UWF, NSU, UCF, FAU, FGCU) received Sea Grant scholarships using private Aylesworth Foundation funds totaling $402,824. Twenty-six university students from Florida have earned a Sea Grant Knauss Marine Policy Fellowship to spend one year working in the executive or legislative branches of government in Washington, D.C.

- - - Impacts - - -

Marine Biotechnology

Florida is a recent arrival on the national marine biotechnology scene. However, this area represents a solid opportunity for both university scientists and biotechnology-based companies to have an impact on the growth and duration of this field.

Florida Sea Grant is:

- Developing ways to produce commercial quantities of marine antiviral agents for use as potential pharmaceutical products.
- Using cell culture techniques to chemically duplicate marine natural products (and thus reduce the need to collect products from the "wild") for clinical development as potent antitumor compounds.

Aquaculture

Production of marine species is only a small part of Florida's aquaculture production, valued at just over $100 million. Commercial culture of hard clams is a recent success story and a critical mass of effort is developing for the marine ornamental species sector. There is potential for marine aquaculture growth. Florida Sea Grant is:

- Developing economic information on Florida's tropical ornamental marine species industry to help the Florida industry grow and become internationally competitive.
- Testing the feasibility of producing mutton snapper in commercial quantities in cages.

Seafood Safety

Florida has about 5,000 processing plants and retail seafood firms. These range from small retail shops to the nation's largest shrimp processing plants. All are responding to increasing demand, shifts in available seafood supply, increasing international trade and competition, new regulatory inspection mandates and environmental concerns.

Florida Sea Grant is:

- Providing national leadership to ensure the safest possible seafood in the U.S. by training more than 10,000 seafood processors and regulators in 37 states, using the latest scientific information, on federally mandated Hazard Analysis Critical Control Point (HACCP) methods.
- Conducting an annual "Shrimp School" for key processors and importers of shrimp to Florida. The latest scientific methods are taught to about 60 students each year, from many states and foreign countries.

Fisheries

Florida leads the nation in terms of the economic value from all uses of its marine fish and shellfish. However, Florida's fisheries are affected by multiple use conflicts, global trade, overfishing, and coastline development that contributes to habitat loss.

Florida Sea Grant is:

- Reducing the depletion of snapper and grouper stocks by determining the best techniques the charter/party boat industry can use to increase the survival of released undersized fish.
- Evaluating the status of the Florida spiny lobster trap certificate program as a way to recommend management changes and increase the biological and economic returns from the fishery.

Water-Dependent Businesses

Managing coastal development is a critical challenge facing Florida. Water-dependent enterprises–traditionally small businesses engaged in tourism and the marine trades–are at risk and need to increase productivity and efficiency by adopting new technologies, adapting to regulatory changes, and maintaining access to coastal waters. Almost one million boats and 1,500 coastal marinas are critical to the economic survival of coastal communities. Florida Sea Grant is:

- Teaching boaters, marina operators, and citizens how to regulate themselves–using science-based maps and Geographic Information System (GIS) technology–both to avoid costly regulations and maintain economically viable marine industries.
- Designing boat traffic systems to minimize environmental impact and maximize boating availability in Florida's urban baywater systems.

Water Quality

From high quality recreational fishing opportunities on the Gulf coast, to attractive eco-tourism in the Florida Keys, to productive commercial fishing along the Atlantic, "clean" water is the engine that drives a significant part of Florida's large renewable natural resource-based economy.

Florida Sea Grant is:

- Assisting scientists and the public with an organized outreach program on Florida Bay to ensure that resource managers and citizens are informed about key issues affecting water quality in the Bay.
- Developing techniques to evaluate rates of non-point source pollution from barrier islands to surface waters along the coast.

Coastal Habitat

Environmental awareness in Florida is at a high level, with wide public concern over the "replumbing" of the Everglades in its planning and funding phase. The Florida Keys National Marine Sanctuary was recently established. Both are true national assets and directly relate to the future of Florida Bay, which lies at the southern tip of Florida, between the Everglades and the Florida Keys. Florida is home to three of the nations' 24 National Estuarine Research Reserves.

Florida Sea Grant is:

- Assessing the importance of various estuarine habitats for blue crabs as a way to eliminate habitat damage and ensure their continued production.
- Determining the role of sponges in controlling nuisance algae blooms caused by non-point source pollution.

Coastal Storms

Florida's coastline, home to 80 percent of the state's residents, is at risk from winds, waves and floods generated by tropical storms. Over the last five years, these coastal processes and hazards have resulted in billions of dollars in damage.

Florida Sea Grant is:

- Designing ways that local communities can develop risk-based policies for funding storm hazard management programs.
- Implementing micropropogation techniques in nurseries to improve the survival of sea oats in coastal dune stabilization projects.

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 2000 annual report, program accomplishments and benefits are reported under those goals and tasks scheduled for 2000 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)

A combined faculty-industry effort led to introduction and passage out of House of Representatives and Senate committees of the 2000 Florida Legislative Session of a bill to create a marine biotechnology research and development program. The bill died on the floor on the last day of the session. A $2M appropriation was to be created by the bill, to be jointly administered by FSG and the Florida Marine Research Institute. Due to very favorable response of legislators and staff, the bill was revised by the working faculty committee later in the year for introduction into the 2001 legislature. Meanwhile, Florida Sea Grant organized the Marine Biotechnology Summit II, held in conjunction with the BIOFlorida annual trade association conference. The summit was attended by at least half of the 75 cognizant faculty across Florida. (A representative from the National Sea Grant Office called the meeting "superb.") Thus, Florida is recognized nationally as having one of the most active marine biotechnology academic efforts.

1.2 The presence of carcinogens in the environment is a serious health and social problem. A method to detect carcinogens in Florida's coastal marine waters will be developed as a way to reduce human exposure to these agents. (Paul: R/LR-MB-3)

This project represented a new line of scientific inquiry. It is based on a developing hypothesis that the ocean behaves like a pseudolysogenic culture, in that there are a mixture of sensitive and resistant cells in the presence of high numbers of viruses. A major problem encountered was that the previously characterized lysogenic phage host systems lost their capability to establish a true lysogenic relationship. However, the pseudolysogenic relationship established was of even more interest. Success with other lysogenic systems is occurring and these will form the basis of the marine prophage induction assay. The observations of pseudolysogeny formed the basis of a proposal which was funded as a follow-on to this project by the National Science Foundation. Presentation was made to the American Society for Microbiology and the project supported a student who is completing a thesis for a M.S. degree.

1.3 Marine microbes associated with invertebrate species are relatively unexplored and an exciting potential new source of disease-fighting substances. Microbes will be collected, cultured and bioassayed to determine if they are potential anticancer and antibiotic substances with new drug potential. (Baker/Grimwade/Leonard: R/LR-MB-4)

Examination of hundreds of marine microbes provides the first evidence of a difference between Antarctic and temperate microorganisms in terms of bioactivity profile (13% active in Antarctica vs. 43% of temperate). This is contrary to prevailing biogeographic theory and suggests that microbes isolated from warm water invertebrates may be an unusually rich source of bioactive metabolites. There are four potential lead compounds for new antibiotics; their structures are currently being determined and thus far appear

novel. One student earned an M.S. degree (M. Van Ert), and a doctoral degree is in progress. Four publications resulted.

1.4 Marine invertebrate cell culture technology can be used to produce useful natural marine products. Sponges and tunicates will be used to identify, clone, and express growth-regulating genes to enhance the production of compounds with therapeutic potential. (Pomponi: R/LR-MB-5)

Supply of marine-derived bioproducts with pharmaceutical potential is a limiting factor in commercial development. The development of *in vitro* production techniques may provide new commercial opportunities for production of marine-derived drugs for clinical use. This project demonstrated that certain molecular processes can be regulated *in vitro* which provides the basis for continued research on regulation of biomass and bioproducts production. A DNA sequence was identified that may lead to the development of a vector which can be used to introduce recombinant transgenic constructs into cultured sponge cells. This is a significant result which may have important implications for development of transgenic sponge cell lines for *in vitro* production of marine-derived drugs. The research also led to unexpected results that have provided new insights into marine invertebrate cell culture and marine biotechnology. Six presentations were made to such groups as BIO 98 in New York, BIO Florida in Bal Harbor, the Marine Bioprocessing Symposium in Holland, Benthic Ecology 2000 in North Carolina and the Aquatic Invertebrate Tissue Culture workshop in France. Two graduate students, one undergraduate and one high school student worked on the project. Six articles are in press or have been published.

1.5 Preclinical and clinical development of promising pharmaceutical agents are frequently compromised by inadequate supplies. Novel techniques will be used to develop production methods for two groups of bioactive marine alkaloids in sustainable supplies necessary to produce sufficient quantities of new drugs and protect the marine environment. (Kerr/Pomponi: R/LR-MB-6)

The significance of the progress made during this project is that methods have been developed which should be of utility for the sustainable production of biologically active marine natural products. Currently, the only source of bioactive marine natural products is from organisms collected from our reef communities. The goal is to develop enzyme-based synthesis and cell culture methods to provide renewable supplies of natural products of therapeutic value. The benefits are therefore in the health sector and also the marine environment. Three students received M.S. degrees while working on the project and three publications are in process. A presentation was made to the American Society of Pharmacognosy.

1.6 Discodermolide is a potent anti-proliferative compound similar to but more potent than Taxol®. Supplies for ongoing preclinical evaluation is a critical issue. It will be determined if discodermolide is produced by a microorganism associated with sponges as a renewable resource. (Sennett/McCarthy/Pomponi/Gunasekera: R/LR-MB-7)

Since the proposal was submitted, the Industrial Partner referred to in the proposal (Novartis Pharma AG) licensed discodermolide for development as an anticancer drug. The research partially met its objectives, in that of 450 strains of microorganisms analyzed, about 10% of extracts were determined as cytotoxic to a Leukemia cell line. Two college and one high school intern assisted in summer.

1.11 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 that 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. (Paul/Rose: R/LR-MB-12 [T-99-5])

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 enteroviruses 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.

1.13 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)

Over half of Florida's faculty involved in marine biotechnology attended Marine Biotechnology Summit II. Through posters and presentations, 53 faculty, graduate students and industry and agency cooperators established a statewide network.

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

2.2 Managers of the Florida spiny lobster fishery will be provided with a model that accurately predicts adult spiny lobster stocks based on ecology and biology characteristics of the Florida Keys primary spiny lobster nursery area. (Hernkind/Butler: R/LR-B-45)

Despite extensive hurricane damage to study sites, the work produced initial modeling simulation results, for six different scenarios of differing postlarval lobster supply along the Florida Keys. Future analyses and modeling will permit a grand test of a recruitment hypothesis derived from results and observations of the past decade of Sea Grant - supported research on this issue. Such a large-scale experiment has heretofore not been conducted with any spiny lobster. Six journal articles resulted, and two doctoral dissertations (Robertson, Schrawieser).

2.3 Blue crabs are a popular and valuable marine species along the coasts of both the Atlantic Ocean and the Gulf of Mexico – even though their habitats may be quite different throughout their range. This project, conducted jointly by Florida Sea Grant and North Carolina Sea Grant, examines how blue crabs use different habitats and how these habitats function with regard to the crabs. The project includes extensive field sampling along both the mid-Atlantic coast and the Gulf of Mexico's northern coast. (Frazer/Posey: R/LR-B-46)

Both seagrass and marsh channel habitats harbored more juvenile blue crabs per unit area than oyster reefs in the same area. Mean juvenile blue crab abundance is slightly higher in seagrass than in marsh channel habitats. The difference, however, is largely attributed to a late winter influx of early juveniles to the seagrass sites. The late winter influx of early juvenile blue crabs suggests that the peak period of recruitment along the central Gulf coast of Florida is not in early fall as assumed prior to the project. The primary method of sampling involved the use of sweep nets. As a consequence of a comparative methods study, sweep nets underestimate actual abundances of juvenile blue crabs. However, no habitat specific biases with the sweep net method was found that would cause changes in the interpretation of the data.

Juvenile blue crabs are more common in seagrass and salt marsh habitats compared to oyster reefs when all three habitats occur sympatrically. Mean blue crab abundance is slightly higher in seagrass than in marsh habitat, but this pattern is highly variable in space and time, possibly related to the ephemeral nature of seagrass beds in southeastern North Carolina.

In general, juvenile blue crabs are more abundant in marsh channel habitat relative to oyster habitat. However, greater numbers can be found in oyster beds on specific sampling dates. Peak numbers of early juvenile blue crabs were sampled in both late fall and winter of 1999 suggesting that winter is a potentially important recruitment period along the central Gulf coast of Florida.

There were strong interactions between the sub-regions within each state in seagrass compared to those lacking seagrass even within a geographic area. In general, habitat effects were strongest when seagrass was present and were less prevalent when seagrass was absent. This reflected a general trend where oyster and marsh habitats were used similarly in the absence of seagrass, but densities of many fauna were much lower in oyster reefs relative to other habitats when seagrass was present. Somewhat unexpectedly, marsh and seagrass were used similarly by a variety of taxa when both habitats occurred sympatrically. There were differences in overall density and rank abundance of fauna between geographic regions, reflecting greater densities of specific fauna and greater overall diversity in the Florida region. These patterns reflect a hierarchy in habitat preference and density-dependence in habitat use and the findings will stimulate further research to determine the importance of alternative habitat types for a large number of ecologically and economically important fishery species.

Seagrass is preferred over oyster and sand habitats. Oyster habitat is used as a refuge when seagrass habitat is not present. Based on juvenile crab densities per patch, oyster patches and seagrass patches appear to be used similarly when presented in isolation. Tethering experiments in fall 1998, winter 1998/99, and summer 1999 indicated little difference in survivorship between habitat types, with a no-significant trend towards higher survivorship in seagrass patches.

Because juvenile blue crabs rarely occur in oyster habitats in the Crystal Bay area where this work was carried out, the hypothesis was tested that growth potential is actually greater in the non-structured marsh channel habitats than in seagrass. Enclosure experiments were carried out at two sites within the St. Martins Marsh Aquatic Preserve. Caging effects were also examined by measuring and comparing above-ground and below-ground biomass of the seagrass (*Halodule wrightii*) and the number and diversity of

infauna in enclosures containing crabs, enclosures with no crabs and at sites immediately adjacent to the enclosures. At one site growth of juvenile blue crabs was greater in the marsh channel habitat than in seagrass consistent with the hypothesis. Survivorship at the second site was too low, however, for adequate statistical treatment. In the former case, crabs increased in size, i.e., carapace width, by an average of 28.3mm and 17.9mm in the marsh channel and seagrass habitats, respectively. With regard to caging effects, the biomass of both seagrass blades and rhizomes was greater in cores taken outside of enclosures. In general, the abundance of infauna was low, but greater numbers of infaunal organisms were collected from enclosures within the marsh channel habitats. These findings indicate that there may indeed be a growth advantage for juvenile blue crabs that forage in non-structured, marsh channel habitats, and that for some crabs this benefit may offset the risks associated with predation in this habitat type. These results in combination with those noted above, as part of other objectives will lead to the investigation of the potential ecological significance of marsh channel habitats to post-settlement blue crabs along Florida's Gulf coast and other regions in the Southeastern United States. The findings from these future efforts will be of importance to fishery resource managers as they attempt to determine which habitats are to be considered truly 'essential' for the blue crab and other estuarine dependent species. One potential problem that needs to be considered in this study is cannibalism by juvenile blue crabs within enclosures. There were reduced numbers of crabs in several enclosures at one site, possibly reflecting cannibalism that resulted in a loss of statistical power, which, in turn, affected the strength of the conclusions. Based on this study, alternative experimental approaches should be developed and employed to study growth aspects of habitat function for this blue crab and other crustaceans that likely exhibit similar types of behavior.

In both the Florida and North Carolina portions of this project, 10 graduate and 7 undergraduate students were involved. Fifteen publications were prepared or are in progress and ten presentations were made to such groups as the National Shellfisheries Association, Blue Crab Symposium and annual Benthic Ecology meetings, among others.

2.7 A vessel-level economic behavior analyses on the pelagic longline fleet 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)

The NOAA/NMFS vessel-level economic behavior project is continuing. Logbook data have been obtained and initial analyses have been conducted. A poster of the preliminary findings was presented at the 2000 Southern Agricultural Economics Association annual meetings in Knoxville, TN.

2.8 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)

An article which reports the vessel level cost and earnings data is currently in review (second) with the Marine Fisheries Review journal. The data from this paper will provide the basis for the extension brochure.

2.9 Assistance will be provided in the development of the Menhaden Management Plan for the Gulf States Marine Fisheries Commission. Ten state and federal managers will have a more complete knowledge of the economic contribution of the menhaden fishery to the Gulf region economy. (Adams)

Analyses regarding the economic status of the industry was provided to commission staff. The revised plan is currently under review by the appropriate advisory committees and state agencies.

2.10 Service will continue as a member of 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)

Participated in meetings of each committee.

2.11 On-going applied research efforts will continue on effort distribution among the complement of major commercial fisheries in South Florida, the harvest sector and market characteristics of the Florida marine life industry and the economic consequences of red tide events in southwest Florida. (Adams)

A paper has been accepted for publication by Kluwer Academics (Netherlands) which describes the wild harvest of marine ornamentals in Florida. This paper was given at the First International Marine Ornamentals Conference in Hawaii. Another paper addressing the existing market channels and international trade patterns for marine ornamentals has also been accepted for publication by the same publisher. Both papers are expected to be published in early 2001.

2.12 An informational brochure for the FL 317 State Major Program, Sustainable Fisheries, will be developed. (Adams)

The brochure for the FL 317 State Major Program was not completed. The Design Team has decided to create a web page, rather than a brochure. This will be completed in 2001.

2.13 The 2000 Coastal Pelagics Stock Assessment Report to the Scientific and Statistical Committee of the Gulf and South Atlantic Fisheries Council and the Industry Advisory Panel of the Gulf of Mexico Regional Fishery Management Council will be co-chaired, co-authored and presented. Ten federal fishery managers and ten commercial/recreational fishery representatives will become better informed regarding the status of coastal pelagics stocks in the Gulf and South Atlantic region. (Adams: Gregory)

The National Marine Fisheries Service (NMFS) implemented the Mackerel Amendment 9 that establishes a gill net moratorium and reallocates king mackerel among the various fisheries throughout the southeastern U.S. This culminates a 3-year effort to obtain these measures that are expected to bring increased stability and profitability to the Monroe County fishing fleet.

Gregory served as an invited participant to the 4-day Coastal Pelagics (Mackerel) Stock Assessment Panel meeting in Miami for the Gulf of Mexico and South Atlantic Fishery

Management Councils to set Total Allowable Catch (TAC) for the Gulf king mackerel for the 2001 fishing year. A 5% reduction in current TAC was recommended.

The Mackerel Stock Assessment Panel report was presented to the Gulf of Mexico Fishery Management Council's Mackerel (10 persons) and Dolphin/Wahoo (8 persons) Industry Advisory Panels and to the SSC (17 persons) Tampa. The Gulf Council eventually accepted the recommendation of the Stock Assessment Panel to reduce the Gulf king mackerel TAC by 5 percent. The TAC is now under consideration by NMFS.

2.14 Four industry workshops regarding proposed fishery management regulations will be held. 100 commercial fishermen will become involved in the process of developing alternative management measures that minimize the socio-economic impact while achieving the biological goals of the management agency. (Adams: Gregory)

Only one of the four planned industry workshops were held this year because the Monroe County Commercial Fishermen, Inc. took the lead in informing the local fishermen about upcoming regulations. This past year was relatively quiet from the regulatory perspective. The single workshop conducted by the Monroe County Marine Extension Agent was on king mackerel proposals. Fifteen fishermen attended the meeting and became informed about the regulatory options. (Gregory)

The Monroe County Marine Extension Agent participated in the following regulatory meetings that were held for public input:

1. Participated in 2 FWC sponsored spiny lobster workshops in Islamorada and Key West.
2. Participated in the Gulf Council Stone Crab Advisory Panel Meetings in Marathon.
3. Participated in the Gulf Council Meetings discussion of the Tortugas Marine Reserve proposal from the FKNMS.
4. Assisted in getting local shrimp fishermen to attend the Gulf of Mexico Fishery Management Council Workshop on Shrimp Bycatch. Sea Grant provided testimony with respect to the results of previous bycatch observer efforts coordinated by the local agent. It was stressed that existing bycatch reduction devices were not effective in the Tortugas pink shrimp fishery because the tropical nature of the area favored crustacean bycatch over finfish bycatch.

2.15 Assistance will be provided in administering disaster aid grants to lobster fishermen affected by Hurricane Georges. 25 fishermen will become aware of what is required to comply with disaster assistance applications. (Adams: Gregory)

The Monroe County Marine Extension Agent provided documentation regarding the impact of recent hurricanes on lobster and stone crab trap fishermen that helped them to obtain $4.8 million in disaster aid from Congress in 2000. The money will be administered by NMFS and the Florida Fish and Wildlife Conservation Commission and should be available to the industry in the spring 2001.

2.16 Lobster monitoring research on the Florida Keys National Marine Sanctuary Ecological reserve in the Lower Keys region will be conducted. One commercial fisherman will be contracted to provide data collection support. (Adams: Gregory)

Sampling of 90 traps was completed in June with 270 trap pulls. Over 1000 lobsters were observed and a presentation was made to the 6th International Lobster Conference in Key West, FL on the results of the three years of monitoring with commercial traps. Data collected to date indicate the reserve is providing some protection to lobsters but the effects have not been cumulative through the three year period.

2.17 Service will be continued 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 biological consequences of proposed fishery regulations. (Adams: Gregory)

The Monroe County Extension Agent participated in the discussion of proposed dolphin and wahoo regulations at the June meeting of the South Atlantic SSC in Islamorada.

The Gulf King mackerel quota was discussed at the May meeting in Tampa. The proposed stone crab trap limitation program in Florida was discussed at the June meeting in Key West. Regulations have passed the state legislature and Council, and are under consideration by NMFS.

2.18 Four fishing tournaments will be officiated. (Adams: Novak)

The Charlotte County Marine Agent officiated two shark, ray, and catfish fishing tournaments for Fishin' Franks Tackle Shop, and three red drum/snook tournaments for the Charlotte County Chapter of the Florida Coastal Conservation Ad Hoc committee. The shark tournaments were kill tournaments and the red drum/snook were release tournaments. The agent also designed, constructed and demonstrated a "reccessitation" tank which was used to rejuvenate tournament fish that were stressed when they came to weigh-in. The tank was used for three "release" tournaments during 2000 and will probably be used at several more around the state next year. It received excellent reviews by local and state tournament representatives.

2.19 Sustainable fisheries general information will be provided to marine related businesses. At least 20 bait/tackle stores, party boat operations, scuba shops, and marinas will be better informed regarding fish venting techniques, use of circle hooks, fish identification and eco-friendly anchorage sites. (Adams: Stevely, Novak)

Working collaboratively with the Charlotte County Marine agent, and using Sea Grant funding and volunteer assistance, 900 fish venting tools were constructed for distribution to offshore fishermen in the central west Florida coast region. Venting tools and informational materials have been distributed through several venues: offshore fishing tournaments (3), cooperating bait and tackle stores (3), and newsletter and newspaper articles. Assistance was provided by marine extension advisory committee members for a poster display at the RecFish 2000 conference, Mote Marine Lab fish tagging biologists, FWC public outreach program, FWC law enforcement officers, and Sarasota Co. Dept of Natural Resources. (Stevely and Novak)

More than 2,500 venting tools were constructed and more than half have been distributed. Seven programs for local fishing and boating clubs were presented on how to use the tools. The tool was also demonstrated on television and at the Fish Expo sponsored by the Florida Coastal Conservation Association. As a result, approximately 600 venting

tools have been distributed to offshore fishermen. Specific contact information for 125 fishermen has been obtained. Inquires for fish venting information have been received from other states in the Gulf and South Atlantic, and other regions of the world (i.e. Australia). This contact information will be used to conduct a formal evaluation of the use of venting tools by recreational fishermen in 2001. Approximately 80 venting tools have been distributed by Mote Marine Lab and the FWC outreach program.

Funding was obtained from Florida Sea Grant and the West Coast Inland Navigation District to revise and reprint 25,000 copies of the Tackle Box Guide to Common Saltwater Fishes of Southwest Florida.

Informational posters, anchorage maps and Tackle Box Guides have been distributed to 23 marine resource related businesses.

2.20 Data will be collected, analyzed and distributed on the recovery of sponge populations in the middle and upper Keys. Funding will be obtained from the FWC Marine Research Institute. (Adams: Sweat/Stevely)

Activities included obtaining funding from the Fish and Wildlife Conservation Commission and Florida Sea Grant ($12,500) to collect, analyze, and distribute data on recovery of sponge populations in the middle and upper Keys. Field work was completed, data analyzed, and final report submitted to the FWC. In response to a request from the Florida Keys National Marine Sanctuary, a comprehensive review of sponge community recovery, sponge biology, and fisheries data was prepared and presented to the Sanctuary Program Advisory Council. Technical training in sponge identification was provided to a Sea Grant researcher working on ecological impacts of sponge filter feeding. Similar training was provided to two University of Central Florida faculty and Old Dominion University scientists to assist their work on sponges.

As a result of scientific information presented to the Keys Sanctuary Advisory Council, sponge fishery management issues in the Keys are being resolved without the need to ban sponging in the Keys. The Keys sponge fishery provides approximately $1 million in revenues and a livelihood for approximately 125 fishermen.

Florida Keys sponge community recovery data are providing research and resource managers with a long-time, comprehensive understanding of the rate of sponge community recovery and a tool for evaluating restoration of Florida Bay ecosystems. These data were utilized by the FWC Marine Research Institute to model impact and restoration strategies to mitigate impacts resulting from construction of a natural gas pipeline in the Gulf of Mexico.

Technical training in sponge identification has enhanced the ability of Sea Grant researchers to conduct an evaluation of the ecological impacts of sponge filter feeding.

2.21 Assistance will be provided in the implementation of the Sea Grant strategic investment project for evaluating scallop enhancement technologies as a way to increase scallop wild stocks. (Adams: Stevely)

Input was provided in the project planning meeting. It was suggested to include partially buried cages as part of experimental design. Contact information to contract with bait

shrimpers to collect baseline data and collect brood stock was provided to the researchers.

2.22 Feature stories on fish venting will be developed with at least two outdoor writers for major daily newspapers in Southwest Florida. (Adams: Stevely)

Two feature articles were developed for local weekly newspapers (Island Bystander and Longboat Observer) in the Manatee and Sarasota Counties region. The articles addressed the use of fish venting tools.

2.23 The annual Pier Fishing Tournament in St. Petersburg will be conducted. 200 youngsters and their adult sponsors will be provided an introduction to fisheries conservation and fishing ethics. (Adams: Sweat)

The 12th Annual Kids Fishing Tournament was planned and held on 12 May 2000. Two-hundred thirty-five youngsters participated. Over $6,000 in donated food, drink, and prizes contributed to the success of this event.

2.24 The Boater's Pledge and Code of Angling Ethics will be presented to Taylor County fishers and boaters. At least 10 participants will alter at least two existing behaviors. (Adams: Aubrey)

One hundred twenty-five people were presented with NMFS' Code of Angling Ethics. Boaters Pledge materials were not available at the time of presentation. Participants have not yet been surveyed in order to assess how many have altered their behavior.

2.25 The feasibility of conducting a 4-H Sport Fishing Leaders Training Program in Taylor County will be determined. (Culen: Aubrey)

The concept of holding a 4-H Sport Fishing Training Program in Taylor County is still being analyzed.

2.27 Florida Sea Grant has made a long-term investment in the Florida spiny lobster industry. Project participants have always interacted with scientists working in this area through an international lobster biology and management workshop. The Sixth International Conference and Workshop on Lobster Biology and Management will be held in Key West, Florida, in September 2000. Florida Sea Grant will support a one-day symposium titled "Integrating Ecological Research with Lobster Management." (Hermkind/Butler: PD-98-8)

The overall conference involved over 200 participants from 25 countries (including 26 students). The symposium included 16 presentations, with emphasis on prediction of lobster catch, based on abundance of juvenile individuals. The papers are being published in a peer-reviewed journal.

2.28 Sponsorship of the Socio-Economics Session at the Gulf and Caribbean Fisheries Institute.

Economics and social information on fisheries is limited. The goal was to encourage the dissemination of available information. Funding was used to print the abstract book and poster materials for this session, held in Key West, Florida, in late 1999.

Other Accomplishments Not Originally Planned

Two papers were given at professional meetings that describe recent changes in the management structure for Cuban fisheries. One paper was given at the 2000 International Institute of Fisheries Economics and Trade (IIFET) in Corvallis, OR. The other was presented at the 2000 American Society for the Study of the Cuban Economy in Miami. Proceedings papers will be published for each. (Adams)

Two papers were published on the Net Ban in Florida. One was a FSG Extension Fact Sheet (SGEF-117) "Since the Net Ban" and the other was TP-101 "Impacts of the Florida Net Ban on Commercial Fishing Families." (Adams)

A trip to Havana, Cuba resulted in a visit with staff of the Cuban Ministry of Fisheries (developed paper describing the recent changes in the Cuban fishing industry) and the Institute of Oceanology (visited with staff regarding sponge biology). (Adams and Stevely)

Two guest lectures were presented to the Florida Keys Community College Marine Biology classes on spiny lobster life history, historical fishery trends and current challenges toward achieving sustainability. (Gregory)

Sixteen fishermen were assisted in obtaining federal and state fishing permits. (Gregory)

Trips were taken on two commercial kingfish gillnet vessels to observe and document the activity of the local gillnet fleet fishing in federal waters. (Gregory.

Three newspaper articles were published in Monroe County. (Gregory)
"Industry and Government Cooperation Creates a Sustainable Lobster Fishery"
"New Shrimp Fishing Regulations are Being Considered"
"Why Does the Lowly Sponge Create so Much Controvery"

The Monroe County Extension Agent served as invited panel discussant during the Annual Meeting of the Association for the Study of the Cuban Economy, Miami. (Gregory)

Over 350 youth were trained at Youth Fishing Clinics. They were taught the techniques of catch and release fishing. Participants were also educated on how to bait the hook, tie a knot, and cast. A lecture was given on the biology and ecology of the surrounding environment and the impacts of marine debris to marine life. (Crane)

Nine articles were written for the Charlotte Sun Herald newspaper and six for the Charlotte County Extension Newsletter related to artificial reefs, care of fish, fish venting, circle hooks and clam farming. (Novak)

Two Kids Fishing Days were planned and held. The first was held at Cecil Webb Refuge and more than 80 participants learned skills needed for fishing. More than 180 children were on hand for the saltwater version where each had an opportunity to fish from a boat and received a full set of fishing gear. Underprivileged children are given first chance at registration for both events. (Novak)

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

3.1 A marine ornamental fish industry advisory committee organized in 1999 will meet at least two times. This will allow appropriate guidance to the new Sea Grant priority in marine ornamental fish. (Seaman)

The advisory committee includes four individuals from industry and two from oceanaria. They met once in 2000, and endorsed the FSG long-range goal of enhancing the industry and contributed the principal research priority statements for the 2002-2003 biennium.

3.2 Diets will be formulated which will improve the growth and development of cultured ornamental fish and red drum. Texas Sea Grant will participate. (Marcus: R/LR-A-22)

Copepods nauplii derived from diapause eggs provide a promising alternative food item for expanding the variety of fish species that can be cultivated. The larvae of one species grew better in trials, when compared to other feeds. Industry has requested samples of the product for evaluation. Two papers were sent to journals.

3.3 A baseline economic analysis will be completed to define the demand for Florida marine ornamental fish, trade patterns, and to determine industry outlook and regulatory needs. This analysis will specify research needs which will lead to the growth and development of the Florida ornamental fish industry. (Lee/Milon/Adams/Degner: R/LR-A-23)

Since 1990, landings of bigeye, flounder, shark, and scorpion fish have decreased more than 60%. Landings of spade fish, catfish, and remora have risen more than 1000%. Among the invertebrate species, increases in the landings of scallop (+10,900%), sea star (+7,000%), sea hare (+5,200%), conch (+4,900%) were most notable as was the decline in landings of octopus (-58%), jellyfish (-53%), plants (-36%), and nudibranchs (-18%).

The average Florida firm has an inventory capacity of 22,000 gallons and 16.8 years of experience in the business. Florida wholesalers livestock inventory comprises 95% marine species, 85% marine life from Florida, 50% fish species, 42% invertebrate species, and 8% live rock and live sand. Florida wholesalers obtain 34% of their inventory from full time employee-collectors, 30% from other local collectors, and 36% from other wholesalers. Fifty-six percent of Florida wholesale purchases are from other Florida dealers. The majority of imports held in inventory are from Haiti. Florida dealers sell 71% of their product to other Florida wholesalers, 26% to the retail sector, and 3% to others (including consumers, educational institutions, and aquariums). By comparison, wholesalers in other states acquire 66% of their inventories from collectors and 34% from other wholesalers. Out-of-state dealers acquire 78% of their purchased product from Florida.

Local dealers reported that compared to imported product, Florida products are preferred because they have a better survival rate. Florida products are more competitive because they are less costly than imported products and are free of the "red tape" associated with imports. The disadvantages of dealing in Florida products are the limited supply and seasonal availability of Florida species. Furthermore, dealers in other states find Florida products to be more costly and less attractive (color, size, and species selection) than imports from the Pacific. The increase in invertebrate landings can be attributed to the relative ease of harvesting invertebrates compared to fish species and the increased

demand for reef tanks with invertebrates. The decline in Florida fish landings is explained by the increase in the number of fishing regulations, decline in water quality, and reduction in prices. The outlook for the marine life market includes more cultured species, fewer firms, more large firms, and increased demand for products collected with environmentally benign harvest practices.

This work provides the first comprehensive analysis of this unique, multi-product, multifaceted industry. The fast changing nature of the industry requires that both researchers and resource managers stay abreast of trends to anticipate potential problems and formulate effective policy solutions. Future research on marine life management in Florida will turn to this body of work for baseline information and analysis of primary data.

An undergraduate student worked on the project. Four articles and three Florida Sea Grant publications are in process and eight presentations were made to the World Aquaculture Society and Marine Ornamentals '99.

3.4 Atlantic surgeonfish are routinely collected off the Florida coast for sale through the aquarium trade and for display in oceanaria. The anatomy, histology, blood history, and diets of these fish will be determined in order to respond to specific diseases, nutritional studies and reproductive problems experienced by the handlers of these fish. (Francis-Floyd: R/LR-A-24)

Some unexpected findings of this research will have an impact on how tropical surgeonfishes are maintained in aquaria. For example, a high degree of opportunistic feeding and consumption of animal matter, as opposed to the predicted high levels of plant matter, were observed. Also, the unusual character and content (i.e., thickened stomach and presence of find sand) of the digestive system offers information on design of aquarium housing and substrate. One master's degree student was supported. An atlas of fish anatomy and physiology is in production, for use by aquaculturists.

3.11 An economic impact analyses of the hard clam industry by region and entire state will be completed. Fifty clam culturists and ten state agency representatives will become aware of the economic contribution of the clam industry to the economy of Florida. (Adams: Sturmer)

An assessment of the economic impact of the hard clam culture industry on the economy of Florida is underway. Completion of the study is projected for early 2001. The survey instrument has been developed, IRB-approved, and field-tested. A telephone survey has begun with about 25% of the interviews completed. The results will provide the contribution to local incomes, jobs and expenditures resulting from the hard clam culture industry for three regions of the state and Florida.

3.12 A technical and economic feasibility study of the remote setting of hard clam seed will be conducted, and a demonstration on how the cost of acquiring clam seed can be reduced will be held for commercial growers. Three hundred commercial clam growers will become aware of the economic advantages or disadvantages of utilizing the remote setting to obtain clam seed for growout. (Adams: Sturmer)

A technical and economic feasibility study of the remote setting of hard clam seed has been initiated with industry partners to demonstrate how the availability of acquiring clam seed can be increased for commercial nursery operators. Field trials were conducted at

commercial nursery operations in Levy and Volusia counties during the spring and fall. The two-year study is funded through the Florida Sea Grant Program and conducted in conjunction with the Louisiana State University.

3.13 Data archiving software for use in USDA funded aquaculture crop insurance program development efforts will be developed. Fifty commercial clam farmers will better understand the need for proper recordkeeping necessary to substantiate any losses reported to the USDA aquaculture crop insurance program. These individuals will be trained in how to use the recordkeeping software developed by the project. (Adams: Sturmer)

Progress has been achieved on the development of a data archiving software package for participants in the newly developed hard clam crop insurance program. This software is being developed under a USDA-funded project. The software will allow hard clam growers to document their nursery and growout plants and survival. The software will also allow growers to document their expenditures and sales. The information will provide the necessary data to reconcile any losses claimed under the crop insurance program.

3.14 The Florida Department of Agriculture and Consumer Services will be assisted in conducting workshops addressing the use of best management practices in lieu of the general permitting process for marine bivalve facilities. Fifty clam hatchery and nursery operators will become informed of how BMPs will affect their businesses. (Adams: Sturmer)

The aquaculture rule adopting the use of best management practices in lieu of the general permitting process for marine bivalve facilities became effective in October 2000. The Florida Department of Agriculture and Consumer Services was assisted in conducting workshops addressing their use during November and December 2000.

3.17 An economic feasibility analysis for bay scallop culture utilizing alternative cage designs will be completed. Ten scallop culturists will become better informed of the differences in production and economic characteristics of culturing bay scallops with alternative growout cage designs. (Adams: Sweat)

Ten prospective scallop culturists were involved in the Sea Grant funded study to examine alternative cage designs for scallop culture. The results of the study were hampered by poor growing conditions during the 2000 production season. The economic analysis was not completed due to the lack of data by which the previous cost and earnings estimates could be modified.

3.18 Five net ban fishermen and clam growers will be apprenticed into scallop aquaculture. (Adams: Sweat)

Five scallop aquaculture school graduates were provided with 30 growout cages and 10,000 seed scallops for growout trials.

3.21 A workshop addressing the feasibility of small scale, outdoor, low tech, and low cost tilapia culture in Florida will be assisted. One hundred aquaculturists will become informed of the economics of tilapia culture in Florida utilizing low cost methods of production. (Adams)

Presentations were given at industry workshops concerning baitfish, sturgeon, and tilapia culture. These presentations addressed the cost and earnings of the small-scale culture of each species. The economic characteristics of the culture process and available market-related information was provided to 100 prospective culturists.

3.22 A preliminary economic analysis on the culture of sturgeon in outdoor ponds will be completed with the assistance of the staff of the UF Mitchell Aquaculture Facility in Blountstown, FL. Ten prospective sturgeon growers will become informed of the financial characteristics of small-scale, outdoor culture of sturgeon in Florida. (Adams)

The analysis of the economics of sturgeon culture is progressing and not completed. The Florida Sea Grant funded study will be completed during 2001. The financial characteristics of the culture process for ponds and tanks will be determined.

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

4.1 A smoked fish processing school will be organized to cover all aspects of processing, storage, distribution, HACCP and SSOPs. Initial attendance is expected to exceed over 100 companies representing over 90% of Florida production. (Otwell)

Planning for an annual Smoked Fish School has advanced with the final installation and operational check of the new smokehouse completed May 2000. Necessary supplies are being purchased through special project funds provided by the Florida Sea Grant Program. The Seafood Technology Design Team will convene a joint team planning and smokehouse orientation session during the summer 2001. The projected date for the first Smoked Fish School is 2002.

4.4 Federal regulations imposed by the U.S. Food and Drug Administration (FDA) in December 1997 mandated that all domestic seafood processors and importers adopt HACCP to identify and prevent the occurrence of hazards that could affect the safety of seafood. A Seafood Education Alliance was formed in 1994 to organize a HACCP training program. (Otwell: E/TP-1)

The Seafood HACCP Alliance has been the most successful national Sea Grant project relative to the impacts on industry, respective regulatory agencies and program operations. It has involved every state in the nation, plus every U.S. Territory. It has exceeded the national boundaries with participation from over five nations exporting products to the United States.

- Training efforts have reached well over 90% of the original projected commercial audience (5000 domestic processing operations vs. over 7500 industry graduates from the Alliance course).
- Training efforts have reached programs and individual firms in over five nations exporting products to the United States.
- Training materials have spawned numerous international training programs that rely on the Alliance training curriculum. These programs will continue through the next decade.
- Every federal FDA inspector trained for the evaluation of a seafood HACCP program has completed the Alliance course.
- The NMFS volunteer inspection services have adopted the Alliance training materials.

- Every Sea Grant program in the nation has been involved to some degree, either in aligning or helping deliver training. Leadership roles and service on the national Alliance Steering Committee has been provided by six Sea Grant programs (AK, CA, FL, LA, NC, OR, and VA). Recent individual assignments reflect expansion in Sea Grant program roles in CT, DE, GA, NY, PR, and TX.

In terms of program operations, the Alliance project has fostered inter program cooperation among every state based Sea Grant program in a manner that was not previously available. These efforts of the Sea Grant program are recognized and appreciated by every state regulatory organization, the regional seafood trade associations, and key international fishery and food safety organization (i.e., FAO, PAHO, WHO, etc.).

Other Documentation:

1. The Seafood HACCP Alliance Training efforts are recorded on an established database in the headquarters for the Association of Food and Drug Officials (AFDO) in York, Pennsylvania. The records can be accessed to determine total training efforts by location (city, state, country), date, employment categories (industry, government, academic, others), and individuals (instructors and graduates). This database reflects on the total and continuing training programs about the nation and world.

2. The FDA continues to reference the Alliance training program as an FDA prerequisite for all FDA inspector training for both domestic and international seafood activity.

3. The National Marine Fisheries Service's national and international HACCP training programs (based on a fee for services basis) have been modified by adoption of the Alliance training curriculum.

4. The Seafood HACCP Alliances efficient organizational structure has been referenced by other organizations to assist their efforts in similar education programs. For example the U.S. Environmental Protection Agency (EPA) recently requested the assistance of the Alliance to announce and help coordinate their regional training program on *Pfiesteria* for responsible state agencies throughout the Southeast. Their program occurred July 1998 in Atlanta.

5. The Alliance maintains a list of priority research needs relative to seafood safety and quality. This list has been distributed to and is available to organizations or interested individuals. It is maintained by Dr. Ken Hilderbrand, Oregon Sea Grant.

Awards

Awards bestowed for the Alliance educational activities to date include numerous intrastate and intra-program recognitions, plus: Vice President Al Gore's 1999 National Performance 'Hammer Award' for innovations in government. U.S. Department of Agriculture's (USDA) Secretary's 1999 Honor Award. Plaques were awarded to all participants on the Seafood HACCP Alliance Steering Committee.

Ninety-three percent of the industry benefited from the training and 83 percent indicated they could not have complied with HACCP without the training. The project is completing

and making a transition to sanitation training. Courses will henceforth be provided in varying locations about Florida to accommodate the continuing need to train new firms and inspectors and to provide remedial help.

4.6 One hundred percent of the new shellfish producers in Levy County will implement HACCP plans and existing shellfish producers will continue to update their record keeping requirements. (Otwell: Sturmer)

90% of land-based nursery operators in the Big Bend area adopted appropriate Best Management Practices (BMPs) as they pertained to their facilities. 80% of shellfish processing plants (28) received certificates from the Seafood HACCP Alliance in sanitation BMPs.

All clam processors are now operating with the appropriate HACCP program. Regulatory advisement continues but there have been no warning letters or regulatory treats to stop operations. Commercial adaptation of the necessary 'tempering process', developed by UF/FLSG to prolong clam survival, is advancing with completion of verification trial through the summer of 2000. Industry requests for additional 'temper' verification work has culminated in a project for refinement of the methods during the warm 2001 summer season. All past work is being assembled in a position paper to support this practice in light of regulatory scrutiny from FDA and ISSC. This position is in response to commercial and regulatory requests in Florida.

4.7 Based on popular demand, the Florida Sea Grant Annual Shrimp School will be expanded to biannual sessions (spring and fall both in Gainesville), plus the First Annual Latin American Shrimp School to commence in Nicaragua. (Otwell)

Annual Shrimp School was held in May 2000. By design the attendance was restricted to the first 25 firms that registered. This design allows for the necessary teacher to student ratio for more effective hands-on instruction. To date all Florida shrimp processing firms have participated in previous Shrimp Schools and they continue to use the school for new staff and refresher courses. The program is now responding with plans for an Annual Latin American Shrimp School, the first of which will be held in Nicaragua in Summer 2001 and a domestic shrimp school in May 2001.

4.8 Annual processor schools will continue for Florida processors for blue crabs, hard clams, oysters and stone crabs. The schools will meet at various locations in Florida depending on convenience of the processors. (Otwell)

The Sea Grant Seafood Design Team approach through annual commodity schools provided separate 2000 industry schools for blue crab, hard clams and oyster processors. For each school over 70% of the state processed production was represented at each school, respectively. Plans for a similar school for stone crabs, spiny lobsters and smoked fish are still under construction.

4.9 Demonstration studies will be conducted to integrate the use of simple time-temperature controls with HACCP and SCP to allow for continued use of modified atmospheric packaging (MAP). The established MAP processes and retail use is threatened by federal mandates for termination of all MAP use for fresh seafood due to time-temperature related

issues pertinent to potential *Clostridium botulinum* safety problems. All field work will be conducted in St. Petersburg, Tampa, Orlando and Lakeland, Florida. (Otwell)

Numerous trial shipments with innovative 'smart labels' to prevent potential *Clostridium botulinum* problems with modified atmospheric packaging (MAP) were completed with pioneering firms based in St. Petersburg, Miami, Boston and Costa Rica. These firms were selected to represent MAP seafood commerce with domestic processing to retail, international sourcing into Florida, and out of state sourcing into Florida. All results verified the utility of the smart labels. Firms have initiated commercial adaptations thus averting regulatory warnings by FDA and Florida DACS. This work is supporting a research proposal to Sea Grant to advance the science of 'smart labels'. Likewise, accompanying HACCP programs have been drafted for commercial use and FDA has adapted the directives in their new Fishery Products Guide due for release in June 2001.

4.10 Demonstration trials will be conducted to determine consequences of carbon monoxide gas (CO) to impact 'fixed' colors in various fish species. The introduction of CO treatments has stirred regulatory confusion, aligned competition among fresh vs. frozen fish products, and complicated regulatory procedures and guidelines for traditional fisheries (tuna) and emerging aquaculture (tilapia). (Otwell)

A MS thesis was completed in Spring 2001 with results used to direct the proper use of carbon monoxide or 'tasteless smoke' to retain color in frozen tuna and related red muscled fishes. The results suggest benefits, but specific controls are necessary and must be monitored to prevent potential hazards due to CO treatments and mishandling of the potential scombrotoxic fish species. The results are being referenced in commercial and regulatory debates concerning proper controls and required labeling.

Projects ending in 2000, but not included in 2000 work plan.

PD-00-5 – Oyster Shucking - Regulatory concerns for contamination that may arise from traditional "grinder-assisted" oyster shucking prompted this pilot study of an alternate technology, "heat immersion." In tests conducted at industry facilities, efficiency of shucking and bacterial load were compared for two procedures. Heat shocking had lower bacterial levels, and also was easier for handlers to learn. Speed and yield of product seemed about the same for both practices.

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

5.3 Marina owners are facing economic and environmental conditions and regulations that restrict profitable operation. As part of a national project, designed to educate marina owners on techniques to increase economic efficiency and reduce environmental impacts and costs, Florida Sea Grant is assisting in conference coordination for the group. (Jackson: E/T-7)

Conference coordination was arranged for Boating Week, held in Orlando, Florida in fall, 2000. Florida Sea Grant arranged the logistics for meeting and housing spaces, assisted in agenda formulation and reviewed the final report. The result of the conference was an agreement between several Sea Grant Programs and major boating industry associations on the future of marine-related environmental education efforts, avenues of communication between Sea Grant and the major boating industry associations, and an agreement that

MEEF (Marine Environmental Education Foundation) would assume the lead role as the future coordinator. Other participants included individual marina operators as well as representatives from MOAA, (Marina Operators Association of America), SOBA, (States Organization for Boating Access), NMMA, (National Marine Manufacturers Association), IMI (International Marina Institute), and NASBLA (National Association of State Boating Law Administrators).

5.4 An in-service training workshop on Eco-Tourism and Geographic Information Systems (GIS) will be held on "Applications of GIS Technology to Eco-Heritage Tourism Development in Your Community." (Antonini: Halusky/Swett)

Cancelled due to retirement of Joe Halusky.

5.5 An Eco-Heritage Tourism provider training field trip will be held at Marineland Environmental Center. Quarterly events will be held for providers at University of North Florida. (Antonini: Halusky)

Cancelled due to retirement of Joe Halusky.

5.6 A non-motorized boaters' survey and development of a paddlers' guide for Northwest Florida will be completed. (Antonini: Turpin)

Robert Turpin (Okaloosa/Walton) was the agent that enlisted for this task. He resigned early in the year and the activity was cancelled.

5.7 Quarterly regional workshops in Eco-Heritage Tourism will be held with the regional councils in Northwest Florida (inventory, networking, training and education, marketing and promotion, protection of resources). (Antonini: Halusky)

Cancelled due to retirement of Joe Halusky.

5.8 Sixteen kiosks on boater education will be constructed and maintained in Charlotte County. (Antonini: Novak)

Fifteen kiosks have been installed and are in use.

5.9 The Charlotte County Boater's Guide will be distributed throughout the year. (Antonini: Novak)

50,000 Charlotte County Boaters Guides were distributed throughout the year.

5.10 Fact sheets on personal watercraft safety, ethics and courtesy, and paddlecraft safety, ethics and courtesy will be written for Manatee County. (Antonini: Stevely)

The Manatee County "paddlers guides" for kayaks and canoes are in draft form and will be published by the end of 2001. John Stevely chaired the committee for developing the guide for Terra Ceia Bay. This was a joint effort with the National Park Service and the Manatee County Trailways and Blueways Committee.

5.11 Volume One of the Southwest Florida Waterway Atlas will be distributed to marinas and boating facilities in Southwest Florida. (Antonini: Stevely/Novak)

Volume one was completed and it provides the public with an understanding of the changes in the bays, estuaries and waterfront brought about by coastal development. It is a useful tool for encouraging stewardship of bay water resources.

5.12 Volume Two of Southwest Florida Waterway Atlas for Charlotte Harbor and points south will be completed. (Antonini: Fann)

The cartographic research for this Volume will be completed by summer 2001. Write-up is scheduled for the fall, book production during the Spring 2002, and publication by the summer of 2002.

5.13 Phases One and Two of the Lee County Regional Waterway Management System mapping and analysis will be completed, and two Sea Grant technical documents including maps and metadata will be published on CD-ROM. (Antonini: Swett/Fann)

Phase one of the Lee County Regional Waterway Management System was completed and ArcView GIS data layers and applications, a waterway restriction analysis, and a final report were provided to Lee County and the West Coast Inland Navigation District. All project elements for Phase two have been completed and the draft final report was delivered to Lee County. FSG is awaiting the County's final revisions before publishing the final report.

The Regional Waterway Management System provides the WCIND and Lee County with a standardized, science-based regional waterway management system that includes GIS data (boats, depths, moorings, facilities, and signs), analytical techniques, and policy recommendations with which to prioritize waterway management protocols. This work has been adopted by the state, and led to enactment of the Inland Waterway Management Law.

5.14 Map Atlases of the Regional Waterway Management System Pilot Study (south Manatee County and north Sarasota County, FSG/TP-83) and South Sarasota Project (south Sarasota County, TD-1) will be reformatted to include digital ortho-photography base map coverage. (Antonini: Swett)

The Pilot Waterway Management Project, covering Sarasota Bay (Antonini and Box, 1996), and the south Sarasota Waterway Management Project (Antonini, Swett, Schulte and Fann, 1998) were reformatted to conform to a 1-meter resolution, USGS digital orthophotoquads, and realigned from a map base to a digital photo base. The Map Atlases and the GIS data sets for the two projects were redesigned to provide relevant information to jurisdictions within Manatee and Sarasota Counties and for the West Coast Inland Navigation District. The completion of this task provides a regional database for Southwest Florida that is visually consistent.

5.15 A Regional Waterway Management Manual will be published as a Florida Sea Grant Technical Paper to provide all the necessary information required to perform regional waterway management analysis. The manual will cover project planning and preparation, field and survey procedures, post-processing methods, data analysis, production of final

maps/tables, and include all necessary computer programs and automated procedures. (Antonini: Swett/Fann)

This work is now scheduled for completion in July 2002.

5.16 Cooperative work with the Florida Marine Research Institute will be completed by carrying out Project Blueways recreational boating-use evaluation to estimate boat traffic potential for Charlotte Harbor as a function of trip origins, destinations, and travel paths. (Sidman: Antonini)

Cooperative work with the Florida Marine Research Institute (FMRI) was completed in December 2000. This research is documented in the Sea Grant TP-109, entitled "A Survey of Methods for Characterizing Recreational Boating in Charlotte Harbor, Florida". A combination of survey methods – including aerial reconnaissance, expert workshops, and telephone and mail surveys – was used to develop spatial (GIS-mapped) and temporal boating profiles. A ranking system summarized the strengths and weaknesses of each method. This research has been extended to integrate boating information obtained from additional aerial surveys and workshops, and to expand the applications of the data generated from initial telephone and mail surveys. This new work will involve the estimation of boating 'spheres of influence' and areas of greatest crowding. The results will provide valuable human-use data themes in support of the FMRI Blueways initiative to analyze human-environmental impacts in Charlotte Harbor, Florida.

5.17 Cooperative work will occur with the NOAA National Ocean Service/Marine Chart Division in formulating improvements to small-craft chart series. (Antonini: Sidman/Swett)

NOS small-craft navigational chart 11425 was redesigned 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 to NOAA have resulted in the development of new products by the Marine Charting Division that eventually should replace the current national small-craft chart series. The new charts will include content that meets operational safety requirements and, additionally, provide information that will allow boaters to become better stewards of the environment.

5.18 The Florida Sea Grant Anchorage web site will be updated to include the legal and jurisdictional rights to navigation. (Antonini: Sidman/Ankersen)

The web site was updated to include additional anchorage photomaps and information regarding the legal and jurisdictional rights to navigation. This new information promotes responsible boating and the stewardship of anchorage resources, and provides important information regarding state and local anchoring and boating restrictions at popular anchorages. The web site has proven successful in reaching boaters that use recreational anchorages. The success of the current content has led to a proposal to improve the content and navigation of the anchorage web site.

5.19 Five new anchorages in southwest Florida will be inventoried. (Antonini: Stevely/Sidman)

The Bradenton Beach City Commission requested assistance in inventorying the anchorage resources and providing legal guidelines from the Center for Governmental Responsibility for setting up an anchorage plan. Present use is placing undue pressure on bay habitat. Map will provide basis for establishing a perimeter around optimal area for temporary anchoring. The remaining four anchorages were not inventoried due to lack of anticipated support from Department of Environmental Protection personnel.

5.20 Regional Harbor Board Memorandum of Agreements with local governments in Southwest Florida will be formalized. (Antonini: Stevely)

A workshop was held with the Bradenton Beach City council and members of the Regional Harbor Board. As a result, Antonini and Stevely undertook a survey of the Bradenton Beach anchorage. The survey included mapping the extent of the anchorage, bottom sediments and critical habitats. These data were used by the City to begin the process of developing an anchorage management plan with Manatee County.

5.21 An annotated model ordinance for local harbor management based upon the Regional Harbor Board's framework principles will be developed. (Antonini: Ankersen/Hamann)

The annotated model harbor ordinance was officially adopted by the Southwest Florida Regional Harbor Board as the appropriate tool for local management of anchorages. The model ordinance encourages local boater driven anchorage governance and replaces arbitrary length of stay regulations with temporal and spatial zoning of marine space within anchorages. The ordinance is under consideration in several communities and has served, at least in part, in the development of the Fort Myers Beach plan for the Matanzas Pass Anchorage. The City of Miami Waterfront Advisory Board recently requested a copy of the model ordinance.

5.22 The legal and policy framework for a regional approach to waterway maintenance and improvement in Southwest Florida will be developed. (Antonini: Ankersen/Hamann)

FSG is assisting the WCIND in the development of a planning framework to guide and monitor WCIND planning efforts and accomplishments through 2006. The 2001-2006 plan will reflect the broadened mandate of the District that resulted from legislation enacted in 1998, to include manatee protection and emergency planning. Plan elements will discuss existing conditions and present a planning framework that will specify goals, objectives, policies, future activities, and implementation actions. The plan is to be completed by September 30, 2001.

5.23 Six Clean Boatyard Program workshops will be held statewide and 250 more tool kits will be distributed. (Antonini: Jackson)

This program has been revised. Two workshops will be held and resource kits developed in Summer, 2001.

5.24 Marina owners are facing economic, environmental and regulatory conditions that limit profitability. The goal of this project was to educate marina owners on techniques designed

to enhance the economic and environmental sustainability of marina owners. (Clarke: E/T-7)

MarinaNet was formulated as a multi-state network of Sea Grant personnel and marina owners and operators. Several activities took place under the aegis of MarinaNet. The first was a Collegium held in March 1997 in Dallas, Texas. This Collegium was successful in identifying major issues to be addressed in the future. Five working groups were formed with the directive to report back at the IMI Marina Research meeting the following year. Sea Grant personnel acted as facilitators at those meetings with industry in 1998. Results were published as "The Future of the Marina Industry." The five focus groups were - education, economic impact, marketing, business management, and technology of facilities and services. An Internet discussion group was formed for interchange of ideas, problems, and solutions relating to marinas and the marine industry. Over 200 users have been enrolled. This is hosted by Oregon State University Sea Grant.

The "Panic Preventer File for Marinas" was published through Florida Sea Grant. It has been distributed nationally and a few copies have been sold internationally. The second edition is now in print. Approximately 525 copies have been sold or donated to date. The MarinaNet newsletter (5 issues) was published to communicate with industry partners and all Sea Grant cooperators. All 5 issues are available on the MarinaNet webpage (http://seagrant.orst.edu). Future communications will be handled through a "news bureau" managed through Louisiana Sea Grant. Contributing Sea Grant offices and any industry cooperators will funnel news articles through this news bureau for publication in industry and other in-house communication media.

The transition of Sea Grant leadership to industry leadership has been accepted by the following organizations: National Marine Manufacturers Association, Marina Operators Association of America, Marine Retailers Association of America, and the International Marina Institute. This group of industry organizations worked together to hold "Boating Week" in September 2000. Sea Grant representatives participated with presentations on the use of low power radios, distribution of spill kits, and other topics.

As a result of these meetings, focus groups and products, the marine industry is now communicating within the various facets, a phenomenon that was not true five years ago. The effort to join forces for "Boating Week 2000" is evidence of a new era of cooperation. The joint Industry/Sea Grant products of the "Future of the Marina Industry" and the web and email sites for discussion are also a result of this project. The door is now open for future collaboration with individual Sea Grant offices, but at least as importantly, with a group of Sea Grant offices in several states. The "team" of Sea Grant people who worked on projects throughout this grant is now ready to tackle future projects together. This had not been the case on a national basis prior to this grant.

5.25 Navigation charts for coastal recreational boaters have not been updated in many years. In some cases the data are no longer accurate and both navigation and environmental information needs have changed. This project was designed to determine recreational boater chart information needs and design a prototype photochart. (Antonini, West, Sidman, Swett: E/CSC-3)

A triple-fold prototype photo-chart (30"x60"), one third larger than the conventional small-craft chart was completed. The prototype chart included background aerial photography

and imagery. Examples were given using 4-meter resolution, digital infra-red, aerial ortho-photography, converted to natural color, 2-meter resolution infra-red color photography, and 5-meter resolution, composite satellite imagery (EOSAT IRS-C), color-fused with aerial photography. The imagery examples included coverage both of water and land as well as only land areas. Environmental information was provided on supplemental panels, based on GIS data from cooperating federal, state and local agencies. An evaluation of the chart by boaters indicated that:

a. Digital imagery, as a backdrop for land areas, was well received. The background imagery enhanced navigation by providing boaters with a heightened sense of location with respect to the coastline and urban features.
b. Bathymetric mapping with a GPS allowed for the inclusion of detailed depth-range contours for near-shore areas.
c. The use of GPS is proven to be an efficient and accurate method for collecting and updating chart information (signage, anchorages, boat ramps, marinas, spot soundings).
d. The prototype charting effort was greatly enhanced by the ability to utilize and incorporate GIS databases (bathymetry, mangrove, sea grass, shellfish harvest areas, speed zones, etc.), available from state and local agencies.

The prototype products did influence boating practices and the quality of boating experiences. The prototype chart had the greatest impact of all test products in affecting decisions to avoid adverse impacts on the environment. The Anchorage Guidebook had the greatest effect, followed closely by the prototype chart, in enhancing awareness of boating safety, reducing potential conflicts, and increasing on-the-water enjoyment.

The study findings have just been submitted to NOAA's Marine Chart Division. A redesign of the Prototype Photo-Chart #11425, the focus of this study, by incorporating volunteer boater recommendations, and its subsequent publication for general distribution and use was recommended. Boaters preferred the new, prototype chart format and additional information contained within it. This improved information will promote safer navigation and environmental stewardship in southwest Florida.

<u>Other Accomplishments Not Originally Planned</u>

- Pelican signs and brochures were given to six marinas in the Miami-Dade region and three other interested environmental/marina agencies around the state of Florida. Approximately 100 English and 75 Spanish signs were distributed. (Crane)
- Funding ($4,062) was obtained from the Greater Miami Billfish Tournament to reprint 500 copies of the "Don't Splash Your Trash" signs. These were distributed to over 40 marinas in the Miami-Dade region. (Crane)

Coastal Ecosystem Health and Public Safety

Goal 6: Protect and Enhance Coastal Water Quality and Safety

6.1 An organized outreach program on Florida Bay water quality and quantity will be continued (begun in 1997) as a part of the overall NOAA South Florida Ecosystem Restoration Prediction and Modeling Effort and under the direction of the Florida Bay Program Management Committee. (Gregory)

Project results during the most recent 12 months include the following:

- The Florida Bay Education Project assisted the PMC executive officer with a two-day modeling workshop that included both predictive and ecosystem modelers to discuss model development appropriate for Florida Bay management. The Education Project has had a less active role in these tasks than originally anticipated because the PMC Executive Officer, whose position did not exist when the previous proposal was written, has taken the lead in organizing topical team meetings.
- The Florida Bay Education Project and University of Florida organized the 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 late 1999 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 Education Project actively communicated research results to the outreach community and the public. Information about Florida Bay research has been provided to outreach educators via the Seahorse Sentinel newsletter, electronic mail, and the Florida Bay Homepage web site. The Education Project collaborated with research scientists and members of the PMC to produce and display seven large color posters about Florida Bay research and the PMC at the South Florida Ecosystem Restoration Forum in May 1999. The explicit purpose of the forum was to communicate research results to resource managers and a Project Educator was on hand to answer questions about the public outreach program. The posters have been posted on the NOAA/AOML PMC's Florida Bay and Adjacent Marine Systems web site (http://www.aoml.noaa.gov/flbay/).
- *Seagrass Summit Outreach Partnership.* The interagency Seagrass Summit Outreach Partnership initiated in Year 2 was expanded significantly in Year 3. 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 May 1999 and March 2000. This combined effort resulted in the Monroe Board of County Commissioners designating May 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.
- *Florida Bay Education Project Advisory Committee.* The Florida Bay Education Project Advisory Committee was convened three times throughout the year to guide the

development of programs and products for the Education Project. There are currently six members representing resource users, outreach, research, and the Program Management Committee. The Florida Bay Advisory Committee met in March, June, and September, to organize, review project awareness, and assist in developing the Year 4 proposal. Two new committee members were added early in 2000 to include more non-agency citizens.

- Development of the partnership network has been continuous. The network has been expanded to about 450 people, 30% more contacts than in the previous year. The contact database is organized into the following categories (n): media contacts (50), educational/outreach partners (130), fishing interests (20), research scientists (100), ecosystem managers (70), and program participants and general public (80). Outreach partners have received a complete set of Florida Bay Project Profiles, the Florida Bay Resource Directory, and the quarterly newsletter. 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.
- The Florida Bay Education Project produced 20 new project profiles describing research projects in Florida Bay in 1999. These one-page color fact sheets are available in both English and Spanish in hard copy and on the project web site. The 37 research project profiles were distributed to outreach professionals during the year.
- The Newsletter, Seahorse Sentinel, has been 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. Topics covered in the newsletters include: the Florida Bay Science Conference, boating impacts to seagrasses, web site information, overview of Florida Bay ecology, and water circulation projects.
- The Education Project maintained and updated the Travelers Information Service radio station 1610 AM in Key Largo to educate tourists and Keys residents traveling along the U.S. 1 Overseas Highway. Program content has included various topics relating to Florida Bay, such as research about bird behavior, crocodile ecology, spiny lobster ecology, and minimizing boating impacts to local seagrass communities. The station, which has a broadcast radius of about 5 miles, can reach an estimated 22,000 motorists daily. The radio station is currently inoperable due to damage caused by Hurricanes Georges in 1998 and Irene in 1999.
- A glossy color brochure titled "Connections" containing information about research and restoration in Florida Bay was developed, produced and distributed to our outreach partners and to the public through various public events.
- 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. The results of the survey will be compiled in a report that will be useful to other agencies and the Education Project for developing targeted programs regarding resource education for the South Florida public. A summary report detailing the findings of the needs assessment is available.
- Twelve monthly news articles about Florida Bay issues were 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. Staff appeared monthly on the Lower Keys U.S.1 Radio "Morning

Magazine" show that has an estimated 4,500 daily listener audience. Florida Bay outreach information was also available through the Florida Sea Grant web site that highlighted research and issues related to Florida Bay (www.flseagrant.org/FLBAY.HTM). Each research project profile is available on the site. The "Seahorse Sentinel" and the Florida Bay Education Project newsletter, are posted on the homepage as well. Information on the Program Management Committee, what it is and who is represented on it, can be found on the homepage. In June 1999, The Florida Bay Education Project displayed over 30 informative "mini" posters at Barley Bay's Festival in Plantation Key, Florida. The Education Project booth also answered questions and provided information about the bay to those attending the event. The event was attended by approximately 2,500 people. In July 1999, the Florida Bay Education Project provided a Florida Bay information booth at the First Annual Tropical Fruit Festival in Key West. Project Educators were on hand to answer questions.

6.5 An Extension bulletin on groundwater in estuaries will be produced. (Seaman: Design Team)

A draft manuscript is in the final stages of review, and artwork to convey the meaning to semi-technical and lay audiences is being prepared. This document will be used in educating planners, elected officials and homeowners.

6.6 At least 50Master Gardeners in Hillsborough, Manatee and Sarasota counties (and as requested by other counties) will increase their knowledge in water quality issues and coastal plant identification and ecology. (Seaman: Stevely)

A total of 62 Master Gardeners increased their ability to support extension horticulture. Numerical evaluations were based on a 1-10 score (10 being the highest). Question 1. What knowledge of the subject did you have before the class: Score: 3.2; Question 2. What is the level of your knowledge as a result of the class: Score: 7.8; Question 3. Was the class content presented clearly and understandably: Score: 9.4; and Question 4. Were you satisfied with the class: Score: 9.4.

6.7 The Manatee County overall extension program will be assisted in conducting a "Water School," which will increase the ability of 25 community leaders in making informed decisions regarding water quality related issues. (Seaman: Stevely)

This work was not done, owing to the retirement of the staff member who had provided leadership for it for many years. Instead, options for future offerings were being considered during this year.

6.8 An existing water quality testing program will be expanded to establish a more comprehensive database for educational use. Twenty people will become trained in water quality testing procedures. (Adams: Novak)

The Charlotte County Marine Agent trained two groups on the principles of water quality testing. First, he worked with the Charlotte Marine Research Team (16 members) who will be surveying artificial reef sites. The second group consisted of Coastal Conservation Association members that will be operating a recessitation tank at catch-and-release fishing tournaments.

6.9 The FSGEP Boaters' and Anglers' Pledge Program will be continued. 200 boat owners will receive published materials describing the program and will join the effort to clean up Florida's coastal waters. (Adams: Sweat)

Two-hundred seventy-six Boaters' and Anglers' Pledge Program packets were distributed during two boat shows and one fishing tournament. Boat owners sign off that they will join the effort to help keep Florida's coastal waters clean of trash and debris.

Other Accomplishments Not Originally Planned

A final report has been submitted to the Florida Fish and Wildlife Conservation Commission which describes the economic consequences of red tide events in SW Florida. The completion of this study represents the first ever attempt to empirically measure the affect of red tide events on residents and businesses in Florida. Additional research has been funded for 2001. (Adams)

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

7.3 A regional project in cooperation with other Sea Grant Programs is designed to increase awareness of the potential problems that can occur as a result of the introduction of nonindigenous species in the Gulf of Mexico Region and stimulate a common interest in the management of nonindigenous species. Educational techniques being used include low power radio messages at Florida Welcome Stations and an education program for growers and suppliers of exotic aquatic plants and animals. (Jackson: E/ZM-2)

Low power (10-watt) radios were installed in three locations on Interstate Highways entering Florida. The message during the day requests boaters to stop at the Welcome Center just ahead to pick up brochures on prevention of the spread of Zebra mussels. The message changes during hours the Welcome Center is closed to a more generic one with information on what the boater can do to prevent their boat from becoming a vector for spread of Zebra mussels. Six brochures or publications were developed and distributed statewide (some of them Gulf-wide). Resource kits on Zebra mussels and other aquatic nuisance species were distributed and in use in elementary schools. All marine extension faculty were provided materials on aquatic nuisance species and will continue to use them at a variety of forums throughout the state.

All Gulf of Mexico states have educational materials available to use in educational programs. More specifically in Florida, these materials will provide awareness, education, and motivation for the general public and several targeted audiences to stop the spread of aquatic nuisance species. The Zebra mussel will continue to be the "flagship" species, but this effort has broadened awareness to cover other plant and animal species as well. Targeted audiences have included trade associations and individuals who deal with ornamentals, aquatic plants and animals, pet store operators, trailer boaters, marina owners and operators, and the public in general.

7.6 Habitat loss and degredation pose serious threats to the long-term sustainability of coastal marine fish and shellfish resources. A geographic information system in conjunction with habitat suitability models is being used to map and analyze fish and invertebrate habitats. The goal is to develop a practical, biologically sound, statistically robust methodology for

quantitative assessment of what constitutes essential habitat for economically and ecologically important coastland marine fish and invertebrates. (Ault/Monaco: R/LR-B-47)

This project brought together a team of university, federal, and state researchers to develop new quantitative protocols and modeling tools with an overarching objective of developing flexible methodologies that facilitate determination of coastal marine habitats critical to sustained productivity of fisheries resources to assist resource managers in the identification, change prediction, and conservation of these "essential habitats." The research collaboration developed a new and robust class of habitat suitability models for several Florida estuaries (e.g., Tampa Bay, Charlotte Harbor, and Biscayne Bay) that successfully predicted fish and shellfish spatial abundance relative to a suite of environmental features. It was determined that habitat suitability models developed for some well-studied estuaries could be reliably applied to bays where precise animal abundance data were not available. These flexible models were used in computer-based statistical analysis and GIS graphical tools.

Information derived from this project has been used to synthesize and combine costly data sets for species captured by disparate multigear technologies, in new quantitative protocols for the design of cost-effective population surveys that provide high-precision spatial estimates of lifestage abundance distributions, and in the efficient estimation of model parameters and initial conditions for spatially-explicit resource assessment models. Other obvious benefits are the facilitated and expanded coordination between research units at the Florida Marine Research Institute in estimation, assessment and modeling to identifying habitats critical to sustainable fisheries. Through identification of cost-effective sampling designs that achieve high precision estimates at substantially lower costs than previously obtained, this approach *de facto* reduces redundancy and increases planning and operational aspects of monitoring surveys. Higher precision at lower costs translates directly to more efficient utilization of limited fiscal and state and federal manpower resources, and these savings could produce economic benefits ranging from hundreds of thousands to millions of dollars in less than ten years.

Although the primary research focus was on development of animal-habitat models for bay-estuarine systems in Florida, the overall intent was to develop a flexible approach with potential for broader applicability over a relatively wide range of U.S. coastal marine environments. To that end, some models developed have been used in the assessment and management of multispecies fisheries and in the design of "no take" marine reserves in the Florida Keys coral reef ecosystem. In addition to assessing essential fish habitat, the general methodologies developed can also be further utilized in conducting environmental impact studies, and in designing cost-effective population sampling surveys. Each of these applications may potentially improve the general scientific understanding of species-environment interactions, and in turn improve the information base for making resource management decisions. The suite of quantitative methodologies developed and implemented in this project are providing state and federal resource agencies with vital information for managing critical habitats of fishes and macroinvertebrates in Florida estuaries to build sustainable fisheries and conserve marine biodiversity.

During the course of this project testimony was provided at several Fishery Management Council and Florida Fish Commission meetings on the relationships between habitat-animal distributions and their importance to the productivity and sustainability of fisheries,

viz, Florida Marine Fisheries Commission, South Atlantic Fishery Management Council, and NOAA Higher Trophic Level Modeling workshops.

Two graduate students were trained during this project and four scientific publications are in process.

7.8 A power point "Estuaries 101" presentations will be developed with the format adoptable to slides, posters, etc., with the option to customize for local settings. (Seaman: Design Team)

Support to develop "Estuaries 101" was received from the USDA Water Quality fund. Once the digital photo archives and two related extension fact sheets on estuaries are completed, and the new Estuaries Extension Specialist is on duty, this work will be achieved.

7.9 A prototype series of slides on estuaries will be organized for catalog into the Sea Grant digital photographic archives. (Seaman: Design Team)

Estuary-related slides were used as the prototype for assembling the overall Sea Grant archive of digital photographs. Dozens of slides related to estuaries were collected and entered.

7.10 Design team meetings will be held in March and October to coordinate preparation of educational materials, advise on the search for the extension specialist for estuaries, and coordinate with other design teams. (Seaman/Kearl: Design Team)

Design team meetings were held in April and October 2000. Principal outcomes were the plans to prepare two extension bulletins on estuaries (i.e., groundwater, nutrients), digitally archive photographic slides of estuaries, and develop an "Estuaries 101" power point slide show to educate clientele statewide.

7.11 At least ten youth will be involved with at least one "environmental" community service project (e.g., Don't Kill Pelicans with Kindness. Center for Marine Conservation's Annual Coastal Cleanup), and at least five local youth will be involved in environmental education summer 4-H camps. (Seaman: Mahan)

The Franklin County Agent recruited and sent two 4-H'ers to the state Marine Science Camp this year. The Franklin County Agent presented his Third Annual Marine Biology Career Day Program to the four kindergarten classes (80 students) at Port St. Joe Elementary School. The students learned what a marine biologist does, what kinds of classes they need to take and got to have a hands-on experience with such things as a sea turtle, dolphin and manatee skulls, a shark's jaw, snail egg cases and a sawfish's bill.

7.12 The knowledge of marine and horticulture extension agents and Master Gardeners in water quality will be increased through the production and use of a "Nutrient Loading Fact Sheet." (Seaman: Stevely)

A draft extension publication on nutrients in estuaries is in review, with expected publication by autumn 2001.

7.13 The role and potential of Sea Grant Extension Program involvement in a national initiative to develop a NOAA-wide Restoration Network will be evaluated. (Seaman: Stevely)

The West Coast Extension Agent was an invited participant at the NOAA-wide Restoration Network Meeting, March 21-22, 2000, Baltimore, MD. He served as Communications and Networking Committee Leader, responsible for identifying community-based environmental organizations in Florida and developing issues paper for discussion at meeting.

7.14 The Sarasota Bay National Estuary Program will be assisted in maintaining a functional Technical Advisory Committee by serving as committee chair. (Seaman: Stevely)

- The West Coast agent chaired three Sarasota Bay National Estuary program technical committees, and served on the seagrass conference organizing committee. A total of 175 participants attended the Tampa Bay Seagrass conference. The scientists, environmental consultants, and resource managers attending the meeting increased their understanding of seagrass ecology, seagrass survey methodology, and current trends and issues affecting seagrass management and restoration. Recommendations resulting from a special workshop are being published by the Tampa Bay Estuary Program. Six graduate students from four universities (UCF, USF, FSGU, and FIU) were able to increase their professional competency by presenting their research findings at an appropriate professional conference; Florida Sea Grant co-sponsored their attendance.
- A fully functional SBNEP Technical Advisory Committee has been maintained. This committee specifically provides guidance in directing the Estuary Program's habitat restoration projects, reviewing technical information, and prioritizing future research. Currently, funding of habitat restoration projects has been averaging approximately $600,000 annually. The TAC and Management Committee approved approximately $75,000 for development of inshore artificial reefs.
- A public workshop to provide for citizen input in the design of a county trail system was attended by approximately 100 citizens. The marine extension program has provided technical assistance and equipment for mapping canoe/kayak trails.

7.17 Marine conservation training will be continued. 500 youth will become better aware of the values of marine conservation through marine conservation training. (Adams: Novak)

The Charlotte County Marine Agent provided a study guide for students participating in the SW Florida Envirothon. He served as a judge and tested 200 youth at the regional competition.

7.18 Eight educational programs on marine habitat will be presented. 100 individuals will become more aware of the ecological contribution of marine habitats in SW Florida. (Adams: Novak)

Eleven educational programs on reefs and anchorages were presented to user groups ranging from power squadrons to fishing clubs. In excess of 600 persons were in attendance at the programs.

7.19 A regional artificial reef coordinators workshop will be held. 20 county artificial reef coordinators will become educated about the most recent research regarding artificial reefs

and become better informed regarding the current status of reef permitting requirements. (Adams: Novak)

Another successful artificial reef coordinators workshop was held in Manatee County. Ten artificial reef coordinators were educated regarding the most recent research regarding artificial reefs and became better informed regarding the current status of reef permitting requirements.

7.20 The artificial reef volunteer training and data base program will be continued. 30 artificial reef monitors will be trained. (Adams: Novak)

The Charlotte Marine Research Team successfully monitored and collected information on Charlotte County reefs, after completing the PADI Research Dive Certification. Two clubs and nearly 40 divers were certified. A grant proposal for $12,000 was obtained from the State to monitor three reefs. The work will be carried out by the Charlotte Marine Research Team over the next 18 months.

7.21 Two new artificial reefs will be permitted. Two new reefs will be built and at least one existing reef will be renourished with additional materials. At least one additional artificial reef grant application will be developed. (Adams: Novak)

Two new artificial reef site permit applications were submitted to the Corps of Engineers but later withdrawn due to the ongoing manatee controversy. In addition, two existing sites were closed for the same reason.

Nine hundred tons of concrete culverts were deployed on Mary's Reef. This included 120 individual modules built by volunteers and four piles of culvert. The majority of the work was paid for by a $20,000 grant written in 1999. Two reef grants were written and one was funded for monitoring in 2000.

Three additional grant applications related to seagrass restoration, limitations to Charlotte Harbor Reef sites, and GIS positioning for clam leases are pending.

7.22 Three meetings of the Extension Artificial Reef Advisory Committee will be held. Ten individuals will better understand the process of developing reef construction grant proposals and permits. (Adams: Stevely)

Two meetings of the Extension Artificial Reef Committee were held. A total of 30 volunteers provided assistance in generating community support for the reef program (distributing brochures, contacting mass media and elected officials, writing letters of support to funding agencies, providing boats for monitoring work). Extension Artificial Reef Advisory Committee members have been successful in generating community support for the Manatee County artificial reef program. Results have included: obtaining a $50,000 reef construction grant for work in 2001, obtaining $50,000 in funding from the Sarasota Bay NEP for inshore reef construction in 2001, and obtaining $25,000 in annual funding from the Manatee County Board of Commissioners.

7.23 An annual workshop/field exercise for artificial reef coordinators in the Citrus, Pasco, Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, and Collier Counties region will be held. 20 county artificial reef coordinators will become educated about the most

appropriate design and construction methods for artificial reefs. (Adams: Stevely/Sweat/Novak)

The workshop/field exercise was held in May at the Pinellas County solid waste disposal facility. Discussion topics included: changes in both state and federal artificial reef permitting procedures, evaluation of military tanks for artificial reef construction, and proper use of venting tools. A field exercise to evaluate several types of reef construction materials (barge, rock rubble, concrete rubble, and three types of prefabricated concrete modules) was conducted utilizing the Pinellas County reef construction barge.

A total of 28 artificial reef program coordinators, representatives of state and federal permitting and funding agencies, and university researchers participated in the workshop. As a result of the technical training provided, ten county artificial reef program coordinators increased their ability to comply with new reef permitting procedures, insuring the continuity of their programs and eligibility for federal and state reef construction grants. Workshop participants also increased their knowledge and understanding of a variety of reef construction materials. Ten reef program coordinators were taught proper fish venting procedures and were provided with 50 venting tools to help educate their local customers.

7.24 Manatee County will be assisted in the design and deployment of 400 tons of artificial reef materials at an offshore reef site. Assistance will also be given in the permitting, design, and deployment of at least three inshore reef sites. Monitoring assessments of at least three Manatee County artificial reef sites will be conducted. (Adams: Stevely)

Deployment of 400 tons of concrete culvert and placement of a derelict barge was accomplished. Artificial reef permit applications for nine inshore reef sites is progressing, and is expected to be completed by 2001. A library of photos of reef fish and reef materials has been developed for two artificial reef locations. Monitoring reports for two reef sites has been completed.

7.25 The status of the Taylor County artificial reef program will be accessed. Proper reef permitting and implementation procedures will be learned from the Florida Fish and Wildlife Conservation Commission. Classes needed by the Taylor County Reef Research Team will be identified. (Adams: Aubrey)

Taylor County's artificial reef program was determined to be inactive, with no activity having occurred in the last two years. FWC was consulted as to proper artificial reef permitting, implementation, and grant procurement procedures. A former member of the Taylor County Reef Research Dive Team and prospective divers were contacted and asked to participate in a new artificial reef program. A dive team of approximately 20 members have been meeting twice a month since August 2000. Team members plan to survey the Buckeye Reef soon in order to place new artificial reef material on the site. In addition, a newly formed Taylor County Reef Committee will meet monthly.

7.29 A world-wide goal is to reduce the environmental impact of the harvest of marine ornamental fish from tropical coral reef systems. One possibility is to use artificial reefs as an alternative collection device. This pilot project will initiate the design phase of the following research project funded through the Sea Grant National Fisheries Habitat Program. The long-term goal is to quantify the net contribution of artificial reefs on fish production. (Osenberg/St. Mary: PD-00-3)

A pilot field site was established in the Florida Keys, and the initial study design developed.

7.30 A book will be produced on the evaluation of artificial reef performance. This involves a 16-author team of experts in biology, engineering, economics and statistics. The book will enable worldwide audiences to document effectiveness of human-made reefs in various fishery, aquaculture, environmental restoration and economic development settings. (Seaman)

The book, Artificial Reef Evaluation, was published. Contents are being disseminated via presentations (e.g., Korea 2000 Marine Ranching Symposium) and workshops (2001 American Fisheries Society divisional meeting).

Goal 8: Prepare and Respond to Coastal Storms

8.1. A method to guide the decision-making process for the reconstruction of storm-damaged coastal habitable structure in Florida will be created. This will result in improved and efficient decision-making by regulatory agencies, engineers, and coastal property owners. (Yazdani: R/C-D-17)

A decision making tool was developed that will determine whether a storm damaged structure should be repaired or rebuilt following 50% substantial damage as identified from the cost survey. The property owners as well as the local government and permitting authorities, insurance companies and engineering communities will benefit from this tool. It will mainly save time and resolve related controversy among the above-mentioned groups. One graduate student was trained in the project and an article is in process. Several workshops for regulatory agencies, insurance companies and engineers are being planned and coordinated throughout the Sea Grant Extension Program for 2001.

8.4 A method will be developed to predict the severity of the sea at 12 nearshore areas where hurricanes are reaching the Florida coast. This will help guide decisions relating to coastal construction, law, coastal planning and policy and insurance. (Ochi: R/C-S-37)

The study has developed a new prediction methodology for assessing the sea condition in the nearshore area at the time of hurricane landing. The methodology developed is applicable not only to the Florida coast but also worldwide where potential hurricane landings can occur. The study provides knowledge for improving technological practice and management decision making regarding the conservation of coastal and marine resources, including dune system and buildings near the shoreline.

8.8 Florida's rapidly increasing coastal population is at risk in severe winds associated with hurricanes. This project is part of a multi-university effort to measure wind field characteristics along the Florida coast. The data will help establish the baseline science and advanced environmental models to improve construction codes, evacuation procedures, public information, weather prediction capabilities and better financial protection for human life and property. (Gurley: PD-99-7)

In-field severe wind data collection was accomplished for three hurricanes, proving the utility of new equipment and strategies for monitoring. The pilot project helped lead to a large funded effort, involving several institutions.

8.9 Coastal hazards such as hurricanes and tropical storms result in lost lives and property damage. This project was designed to coordinate and increase the information flow among Sea Grant programs, projects and research, extension and communications faculty nationwide. (Grantham: A/RE-1)

Florida Sea Grant's role was to develop a listserve and link it to the overall project website. Forty individuals from North and South America now participate using the list serve.

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 2000 Class of Fellows, two applicants were submitted. One student from Florida International University was selected to serve in National Marine Fisheries Service's Office of Protected Marine Resources - Marine Mammals Permits Division.

From 1996-2000, a five year period, four Fellows from Florida have been selected, or an average of .8 per year. Success already known for 2001 will allow us to reach the goal for 1997-2001.

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 1998-2000. 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 2000, 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 annually 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 2000 for a total of five 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 Stetson University.

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 $1.125 million 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)

These competitions are held every other year since most projects are two years in duration. Competitions were not held in 2000. This goal will be reported again in the 2001 annual program report.

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 Science (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 four 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. They were University of Florida, University of South Florida, University of Miami and Florida State University.

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

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

Two applicants were submitted in 2000. Neither was selected.

9.11 Florida Sea Grant will organize and participate in a visit by a national Program Assessment Team (PAT). The goal will be to achieve the highest score possible by the quadrennial review process. (Cato)

Florida Sea Grant's Program Assessment Team visit in April 2000 resulted in the highest score possible, Excellent. A ranking of Excellent was given in all four categories: (1) producing significant results, (2) effective long-range planning, (3) organizing and managing for success and (4) connecting Sea Grant with users. For complete details, see section 10.0 on self-evaluation.

9.12 Many problems are studied by scientists using information and skills from many disciplines. Marine science as a course integrates many disciplines. This project will determine how students become more scientifically knowledgeable and literate as they participate in secondary level marine science courses, how their attitudes change regarding coastal science, technology and society as they participate, and what topics, instructional strategies, curriculum and learning experiences lead to students becoming more scientifically literate. (Marcus: PD-99-9)

Preliminary results indicate that teachers need to improve assessment of students' prior science knowledge at the beginning of marine science courses. The project developed a science survey instrument for teachers. Several teachers are using the surveys to assess their students' knowledge and attitudes at the beginning of the marine science course. The results of this study can provide important baseline information for the development of the Florida Comprehensive Assessment Test in science, which will be implemented in 2003. A doctoral dissertation was developed. Marine science, due to its naturally integrated context, can be an effective science course for teaching and learning several *Standards* and *Benchmarks* for both high school and college students.

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/Grantham/Zimmerman)

The following number of publications was completed. See section 6.0 for more details.

Sea Grant Reports	1
Sea Grant Extension Publications	15
Sea Grant Technical Papers	8
Book Chapters	2
Staff Papers	3
Extension Newsletters	5
Books	1
Conference Proceedings	3

10.1.2 At least ten print news releases will be produced. (Keart/Grantham/Zimmerman)

More than 20 news releases were produced and issued to media and syndicated news services 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, spiny lobster research, safe boating and anchoring, and scholarship opportunities. Press releases were also prepared to announce conferences and to publicize recipients of awards related to Sea Grant programs.

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

Professional web design services were contracted to revamp the Florida Sea Grant web site following recommendations obtained through an extensive process to determine a reorganization structure more suited to Sea Grant's needs and to its clientele. The new format was constructed and has since been reconfigured using a different software program. A 3-person task group within Florida Sea Grant, established for that purpose, now maintains the web site. The task group, which meets regularly, enrolled in a web-based training program in the fourth quarter that continues into 2001. (See section 9.0 on Outreach for additional website information.)

Features of the Sea Grant web site have been upgraded and are now more user-friendly than ever before, and regular site maintenance ensures that current material is available. Individual pages for Sea Grant faculty and staff have been added to broaden access to personnel, and, in the case of marine agents, have facilitated links to county web sites related to their work. Similarly, a consistent effort has been mounted to establish direct links to Sea Grant partners and collaborators. Publications and presentations are also regularly published on the site. One example is the Internet Directory of Marine Education and Research Organizations in Florida, an electronic update of a previous Sea Grant publication that now links browsers directly to institutional web sites. Administratively, the web site is now routinely used for interactive forms that relate to requests for proposals in the grant application process. In addition, work began on a web-based photographic digital archive to serve agents, specialists and research collaborators, scheduled to premier in 2001.

Florida Sea Grant maintained an Anchorage web site during the year featuring boater friendly information, with emphasis on Southwest Florida. New materials were added during the year as project personnel submitted them. This web site is scheduled to transition in 2001 to a private server, following negotiations for revamping its contents through a different software program.

Three additional web sites initiated and/or maintained by Florida Sea Grant and scheduled to transition in 2000 have been turned over to the respective organizations that they represent. The Florida Bay Education Project web site is now operative through Monroe County Cooperative Extension; the web site for SEGUL (an alliance of Southeast and Gulf State Sea Grant Programs) is now maintained by Texas Sea Grant; and the National Display home page has been assumed by the National Sea Grant Office.

10.2 Citizens will be educated about Florida's coastal environment.

10.2.1 Curriculum materials relating to aquatic and marine ecosystems to support county level 4-H programs will be completed. (Culen: Sea Grant off-campus faculty)

A teacher's edition and student's edition of *Coastal Marine Environmental Issues: An Extended Case Study for the Investigation and Evaluation of Marine Issues of the Gulf Coast and Florida Peninsula, Student Edition* was completed.

A website was developed that contains all the study materials 4-H participants and volunteers require to prepare for the 4-H Marine Ecology Event.

10.2.2 A statewide marine ecology contest for 4-H youth will be conducted. (Culen: Sea Grant off-campus faculty)

This one day annual event held at Camp Ocala in November was attended by approximately 100 youth participants from throughout Florida. Content focused primarily on marine organism identification, habitat and ecology. Study materials were disseminated to counties and clubs prior to the event.

10.2.3 Two 4-H Summer Marine Institutes will be held. (Culen: Sea Grant off-campus faculty)

Two 4-H Marine Institute sessions were held at the Timpoochee 4-H Center with a total enrollment of over 200 youth. Twelve weeks of programming were conducted.

10.2.4 Two marine issues in-service training for county extension faculty programs will be conducted. (Culen: Sea Grant off-campus faculty)

A Coastal Marine Issues Workshop was organized for the North American Association for Environmental Educators that introduced participants to the Coastal Marine issues Extended Case Study.

A Marine Ecology Skill-a-Thon was held at the Alachua County Youth Fair.

An Introduction to Marine Ecology training program for Duval County 4-H Club was held at Marineland, Florida.

"An Introduction to Aquatic/Marine Ecosystems" Florida 4-H Leader's Forum was held at the Ocala 4-H Center, and an "Aquatic and Marine Sciences Workshop" for teachers and 4-H volunteers was held in Charlotte County.

10.2.5 A Sport Fishing 4-H training program will be held. (Culen: Sea Grant off-campus faculty)

This activity was not held.

10.2.6 An "Oceans Away" track will be included in the state 4-H Congress. (Culen: Sea Grant off-campus faculty)

This activity was not completed.

10.3 A "tip sheet" on Florida Sea Grant resources for marine educators, with linkage to other key organizations will be completed. The format will be print and electronic. This will allow teachers, 4-H leaders, students and the media, among others, to access Sea Grant information. (Seaman)

A fact sheet, "Florida Sea Grant – A Resource for Marine Educators," was produced (SGEF-123). It has been used by field extension faculty and is now posted on the Sea Grant website.

3.0 PROGRAM FUNDING FROM ALL SOURCES

Funding History

Level federal funding during the 1980s and early 1990s for the National Sea Grant College Program has clearly impacted Florida Sea Grant core programs. While some increased funding was received during the late 1990s, and early 2000, the level of effort or "buying power" of core program funds is still woefully short of early 1980 levels. When inflation is taken into account, the peak buying power year was 1980. Significant core program increases began in 1997, but buying power for 2000 was still 37 percent below the peak year. With 2000 core program funds at $1,907K, and adding funds awarded to Florida due to national competitions of $1,125K, the overall 2000 buying power of the program almost equaled the peak year, as noted in Table 1.

The number of full time equivalents (FTEs) budgeted for the core program from 1986 through 1988 ranged from 55 to 58. This is a level much lower than that of the late 1970's and early 1980's. The pattern of decrease has been repeated in faculty and graduate student research and in the extension program. Education programs (other than graduate student support) were virtually eliminated in 1985 with attempts made to obtain funding for that component from other sources. For the last decade, FTEs supported with core program funds are about 45 as shown in Table 1.

While FTEs have declined, the cost of operating research, education and Extension programs per FTE has increased. In terms of current dollars, the cost per FTE has increased from a low of $13,000 in 1976 to a high of $49,000 in 2000. Clearly, level or slowly growing budgets and a higher cost per FTE have driven downward the number of FTEs the program is able to purchase. On a real dollar basis (accounting for inflation), the cost per FTE has risen from a low of $27,000 in 1984 to a high of $47,000 in 2000 as shown in Figure 1.

Florida Sea Grant historically matched federal funds on an approximate 1:1 basis. During 1989 and 1990 this ratio was reduced and since 1991, our core program proposal has been matched on a 2:1 basis as required by federal law. University policy now mandates that matching funds may only be included at the rate prescribed by the granting agency.

Florida Sea Grant's recent funding history indicates an increased reliance on funding other than federal Sea Grant dollars. A comparative analysis of all Sea Grant funding sources for 1998-99 to 2000-01 indicates that the federal NOAA Sea Grant core program funds represented from 34 to 46 percent of total Florida Sea Grant program effort as shown in Table 3. Florida Sea Grant's use of federal Sea Grant program funds has consistently met national guidelines that at least 50 percent be used to fund research as shown in Table 4. A listing of all funding sources for the Florida Sea Grant College Program funds for the last three years is shown in Table 5, 6 and 7.

Sea Grant federal funds plus all extramural grants generated 10.7 times the amount of state appropriations received through the Education and General budget of the University of Florida for 2000. Including faculty salaries dedicated to the program by UF/IFAS, 4.6 grant dollars were generated per state dollar of 2000 appropriations as shown in Table 8.

Table 1. Federal Sea Grant Funding ($1,000's) for Florida Sea Grant College Program, 1972-2001[e]

	Current			Real[a]		Peak Year	
Year	Core Funding	National Competitions	Total	Core	Total	Core	Total
1972	378			1188		58	
1973	600			1786		37	
1974	740			2022		29	
1975	900			2248		21	
1976	975			2305		19	
1977	1125			2499		12	
1978	1260			2612		8	
1979	1450			2775		3	
1980	1627			2852		0	
1981	1575			2525		11	
1982	1575			2377		17	
1983	1428			2073		27	
1984	1458			2041		28	
1985	1458			1973		31	
1986	1506 [b]			2000		30	
1987	1506			1941		32	
1988	1386 [c]			1728		39	
1989	1489			1788		37	
1990	1530			1769		38	
1991	1652			1843		35	
1992	1652			1799		37	
1993	1500	86	1586	1595	1686	44	41
1994	1500	127	1827	1562	1903	45	33
1995	1620	626	2246	1653	2292	42	20
1996	1620	455	2075	1620	2075	43	27
1997	1880	194	2074	1844	2034	35	29
1998	1780	322	2102	1724	2036	40	29
1999	1846	444	2290	1762	2186	38	23
2000	1907	1125	3032	1784	2836	37	1
2001[e]	1965	463	2428				

[a] Deflated using Gross Domestic Product Implicit Price deflator.
[b] Includes MAREP add-on and GRH reduction.
[c] After NOAA overall budget cut of seven percent from base of $1,489K.
[d] Beginning in 1993, total Sea Grant federal funding includes various initiatives and other funds provided through special national competitions.
[e] As of April 2001.

Table 2. Individuals and Full-Time Equivalents (FTEs) Supported by Federal Sea Grant Core Program Funding 1972-2001.

	Research Number				Education		Advisory		Total	
Year	Faculty	Students	Total	FTE	Number	FTE	Number	FTE	Number	FTE
1972	14	25	47	13	0	0	6	1	59	15
1973	29	39	93	32	0	0	10	8	103	40
1974	32	34	17	36	0	0	29	10	136	46
1975	44	55	151	49	8	[b]	4	13	204	62
1976	38	50	109	40	17	12	26	22	152	74
1977	32	54	108	40	24	14	74	27	206	81
1978	28	37	115	42	23	4	59	26	197	77
1979	34	41	99	49	31	2	115	32	245	83
1980	46	38	128	48	7	1	111	28	246	77
1981	53	39	153	46	4	1	120	31	277	78
1982	39	35	91	44	12	3	108	34	211	81
1983	29	30	75	33	1	1	102	32	178	65
1984	48	44	108	39	5	2	102	29	216	70
1985	48	48	118	37	2	[b]	89	26	209	64
1986	39	35	83	30	0	0	90	26	173	55
1987	44	23	86	30	4	4	79	27	181	58
1988	53	30	96	31	0	0	79	27	181	57
1989	48	24	87	28	9	2	37	15	133	44
1990	45	23	81	28	7	1	36	15	133	44
1991	44	26	85	26	0	0	29	22	114	48
1992	43	25	80	25	0	0	29	22	109	47
1993	29	20	61	19	0	0	29	22	90	41
1994	25	14	48	18	0	0	32	22	80	40
1995	38	16	54	19	4	6	22	22	96	45
1996	39	14	53	19	0	0	22	22	97	45
1997	54	24	101	24	0	0	23	19	124	43
1998	46	21	70	20	0	0	34	24	104	44
1999	44	21	68	21	0	0	33	23	101	44
2000	55	24	82	20	0	0	29	19	111	39
2001	65	31	99	26	0	0	28	19	127	45

Table 3. Florida Sea Grant Funding Effort by Source for Fiscal Years (1 July - 3 June) 1998-1999 to 2000-2001.

Source	1998-99		1999-00		2000-01	
	$000	%	$000	%	$000	%
Federal NOAA Sea Grant Core Program	1,846	46.0	1,907	34.3	1,965	41.7
Federal NOAA Sea Grant National Competitions	444	11.0	1,125	20.2	463	9.8
Faculty Match (Core + National)[a]	607	15.1	1,175	21.1	721	15.3
Other Federal Grants	0	0	165	3.0	276	5.9
Non-federal Grants	276	6.9	243	4.4	308	6.5
State University System[b]	724	18.0	746	13.4	781	16.6
Florida Counties	117	2.9	204	3.7	203	4.3
Total Program Effort	4,014	100	5,565	100	4,717	100

[a] This includes all match except state university system appropriations used as match.
[b] This includes state appropriations to Florida Sea Grant via the Education and General budget of the University of Florida and via the UF/Institute of Food and Agricultural Sciences used as match in extension, communications and management.
Source calculated from data in Tables 5, 6 and 7.

Table 4. Percentage of Florida Sea Grant Core and Total Sea Grant Federal Funds Used for Research, Extension, Communications and Management, 1998-99 to 2000-01.

	1998-99	1999-00	2000-01
Program Function	Core (%)		
Research	53.2	52.2	51.9
Extension	31.5	30.1	30.8
Communications	6.8	7.5	7.8
Management	8.6	9.6	9.5
TOTAL	100.0	100.0	100.0
	Total %		
Research	54.4	67.3	59.5
Extension	33.2	22.0	26.5
Communications	5.5	4.7	6.3
Management	6.9	6.0	7.8
TOTAL	100.0	100.0	100.0

Source: Calculated from data in Tables 5, 6 and 7.

Table 5. Florida Sea Grant College Program Funding From All Sources, July 1, 1998 to June 30, 1999.

Federal Sea Grant Core:		Federal	Match
Research		$982,200	$485,959
Extension		580,800	317,560
Communications		125,000	62,500
Management		158,000	79,123
TOTAL SEA GRANT CORE		**1,846,000**	**945,142**
Federal Sea Grant National Competitions:			
ARE-1	HazNet	4,298	3,255
E/CSC-3	Non-Regulatory Boating	24,999	0
E/CSC-4	Non-Regulatory Boating	150,000	0
E/ST-22	Knauss Fellowship	36,000	0
E/T-7	MarinaNet	1,791	902
R/LR-B-47	Quantitative Essential Fish Habitat	54,987	27,493
R/LR-MB-3	Marine Prophage	58,685	29,481
R/LR-MB-6	Bioactive Alkaloids	92,992	59,608
R/NCOP-5	Remote Sensing of Coastal Estuarine Waters	20,663	0
TOTAL FEDERAL SEA GRANT NATIONAL COMPETITIONS		**444,415**	**120,739**
Other Federal Grants:			
		0	0
TOTAL FEDERAL GRANTS		**2,290,415**	**1,065,881**
MATCH COVERED BY STATE APPROPRIATIONS			**(459,183)**
NET MATCH			**606,698**
Non-Federal Grants:			
FDEP	(Florida Bay)	15,000	0
FDEP	(Pfiesteria Lake Organisms)	45,000	0
FDEP	(Blueways Conceptual Model)	5,000	0
FDEP	(Sponge Survey)	2,500	0
FL Fish & Wildlife (Low Power Radio)		0	0
FL Fish & Wildlife (Boat Use Characterization)		0	0
Sarasota Florida (FL Yards & Neighborhoods)		20,000	0
WCIND (Lee Co. Phase 1)		150,000	0
WCIND (Lee Co. Phase II)		23,000	0
WCIND (Reg. Waterway Mtg.)		15,000	0
TOTAL NON-FEDERAL GRANTS		**275,500**	**0**
TOTAL GRANT FUNDING		**2,565,915**	**606,698**
Counties		117,218	0
State Appropriations:			
E&G		324,558	0
IFAS		399,090	0
TOTAL SEA GRANT FUNDING		**$3,406,781**	**$606,698**

Table 6. Florida Sea Grant College Program Funding From All Sources, July 1, 1999 to June 30, 2000.

Federal Sea Grant Core:	Federal	Match
Research	$996,122	$542,005
Extension	585,491	292,747
Communications	143,113	71,557
Management	182,274	91,137
TOTAL SEA GRANT CORE	**1,907,000**	**997,446**
Federal Sea Grant National Competitions:		
E/NS-1 ANS Education	21,000	10,500
E/ST-23 Knauss Fellowship - Becker	38,000	0
E/TP-2 Seafood Alliance Sanitation	60,000	0
R/LR-A-32 Caribbean Oyster Genetics	33,995	17,401
R/LR-A-33A FL Bay Scallop	5,358	0
R/LR-A-33B FL Bay Scallop	23,743	24,125
R/LR-A-34 Bay Scallop	150,000	75,000
R/LR-A-35 Offshore Cage Hatchery	147,944	75,000
R/LR-B-47 Quantitative Essential Fish Habitat	64,445	32,222
R/LR-MB-11 Deep Water Sponges	149,720	146,000
R/LR-MB-12 Enteroviruses	150,000	75,214
R/LR-MB-13 DNA Microarray	149,867	107,015
R/LR-Q-20 Bacteriophage	31,530	15,765
R/LR-Q-21A New Oyster Products	67,384	36,350
R/LR-Q-21B New Oyster Products	31,900	18,384
TOTAL FEDERAL SEA GRANT NATIONAL COMPETITIONS	**1,124,886**	**632,976**
Other Federal Grants:		
E/COP-2 FL Bay	165,000	0
TOTAL FEDERAL GRANTS	**3,196,886**	**1,630,422**
MATCH COVERED BY STATE APPROPRIATIONS		**(455,441)**
NET MATCH		**1,174,981**
Non-Federal Grants:		
AFDO (HACCP)	30,000	0
FDEP (Resource Kits)	29,000	0
FDEP (Marina Workshops)	40,000	0
FL Fish & Wildlife (Low Power Radio)	50,000	0
FL Fish & Wildlife (Boat Use Characterization)	14,087	0
FL Fish & Wildlife (FL Key Sponge Survey)	5,000	0
WCIND (Charlotte Harbor)	10,000	0
WCIND (Computer Systems)	5,000	0
WCIND (Coop. Agreement)	60,000	0
TOTAL NON-FEDERAL GRANTS	**243,087**	**0**
TOTAL GRANT FUNDING	**3,439,973**	**1,174,981**
Counties	203,740	0
State Appropriations:		
E&G	323,950	0
IFAS	422,497	0
TOTAL SEA GRANT FUNDING	**$4,390,160**	**$1,174,981**

Table 7. Florida Sea Grant College Program Funding From All Sources, July 1, 2000 to June 30, 2001.

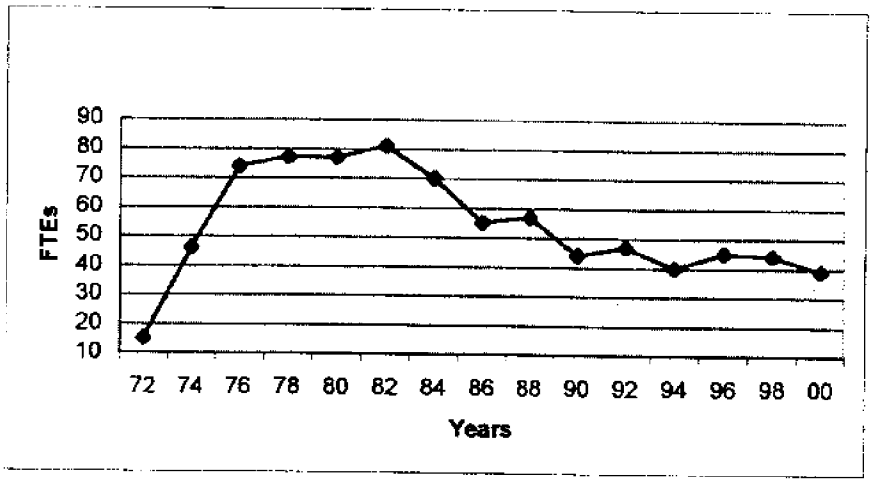
Federal Sea Grant Core:		Federal	Match
Research		$1,020,402	$532,079
Extension		605,277	302,639
Communications		152,496	73,898
Management		186,825	93,413
TOTAL SEA GRANT CORE		**1,965,000**	**1,002,029**
Federal Sea Grant National Competitions:			
E/NS-1	ANS Education	39,000	19,500
E/ST-24	Knauss Fellowship - Yates	38,000	0
E/ST-25	Knauss Fellowship - Alicea	38,000	0
E/ST-26	Knauss Fellowship - Livergood	38,000	0
R/LR-A-32	Caribbean Oyster Genetics	27,787	19,141
R/LR-B-51	Gag Grouper Spawning	102,176	51,088
R/LR-B-52	Artificial Reefs	147,702	82,681
R/LR-Q-20	Bacteriophage	32,500	16,250
TOTAL FEDERAL SEA GRANT NATIONAL COMPETITIONS		**463,165**	**188,660**
Other Federal Grants:			
E/COP-3	FL Bay	30,000	0
E/INT-1	Economic Revitalization	93,532	0
E/INT-2	Shrimp Safety Nicaragua	140,105	0
USDA	S/L Water Quality	12,000	0
TOTAL OTHER FEDERAL GRANTS		**275,637**	**0**
TOTAL FEDERAL GRANTS		**2,703,802**	**1,190,689**
MATCH COVERED BY STATE APPROPRIATIONS			**(469,950)**
NET MATCH			**720,739**
Non-Federal Grants:			
Jupiter Inlet District		14,000	0
WCIND (Lee Co. Phase III)		254,000	0
WCIND (Five-Year comprehensive)		40,000	0
TOTAL NON-FEDERAL GRANTS		**308,000**	**0**
TOTAL GRANT FUNDING		**3,011,802**	**720,739**
Counties		202,755	0
State Appropriations:			
E&G		330,731	0
IFAS		449,947	0
TOTAL SEA GRANT FUNDING		**$3,995,235**	**$720,739**

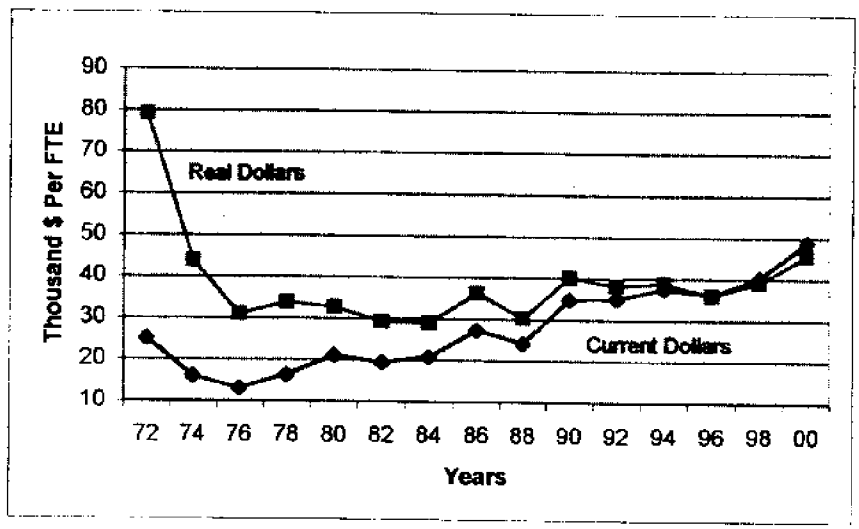
Table 8. Florida Sea Grant total grants generated per dollar of state appropriations, 1999-2000 program year.

	UF Appropriations Through Education and General Budget ($323,950)	UF/IFAS Faculty Dedicated to Sea Grant ($422,497)	Total ($746,447)
Sea Grant Federal Funds ($3,031,886)	9.4	7.2	4.1
All Other Extramural Grants ($408,0870	1.3	1.0	.5
TOTAL	10.7	8.2	4.6

Source: Calculated from Table 6.

Figure 1. A Comparison of Florida Sea Grant Core Program FTEs and Current and Real Funding Per FTE, 1972-2000.





4.0 INSTITUTIONS INVOLVED

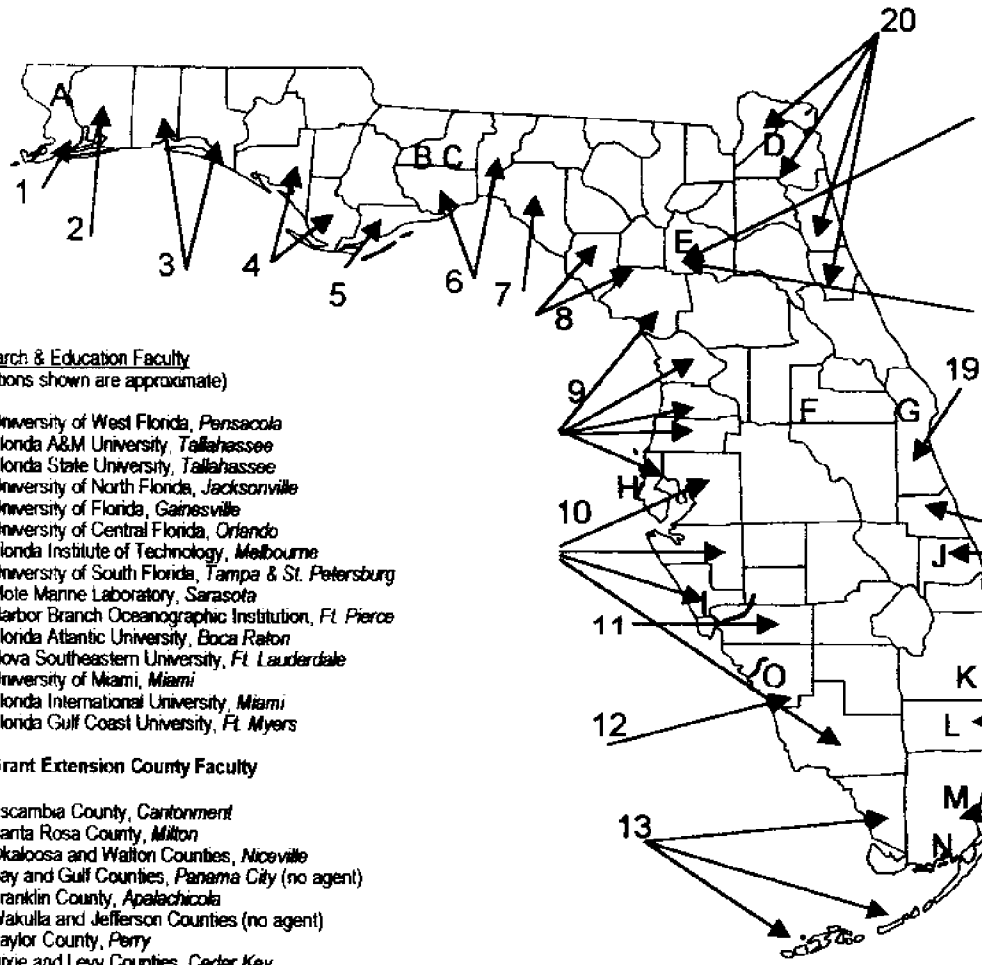
Florida has a unique network of public and private marine academic institutions (see Figure 1).

Florida's academic institutions are rapidly coming of age. They are finding their niche and are being challenged and are responding to that challenge of providing national leadership. Florida scientists are coming to the forefront in pulling the land, sea, and air sciences together and integrating science and politics to find out what science means to the people. For 2000 eight (of 15) institutions (both members of the State University System and private) participated through the receipt of Sea Grant funding for annual projects. In addition, four NOAA offices, two state agencies, one regional management district, eight private companies and 38 counties participated. A complete listing is in Table 1.

Table 1. List of Florida Sea Grant Program participants in NOAA funded core, national competition and pass-through projects, 2000.

ACADEMIC/RESEARCH	INDUSTRY
Florida Institutions	Research Genetics, Inc.
Florida Atlantic University	Akzo Nobel (Belgium)
Florida State University	Novartis Pharmaceuticals
University of Florida	Bayboro Microbiological Associates
University of Miami	Marathon Veterinary Hospital
University of South Florida	Wyeth-Ayerst Research, Inc.
Florida Institute of Technology	Aquaculture Resource Center of the Florida Keys
Florida International University	Ncreus Pharmaceuticals
Mote Marine Laboratory	
	COUNTY
Cooperating Institutions	Bay, Brevard, Broward, Charlotte, Citrus, Clay, Collier, Dade, Dixie, Duval, Escambia, Flagler, Franklin, Gulf, Hernando, Hillsborough, Indian River, Jefferson, Lee, Leon, Levy, Manatee, Martin, Monroe, Nassau, Okalossa, Palm Beach, Pasco, Pinellas, Putnam, St. Johns, St. Lucie, Santa Rosa, Sarasota, Taylor, Volusia, Walton, Wakulla
University of South Carolina, Baruch Marine Field Lab	
North Carolina State University	
Old Dominium University	
University of Texas	
University of Alabama at Birmingham	
Purdue University	
Louisiana State University	
GOVERNMENT	
Districts	
South Florida Water Management District	
State	
Florida Fish & Wildlife Conservation Commission, Florida Marine Research Institute	
Association of Food and Drug Officials	
Florida Department of Agriculture and Consumer Services, Bureau of Seafood and Aquaculture	
Federal	
NOAA, National Ocean Service	
NOAA, National Marine Fisheries Service	
NOAA, Coastal Services Center	
NOAA, Strategic Environmental Assessments Division, Office of Ocean Resources Conservation and Assessment	

Figure 1. Florida Sea Grant's Academic Community of Marine Research, Education and Extension



Florida Sea Grant State Specialists
- Economics
- Seafood Technology
- Waterways Boating Management
- Estuaries

Florida Sea Grant Management
- Research
- Extension
- Communication

Research & Education Faculty
(Locations shown are approximate)

A - University of West Florida, *Pensacola*
B - Florida A&M University, *Tallahassee*
C - Florida State University, *Tallahassee*
D - University of North Florida, *Jacksonville*
E - University of Florida, *Gainesville*
F - University of Central Florida, *Orlando*
G - Florida Institute of Technology, *Melbourne*
H - University of South Florida, *Tampa & St. Petersburg*
I - Mote Marine Laboratory, *Sarasota*
J - Harbor Branch Oceanographic Institution, *Ft. Pierce*
K - Florida Atlantic University, *Boca Raton*
L - Nova Southeastern University, *Ft. Lauderdale*
M - University of Miami, *Miami*
N - Florida International University, *Miami*
O - Florida Gulf Coast University, *Ft. Myers*

Sea Grant Extension County Faculty

1 - Escambia County, *Cantonment*
2 - Santa Rosa County, *Milton*
3 - Okaloosa and Walton Counties, *Niceville*
4 - Bay and Gulf Counties, *Panama City* (no agent)
5 - Franklin County, *Apalachicola*
6 - Wakulla and Jefferson Counties (no agent)
7 - Taylor County, *Perry*
8 - Dixie and Levy Counties, *Cedar Key*
9 - Citrus, Hernando, Levy, Pasco and Pinellas Counties, *St. Petersburg*
10 - Hillsborough, Manatee, Sarasota and Collier Counties, *Palmetto*
11 - Charlotte County, *Punta Gorda*
12 - Lee County, *Ft. Myers*
13 - Monroe County, Key West, *Tavernier*
14 - Miami-Dade County, *Miami*
15 - Broward County, *Davie*
16 - Palm Beach County, *West Palm Beach* (no agent)
17 - Indian River and Martin Counties, Vero Beach and Stuart (no agent)
18 - St. Lucie, *Ft. Pierce*
19 - Brevard County, *Palm Bay*
20 - Nassau, Duval, St. Johns, and Flagler Counties, *St. Augustine*

Florida Sea Grant is the only statewide university-based program of coastal research education, extension/outreach and communications in Florida, drawing from all these institutions.

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5.0 PROJECTS FUNDED

List of Florida Sea Grant Projects That Were Active During 2000 and Funded by Sea Grant/NOAA and Extramural Sources, in Three Major Categories

I. CORE PROGRAM PROJECTS

(This list includes projects that were both completing and starting in 2000)

I.A. Research

R/LR-E-18, Biological and Economic Modeling and Assessment of Limited Entry Strategies in Multi-Species Fisheries in South Florida - - The commercial fisheries industry of Monroe County, Florida (i.e., Florida Keys), represents an important component of the state's seafood harvesting industry. Most of the resources are overexploited and the need to move to restricted access has already been reflected in the management of a few species in the region. The inherent production linkages that exist in this multi-species fishery are not understood despite their significance to restricted management measures. Thus, existing fishery management models do not provide a comprehensive framework to evaluate the long-term impacts of single species management decisions on participants in a multi-species fishery. This project addresses the theoretical and empirical modeling framework and assessments required for that purpose, while maintaining close liaison with the Florida Marine Fisheries Commission.

R/LR-B-45, Establishing the Importance of Postlarval Supply to Recruitment and Management of Spiny Lobsters in the Florida Keys - - The combined worth of the commercial and recreational fishery for spiny lobster places it near the top of economically valuable marine species in Florida. The goal is to provide managers of the fishery with a model that accurately predicts adult stocks based empirically on the ecological processes and biological mechanisms operating in the primary lobster nursery, the Florida Keys. Florida's primary managing agency, the Florida Department of Environmental Protection, has requested and continues to collaborate with and tangibly support the work.

R/LR-B-46, Regional Patterns of Habitat Use by Juvenile Blue Crabs: Assessing the Relative Importance of Alternative Habitat Types in Florida and North Carolina - - Blue crabs are an important commercial fishery along the Atlantic and Gulf coasts. The goal of this regional Sea Grant research (North Carolina, Florida) is to examine juvenile blue crab use of alternate habitat types across spatial scales with a secondary goal of determining relative function of these habitats. Characterization of habitat use and comparison of regional patterns will be addressed through field sampling in natural patches. Work in the mid Atlantic and northern Gulf has indicated that juvenile blue crabs use seagrass beds as a nursery. However, seagrasses are absent from large regions of the blue crab's range and can be locally patchy.

R/LR-B-47, Research and Development of Quantitative Methods of Assessing Essential Fish Habitat - - Managers of the Florida spiny lobster fishery will be provided with a model that accurately predicts adult spiny lobster stocks based on ecology and biology characteristics of the Florida Keys primary spiny lobster nursery area.

R/LR-B-48, Development of Age-Structured Population Models and Risk Analysis for Small Coastal Sharks: An Avenue to Informed Management and Sustainable Fisheries - - Commercial catches of small coastal shark species have increased dramatically in recent years, as large coastal sharks have been over-fished. Management quotas have been set for small coastal sharks. A scientific

framework for assessing the current status of small coastal sharks and to access the impact of future harvest strategies will be completed.

R/LR-B-50, Management of Spiny Lobsters in South Florida Based on Postlarval Supply and Juvenile Dynamics - - The Florida spiny lobster is the most valuable fishery in Florida, when both the commercial and recreational economic impact of the fishery are considered. The stock relies on continued input of post larvae and the suitability of the habitat. This project builds on previous research investments and will provide Florida spiny lobster managers with an accurate method to predict the fishable lobster population several years in advance and to track the health of the essential nursery habitat. Old Dominium University is participating in this project.

R/LR-A-21, Assessment of Sea Urchins as Aquaculture Candidates in the Gulf of Mexico - - Worldwide echinoid fisheries are declining at a time when demand is high. This project will assess *Lytechinus variegatus* as a fishery and aquaculture candidate by optimizing roe production in adults and somatic growth in juveniles, and developing a demonstration culture system for land-based aquaculture. This is a regional Sea Grant project (Mississippi-Alabama and Florida).

R/LR-A-22, Culture Techniques for Marine Ornamental and Consumable Fish: A Better Larval Diet? - - Copepods are the natural food of many fish larvae yet they have not been used extensively in aquaculture because wild zooplankton are not a reliable source and the species that have been cultured have required continuous attention. This research will determine (1) if the growth and development of ornamental fishes can be improved with a diet of copepod diapause eggs/nauplii compared to rotifers and *Artemia*; (2) if the survival and growth rate of marine fishes currently in commercial production such as red drum can be improved with a diet of copepod diapause eggs/nauplii compared to diets currently in use; and (3) the quality of copepod nauplii derived from adults raised on different diets in the laboratory and from the field. Two Sea Grant programs (Texas and Florida) are cooperating in this project.

R/LR-A-23, Structure and Competitiveness of Florida's Tropical Ornamental Marine Species Industry - - The reported ex-vessel value of approximately 300 ornamental marine life products harvested in Florida was $4 million in a recent year. Recent studies, however, have estimated the total value harvest to be over $30 million. This project will characterize the demand for Florida marine life products. Characterization will include identification of individual species product value, market channels, substitutes, and future trends, and assess the competitiveness and the future economic potential of Florida's marine life industry.

R/LR-A-24, Atlantic Surgeonfish as a Model for Description of Normal Anatomy, Histology and Natural Diet of Herbivorous Ornamental Reef Fish- - This project uses Atlantic surgeonfish (Acanthurus spp.) as a model to improve nutritional management of captive reef fish, which will result in improved health management and longevity of these species, and enhance efforts for captive propagation. Atlantic surgeonfish are routinely collected off the Florida coast for sale through the aquarium trade and for display in oceanaria. Captive reef fish suffer two important maladies which are a probable sequelae to improper nutritional management.

R/LR-A-25, Ecophysiological Assessment of Critical Juvenile Fish Habitat: Applications for Stock Enhancement and Habitat Conservation - - Stock enhancement and habitat protection can enhance and conserve estuarine fisheries. In order for these approaches to be effective, methods for determining the "best" habitats for stocking and for protection are needed. This work will develop tools (models and practical survey protocols) through which fish nursery habitats can be quantitatively evaluated. It is a regional project of three Sea Grant programs (i.e., North Carolina, Texas, Florida).

R/LR-A-26, The Feasibility of Sturgeon Culture: An Integrated Market-Driven Evaluation - - Sturgeon is a high value aquaculture species in some regions of the world. Very little is known about the demand for and the value of sturgeon in Florida. Little is known about the production of sturgeon in ponds as opposed to tanks. The performance of sturgeon in ponds will be evaluated, market demand and packaging techniques for the meat will be tested and the economic feasibility of pond growout techniques will be determined.

R/LR-A-27, Enhancing Seed Availability for the Hard Clam, Mercenaria mercenaria, Aquaculture Industry Through Application of Remote Setting Techniques. Adequate seed availability is a major hindrance to the further development of the hard clam culture industry in the southeastern U.S. Critical shortages have occurred, and remote setting will allow nursery operators and growers to become less dependent upon traditional seed sources. Technical procedures will be developed and the economic feasibility determined of transferring remote setting technology from the Pacific Northwest molluscan shellfish industry to the Florida hard clam industry.

R/LR-A-28, Evaluation of the Efficacy of Introducing Hatchery-Spawned Larvae Directly to the Water Column for Stock Enhancement of Hard Clams - - The fishery for naturally occurring hard clams is of major cultural and economic importance to many eastern U.S. states. Landings from the traditional stock have declined in the past due to over harvesting and removal of spawning stock. Stock enhancement in natural settings is an alternative to increasing stock size. the feasibility of introducing hatchery-sponsored larvae directly to the water column as a cost-effective means of stock enhancement for hard clams will be tested in the Indian River Lagoon.

R/LR-A-29, Market Preferences, Wholesale Demand, and Breakeven Prices for Ornamental Fish Cultured an Collected in Florida - - In Florida, marine aquarium species are primarily collected from the wild (about $4 million annually) while farm-level sales of freshwater ornamental fish reached nearly $60 million in 1997. A Sea Grant goal is to increase the culture of marine ornamentals in order to generate economic activity in Florida while protecting the wild-caught stocks. Market information, the acceptability of various marine ornamental attributes, and the overall demand for marine ornamentals will be determined as a way to measure the potential of this culture industry.

R/LR-A-30, Captive Nutritional Management of Herbivorous Reef Fish Using Atlantic Surgeonfish (Acanthurus spp.) as a Model - - Certain marine algal species make up an important part of the natural diet of Atlantic surgeonfish, which have economic importance in Florida, and are traded globally for the aquarium trade. An experimental diet that approximates the natural diet of these fish will be developed and tested. The goal is to develop diets that can be used to improve the health and management of Atlantic surgeonfish and to enhance efforts for captive propagation.

R/LR-A-31, Effects of Broodstock Diet on Fecundity, Egg Quality, and Production of Marine Ornamental Shrimps - - 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.

R/LR-MB-4, Marine Invertebrate-Associated Microorganisms as a Source of Novel Agents for Biotechnology - - Recently, the rate of discovery of new compounds for pharmacological evaluation has diminished because traditional sources of novel microbes have been exhausted; this coincides with a rise in antibiotic resistance of many previously treatable pathogenic microorganisms. Marine microbes, particularly those associated with invertebrate species, are relatively unexplored and thus are an exciting potential new resource. The biochemical potential of these organisms lies in their

production of both secondary metabolites, which may have utility as drugs, and in their production of plasmids, which can be used in the biotechnological development of microbial products such as secondary metabolites. This project will isolate, identify and culture microorganisms associated with marine invertebrates, such as sponges and tunicates. It will target invertebrates which are themselves known to produce bioactive secondary metabolites or which occupy niche environments, such as those adapted to extreme cold.

R/LR-MB-5, Marine Invertebrate Cell Culture for *In Vitro* Production of Compounds with Therapeutic Potential - - Obtaining adequate supplies of marine natural products with therapeutic potential is a critical issue in decisions to develop these compounds into drugs, as well as a major concern to environmental resource managers. Difficulty in obtaining sufficient material for pre-clinical and clinical evaluation of natural products has demonstrated that bulk collections from natural populations are problematic. The goal of the research is to identify, clone, and express invertebrate growth-regulating genes and use the recombinant molecules to enhance the *in vitro* production of compounds with therapeutic potential.

R/LR-MB-7, Cellular Localization and Production of Bioactive *Discodermia* Metabolites - - Discodermolide is a potent antiproliferative compound with a mechanism of action similar to, but more potent than Taxol. Supply of this compound for ongoing preclinical evaluation by an industrial pharmaceutical partner is a critical issue. Evidence suggests that discodermolide is produced by a microorganism associated with the source sponge. Isolation and fermentation of the microbe to produce discodermolide would provide a renewable source for further evaluation of the promising anticancer agent.

R/LR-MB-8, Biosynthesis and Enzymology of the Pseudopterosins: Anti-inflammatory Agents from the Soft Coral Pseudopterogorgia elisabethae - - A mixture of pseudopterosins is sold commercially in skin creams and some have potential as anti-inflammatory and analgesic agents. The overall goal of this project is to develop a biotechnological production method of the pseudopterosins and seco-pseudopterosins from the sea whip to test them for their anti-inflammatory activity.

R/LR-MB-9, Bipyridyl Marine Natural Products as Anti-Fouling Compounds - - Protection of marine surfaces against fouling organisms is not only a big business, but it is also a difficult process to make coatings environmentally friendly. The world market for marine paints is over $2 billion annually. A world-wide ban on some paint ingredients will occur in 2003. The goal of this project is to develop nemertine bipyridyls from marine species which have potential as potent antifouling agents.

R/LR-MB-10, Bioactive Agents Produced by Invertebrate-Associated Marine Microbes - - One solution to increase resistance by humans to pathogen treatment therapy is to identify novel antimicrobial compounds, which can serve as leads in drug discovery programs. Marine microbes are an exciting potential source of compounds. Bacteria will be isolated from several species of Floridian tunicates and sponges that produce bioactive compounds and tested for potential as clinical antimicrobiological agents.

R/C-E-42, Tracer Techniques to Evaluate Rates of Non-Point Source Pollution from Barrier Islands to Surface Water - - One major and rapidly growing source of non-point source contamination in the coastal zone is nutrient loading from septic and other types of on-site disposal systems. This is particularly true on barrier islands that seldom have centralized sewage treatment facilities. This project aims to develop new approaches to study rates of water and nutrient transport via groundwater, and better tools for evaluating such contaminant loading. The approach will use natural radium isotopes and an artificial tracer to assess long- and short-term average flow rates in the proximity of St. George Island, Florida.

R/C-E-43, The Role of Filter-Feeding Sponges in Controlling Phytoplankton Blooms in Florida Bay and the Concomitant Effect on the Health of Seagrasses - - Persistent and widespread phytoplankton and cyanobacteria blooms have coincided with large-scale decimation of sponge communities in Florida Bay. One hypothesis is that the large-scale loss of suspension feeding sponges has rendered the ecosystem susceptible to these recurring blooms. The goal is to experimentally determine the potential for suspension feeding sponges to control nuisance phytoplankton blooms caused by internal non-point source pollution.

R/C-S-36, Characterization of Atlantic and Gulf Coast Sea Oats Populations: Implications for Varietal Selection Using Micropropagation Technology - - The genetic differences in populations of sea oats from Gulf and South Atlantic sites will be determined. This will assist in developing commercially viable alternative propagation procedures for selecting and producing sea oat varieties for revegetating coastal dunes.

R/C-S-37, Evaluation of Nearshore Sea Severity at Hurricane Landing for Application to Florida Coast Conservation - - The bottom profile in the offshore zone varies considerably along the Florida coast; hence, a distinct difference in the nearshore sea severity is expected along the coast. This study will provide knowledge for improving technological practice and management decision making regarding the conservation of the Florida coast. The objective of this research is to provide information on sea severity in the nearshore zone at the time of hurricane landing to those dealing with law, policy, trade and engineering. It will develop a new methodology for estimating the intensity of the sea when a hurricane of specified wind force approaches the shoreline, and carry out numerical computations at twelve locations along the Florida coast for seven hurricane wind speeds.

R/C-S-38, Compatible Plant/Mycorrhizal Fungus Ecotype Combinations for Micropropagated Sea Oats Planted on Florida Beaches - - Establishment of sea oats on restored beaches is critical for combating erosion losses. However, concerns about genetic diversity have lead to restrictions in harvesting and planting of sea oats. The overall goal is to enhance ecologically sound establishment of micropropagated sea oats by developing compatible plant/mycorrhizal fungus ecotype combinations for out planting onto Florida beaches.

R/C-S-39, Long-term Sediment Budget for Florida's East Coast for Coastal Management - - A recently completed Sea Grant project on long-term shoreline position resulted in the identification of previously unrecognized shoreline characteristics which are important to the long-term management of Florida's and the nation's beaches. This project will investigate these characteristics of sand sediment sources and sinks on Florida's east coast, determine the causes of unpredicted shoreline advancement, develop more rationale sediment budgets and disseminate the information to professional and lay audiences for use in decision making and shoreline project plannings.

R/C-S-40, A Field Study of Rip Currents and the Development of a Predictive Model - - Rip currents account for 80 percent of beach rescues, accounting for 36,000 rescues in 1997. About 150 drownings (30 in Florida) occur each year due to rip currents. The ability to predict the occurrence of rip currents will reduce this dramatically. A data base of rip currents will be developed and a predictive model will be developed and tested.

R/C-D-17, Post-storm Model for the Reconstruction of Habitable Coastal Structures - - The goal is to develop decision-making models for the reconstruction of storm-damaged coastal habitable structure in the state of Florida. The model will be developed to quickly separate and mitigate damaged structures above and below the 45 to 55% damage range. A more detailed model will be developed for the structures falling in the 45 to 55% damage range. The approach will use a recent Sea Grant Program Development study findings as the basis. An advisory committee consisting of members from various interest groups will provide guidance.

R/C-P-22, Development and Implementation of a Gaming Simulation of Community Planning for Hurricane Mitigation and Disaster Recovery - - The goal of the project is to develop and implement a gaming simulation of community planning for hurricane mitigation and disaster recovery for use in training local officials and testing the impacts of higher level government policy changes on local planning for disaster recovery and hazard mitigation. One of the central thrusts of federal and state efforts to reduce the public costs that result from the vulnerability of coastal communities to hurricanes has been to require or encourage local governments to prepare various plans and strategies for mitigating coastal hazards through initiatives before or after hurricanes strike. Local communities, however, have generally been reluctant partners in both planning for and implementing such mitigation initiatives. The gaming simulation proposed here provides a useful context for training local officials in the procedures of pre-disaster planning for recovery and mitigation. It will be implemented by the Florida Department of Community Affairs.

R/C-P-23, The Legal and Institutional Framework for Regional Coastal Waterway Management in Southwest Florida - - This project will develop alternatives for implementation of a regional plan developed by boaters, local government representatives, and state and regional agencies for the management of anchorages and associated boating activities. Recreational boating is a $2 billion economic activity in Florida. Unless better ways are found to reduce conflict among users of coastal resources, and to minimize the impact of marine facility development on coastal resources, continued growth of the boating industry cannot be sustained. This research will provide the legal and institutional analysis needed by the participants in an innovative, locally generated effort to bring users and managers of the resource together to devise solutions to waterway management needs of Southwest Florida.

I.B. Extension

SGEP-12, Florida Sea Grant Extension Program - - This work will continue to provide effective and responsible extension education programming that promotes the wise use of coastal and marine resources in Florida, with impacts that extend to the Southeast and the nation. Currently, Extension has 17 agents and 4 specialists that serve the 80% of Florida's population that live in the 36 coastal counties of the state. In cooperation with industry Florida Sea Grant has made a significant impact on improving seafood quality and seafood safety, for example through state, regional and national leadership in development of the Hazard Analysis and Critical Control Point seafood inspection program. This effort has been recognized by the "Hammer Award" of the Vice President of the U.S. for achievement by partnerships. Other efforts include guidance to local government in developing artificial reefs, development of shellfish mariculture, assisting fishers and their families deal with the impacts of the net ban in Florida, and use of rural tourism as an economic development tool.

COMM-4, Florida Sea Grant Communications Program - - Although traditional publication efforts were continued and enhanced, popular communications products were also produced with funding received from other agencies. Recent accomplishments include: the production of more than 50,000 publications; the establishment of an automated radio station in the Keys featuring current research information for Florida Bay; four stories featured by CNN for use in the evening news and Science Desk segments; articles featured in the Washington Post, USA Today, Miami Herald and the Chronicle of Higher Education highlighting Sea Grant research and personnel; and the creation of listserves and homepages in support of regional and national Sea Grant projects.

I.C. Program Management and Development

M/PM-12, Florida Sea Grant Management - - To meet the programmatic goal of Florida Sea Grant, i.e., the use and conservation of the marine resources of Florida and the nation in a way that leads to a

sustainable economy and environment, this project works to coordinate and administer the State University System of Florida Sea Grant College Program. Management activities have been judged against quantitative and qualitative performance goals as mandated by the University of Florida and the National Sea Grant College Program Office.

M/PD-10, Coastal Science and Technology Innovation with Limited Funds: The Florida Sea Grant Program Development Portfolio - - This project continues to give Florida's universities and academic laboratories, through Sea Grant, the unique capability to respond even in the middle of a fiscal year to significant opportunities for marine and coastal resource development. Projects are low budget with limited objectives. All proposals are peer reviewed to insure technical merit and relevance. Projects are conducted if they demonstrate a likelihood of rapid success and meet at least one of six criteria: (1) offer solution to clearly defined timely problem; (2) address problem in opportunistic research area; (3) pilot study to see if longer project justified; (4) provide information to attract support elsewhere; (5) Extension demonstration project; (6) timely exchange of scientific information. Recent projects include:

- 99-6 OPS Research Assistantship
- 99-7 Measurement of Severe Winds Near Ground Level During the 1999 Hurricane Season
- 99-8 Sixth International Conference and Workshop on Lobster Biology and Management
- 99-9 The Impact of Secondary Marine Science Classes on Students' General Scientific Knowledge and Literacy
- 99-10 Impact of the Bloom of the Brown Alga *Dictyota* on Reef Organisms
- 99-11 Developing a Recreational Management Strategy for Rookery Bay National Estuarine Research Reserve
- 99-12 Socio-economics of Fisheries Management
- 00-1 Florida Sea Grant Elise B. Newell Seminar Series
- 00-2 Timely Marine Issues
- 00-3 Artificial Reefs in Marine Ornamental Fisheries
- 00-4 Support for Marine Ornamentals 2001
- 00-5 Comparison of Shucking Techniques for Oysters
- 00-6 Development of Advanced Instrumentation for Monitoring of Wind Actions in Coastal Structures
- 00-7 Short-term Effects of Rapid Salinity Declines on Newly Planted Seed Clams During La Niña Conditions in Florida
- 00-8 Development of a Synthetic Culture Medium for *In Vitro* Production of Horseshoe Crab Bloods Cells

II. ADDITIONAL PROJECTS FROM SPECIAL INITIATIVES AND NATIONAL OPPORTUNITIES

II. A. Research

R/LR-MB-3, Development of a Marine Prophage Induction Assay for Detection of Mutagens in Seawater Samples - - There are many coastal environments in Florida and around the United States that receive effluent or seepage from waste disposal sites that contain carcinogens. There is a need to rapidly determine genotoxic pollutants to prevent widespread mutations in flora and fauna, and to minimize the risk of human exposure to such agents. It is well documented that mutagenicity in bacteria correlates with carcinogenicity in humans. Current mutation assays are not compatible with seawater samples. The goal is to develop an assay to detect carcinogens in coastal waters by use of a marine prophage induction assay.

R/LR-MB-6, Development and Optimization of *In Vitro* Production Methods of Bioactive Marine Alkaloids - - Preclinical and clinical development of promising pharmaceutical agents from marine invertebrates is frequently compromised by inadequate supplies. Marine organisms are often over-collected, thus harming their environment, simply to generate sufficient material for early stages of drug development. The generation of novel methods for producing a sustainable supply of bioactive marine natural products is therefore necessary to produce sufficient quantities of new drugs and protect the marine environment. This project aims to develop and optimize *in vitro* production methods for two groups of bioactive marine alkaloids, the ecteinascidins and stevensine.

R/LR-MB-12 [T-99-55], Molecular Detection of Enteroviruses in Florida's Coastal Waters - - 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.

R/LR-MB-13, Application of DNA Microarray Technology for Marine Invertebrate Cell Culture and Marine Natural Products Production - - 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.

R/LR-MB-11, Methods to Increase Microbial Recovery from Deepwater Sponges - - 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.

R/LR-A-32 [OD-99-47], The Caribbean Oyster: Genetic Resource for American Oyster Culture? - - 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.

R/LR-A-33 [TAQ-99-15], Aquaculture of the Florida Bay Scallop in Crystal River, Florida - - 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.

R/LR-A-34 [TAQ-99-104], Development of Bay Scallop Stock Enhancement Technology - - Depletion of bay scallops in the Eastern Gulf of Mexico is largely due to loss of seagrasses which form an essential habitat. Seagrasses are recovering, but bay scallop spawning stocks are at an all-time low abundance in Tampa Bay. The goal is to significantly advance developing hatchery-release technology to replenish bay scallop populations on the Florida West Coast and to test the relative efficiency of cage versus free-planting cultured scallops in the field.

R/LR-A-35 [TAQ-99-108], Commercial Hatchery Production of Mutton Snapper (*Lutjanis analis*) and Greater Amberjack (*Seriola dumerili*) for Growout in Offshore Cage Systems - - 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.

R/LR-B-52, Field Assessment of the Effects of Artificial Reefs and Their Role in Fisheries Management - - Artificial reefs are a potentially powerful management tool that can be used to enhance fish production and divert deleterious impacts away from natural habitat. To date, their use is limited by some interests due to a scientific controversy over attraction-production. Solutions to this problem must quantify the negative effects of attracting fish away from natural reefs, the positive effects of providing new habitat, and the compensatory responses mediated by reducing density-dependence on natural reefs. Impact assessment, experimental design and a statistical framework will be developed for long-term studies of fish dynamics, using important ornamental reef fish species in the Florida Keys. These small reef fishes comprise an emerging fishery, and provide a tractable model system in which to explore the efficacy of artificial reefs.

R/LR-Q-20 [GMO-99-1], Use of Bacteriophage for the Decontamination of Oysters Infected with *Vibrio vulnificus* - - Bacteriophage have proven to be effective in killing pathogenic bacteria in mice and farm animals. *Vibrio vulnificus* are a bacteria present in oysters. *V. vulnificus* is lethal when consumer by people in certain risk categories. Bacteriophage may offer a practical and realistic method for making oysters safe for human consumption. They will be used to test their ability to kill *V. vulnificus* in oysters.

R/LR-Q-21 [GMO-99-3], New Oyster Product: Processing and Market Research - - 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.

E/ST-22, E/ST-23, Knauss Fellowships - - Two students are currently spending one year in Washington, D.C. working in NOAA offices.

II. B. Extension

E/T-7, National Sea Grant Marina Network Enhancing the Economic and Environmental Sustainability of the Marina Industry - - This multi-state continuing effort aims to educate marina owners on techniques designed to enhance the economic and environmental sustainability of the marina industry. Marina owners are facing economic and environmental conditions and regulations that restrict profitable operation. This will allow them to learn techniques that will allow profitable operations and at the same time protect the environment, so that economic activity will continue to occur, and impact the national economy. During the first two-years. MarinaNet has succeeded in linking individual Sea Grant programs with marina-related activities or projects into a national network to facilitate easy access to all research, advisory, and outreach activities, and to make the network available to the marina industry, Sea Grant programs, and regulatory agencies.

A/RE-1, Sea Grant HazNet - - This project will build a network of Sea Grant programs to provide research, outreach and educational information for natural coastal hazard mitigation. This is a Sea Grant Network Project. Florida Sea Grant's responsibility will be to establish a Sea Grant HazNet web page and Listserver.

E/TP-1, Seafood Hazard Analysis Critical Control Point (HACCP) - - Mandatory Hazard Analysis and Critical Control Point (HACCP) inspection programs for the nation's seafood industry will become effective December 18, 1997. By this time all domestic and foreign seafood processors must develop and maintain a seafood safety program based on proven HACCP concepts including use of critical limits, monitoring and recordkeeping designed to prevent 'reasonably likely' food safety problems. This mandate represents one of the most significant and challenging changes in the history of food safety regulation in the United States. There are over 5,000 licensed seafood processors operating in the United States. In preparation for this, the seafood professionals of the National Sea Grant College network, have organized the "Seafood HACCP Alliance" for education and training. This continuing national project will improve Sea Grant's Seafood HACCP Alliance national training curriculum and manuals; develop additional modes for initial and continuing HACCP seafood safety training and education; advance the content, access and use of the Alliance 'Compendium of Methods'; and provide continuing technical advisement for the implementation of HACCP concepts and related seafood safety and quality issues.

E/TP-2, Seafood Education Alliance for Continuing Education and Technology Transfer - - A new national Seafood Alliance training program in Sanitation Control Procedures is underway. Pilot training programs (two domestic and two international) began in October 1999 followed by Train-the-Trainers sessions through summer 2000. Concurrent industry and regulatory training programs are in process. The target cadre of prepared trainers will be 250 to assist in reaching the projected audience of 5,000 domestic processing firms, over 2,000 inspectors and over 5,000 international participants and importers.

E/INT-1, E/INT-2, Revitalization of the Nicaragua Shrimp Industry - - This a cooperative project with the University of Michigan Sea Grant and Puerto Rico Sea Grant. Florida is conducting an economic analysis of a new zero-exchange shrimp culture system and will teach workshops to shrimp farmers and investors. Florida is also conducting shrimp safety training workshops for shrimp farmers and managers in Nicaragua.

E/COP-1, E/COP-2, E/COP-3, Florida Bay Outreach and Community Education Program - - An organized outreach program on Florida Bay water quality and quantity will be continued (begun in 1997) as a part of the overall NOAA South Florida Ecosystem Restoration Prediction and Modeling Effort and under the direction of the Florida Bay Program Management Committee.

E/NS-1 [ANS-99-107], A National Invasive Aquatic Plant Outreach/Research Initiative - - 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.

E/CSC-3, E/CSC-4, Non-Regulatory Boating Urban Bay Water Management - - The use of boats in Florida waterways is rapidly increasing. There is a need to keep the boating industry economically viable and the environment sustainable. These projects are designed to develop materials and processes, including prototype navigation charts, for use in teaching boaters safe practices and to achieve non-regulatory sustainability for the industry and environment.

III. MAJOR EXTRAMURAL (NON-SEA GRANT-FUNDED) PROJECTS

A number of other projects indicate the reliance of other organizations upon Florida Sea Grant, and are in addition to the partnerships reflected in the projects listed above. Certain projects supplement salary requirements for Extension. These are projects that are funded from the agency to Florida Sea Grant, but are not funded through NOAA. A brief listing of those projects active during 2000 by funding sources is presented below.

West Coast Inland Navigation District
- Lee County Waterway Study
- Five Year Comprehensive Plan
- Charlotte Harbor Study
- Computer System Upgrade
- Cooperative Agreement for Waterway Management Services

Jupiter Inlet District
- Waterway Management

U.S. Department of Agriculture
- Water Quality Education

Florida Fish and Wildlife Conservation Commission (formerly Florida Department of Environmental Protection)
- Low Power Radio Aquatic Nuisance Species Education
- Boat Use Characteristics
- Keys Sponge Research
- Marina Workshops
- Marina Resource Kits

Association of Food and Drug Officials
- HACCP Training

6.0 PUBLICATIONS

Florida Sea Grant has an organized process for printing and tracking publications. Documents published "in-house" include Sea Grant Reports, Sea Grant Extension Publications, Sea Grant Technical Papers, thesis or dissertation abstracts, staff papers and other items such as Extension newsletters. Each is numbered and tracked in an appropriate series. Books and journal articles are published elsewhere, but tracked for completion and credit by Communications staff. All publications are distributed to the Pell Library at the University of Rhode Island. A total of 86 different publication items (with thousands of copies) were completed in 1999. For 2000 through April 2001 an additional 232 have been completed or are in process. Totals for 2000 are still pending, since final project reports for 2000 on most projects and programs will not be completed until the second quarter, 2001. A complete listing of Communication publications and products from 1996 to the present is shown in the following summary.

Table 1. Summary of Florida Sea Grant Publications and Other Educational Products, 1996 to 2001.

	In Process April 2001	Published				
		2000	1999	1998	1997	1996
Sea Grant Reports						
Published	1	1	1	2	0	3
Sea Grant Extension Publications						
Published	3	15	30	38	15	3
In Press	0					
Sea Grant Technical Papers						
Published	3	8	6	8	3	5
In Press	0					
Books						
Published	0	1	0	0	2	0
In Process	1					
Book Chapters						
Published	0	2	3	2	2	1
In Press	2					
Scientific Journal Articles						
Published	1[a]	9[a]	15	14	20	9
In Press	52					
Submitted	27					
In Preparation	22					
Graduate Thesis or Dissertation						
Complete	0	15	11	12	14	8
In Process	24					
Staff Papers/Conference Proceedings						
Published	0	3[a]	9	24	9	11
In Press/Submitted	29					
Extension Newsletters[b]	3	5	6	5	0	0
WWW Pages Maintained	5	1	5	6	6	3

[a] Number low since 2000-01 project final reports have not been processed at time of preparation.
[b] Not recorded prior to 1998.

Publications of the Florida Sea Grant College Program, 1996 - 2001[1]

CALENDAR YEAR 2001 (January - December)

I. Florida Sea Grant Reports

II. Florida Sea Grant Technical Papers

Seaman, W., Jr., and J.H. Whitehouse. 2001. **Florida Marine Biotechnology: Research, Development and Training Capabilities to Advance Science and Commerce.** TP-110. (M/PM-12)

Sidman, C., and R. Flamm. 2001. **A Survey of Methods for Characterizing Recreational Boating in Charlotte Harbor, Florida.** TP-109. (E/WCIND-1)

III. Books and Book Chapters

B. In Press

Clarke, M.E. (planned.) **Microtiter Techniques for Assay of Hatchery Fish.** Chapman Hall: Book Chapter. RSMAS, University of Miami. (R/LR-A-17)

Dean, R.G., and R.A. Dalrymple. (in process.) **Coastal Processes with Engineering Applications.** Cambridge University Press. (R/C-S-35)

Larkin, S.L., D.J. Lee, R.L. Degner, J.W. Milon, and C.M. Adams. (in press.) **Florida's Ornamental Marine Life Industry.** in 2001 Marketing and Shipping Live Aquatic Products, ed. B. Paust, University of Alaska Sea Grant, Fairbanks, AD-SG-01-03. (R/LR-A-23)

IV. Journal Articles

MacMahan, J. 2001. **Hydrographic Surveying from Personal Watercraft.** Journal of Surveying Engineering.127(1):12-24. (R/C-S-40)

B. In Press

Acosta, C.A., and M.J. Butler, IV. (in press.) **Adaptive Strategies that Reduce Predation on Caribbean Spiny Lobster Postlarvae During Onshore Transport.** Limnology and Oceanography. 44:494-501. (R/LR-B-45)

Acosta, C.A., and M.J. Butler IV. (in press.) **The Role of Mangrove Habitat as Nursery for Juvenile Spiny Lobster, *Panulirus Argus*, in Belize.** Marine and Freshwater Research. (R/LR-B-44)

Adams, C.M., W. Milon, and D. Mulkey. (submitted.) **Development of an Economic Impact Assessment Methodology for Occurrence of Red Tide.** Floria Fish and Wildlife Conservation Commission, University of Florida, Gainesville.

Adams, C., D. Sweat, N. Blake, and B. Degner. (in press.) **The Economic Feasibility of Small-Scale, Commercial Culture of Bay Scallops in Florida.** Journal of Aquaculture Economics and Management.

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[1] The project from which the publication originated is indicated by the code number in parentheses at the right side of the last line of each entry. For each year, titles are listed in order of appearance as FSG Reports, FSG Extension publications, books or book chapters, journal articles, graduate theses and dissertations, FSG Technical Papers, miscellaneous papers including conference proceedings, videos, CD-ROM releases, posters and home pages.

Adams, C., S. Larkin, and D. Lee. (in press.) **Volume and Value of Marine Ornamentals Collected in Florida.** Journal of Aquarium Sciences and Conservation.

Ault, J.S., and S.G. Smith. (submitted.) **Extensions to Gear Inter-Calibration Methods for Fishery-Independent Catch-Per-Unit-Effort Data.** Transactions of the American Fisheries Society. (R/LR-B-47)

Baker, B.J., M. Van Ert, A.C. Leonard, and J.E. Grimwade. (in preparation.) **Cold-water Marine Invertebrate-Associated Microorganisms as Sources of Drug Leads.** International Journal of Pharmacognosy. (R/LR-MB-4)

Bell, S.S., and M.O. Hall. (in preparation.) **The Impact of Propellor Scars on Fauna Utilizing Seagrass Beds.** (R/C-E-39)

Benner, R., and S. Otwell. (in press.) **Seafood HACCP, Safety and Quality on the Internet.** Journal of Aquatic Food Product Technology.

Birbari, W.J., G.E. Rodrick, S. Manahan, and J.D. Oliver. (in press.) **Resuscitation of Nonculturable Cells of Vibrio Vulnificus in Clams and Oysters.** Applied & Environmental Microbiology. (R/LR-Q-13)

Blitch, S.B., T.K. Frazer, K.M. Blitch, M.H. Posey, and T.D. Alphin. (in prep.) **Growth of Juvenile Blue Crabs (Callinectes Sapidus) in Seagrass and Marsh Channel Habitats Along Florida's Central Gulf Coast.** (R/LR-B-46)

Burnett, W.C., M. Lambert, J. Christoff, J. Chanton, M. Taniguchi, W. Moore, L. Smith, S Krupa, E. Kontar, C. Smith, R. Paulsen, and D. O'Rourke. (submitted.) **SCOR/LOICZ Group Conducts Assessment of Groundwater Discharge to the Ocean.** EOS. (R/C-E-42)

Butler, M.J., IV, J.H. Hunt, W.F. Herrnkind, M.J. Childress, R. Bertelsen, W. Sharp, J.M. Field, and H.G. Marshall. (in press.) **Cascading Disturbances in Florida Bay, U.S.A.; Cyanobacteria Blooms, Sponge Mortality, and Implications for Juvenile Spiny Lobsters** *Panulirus argus*. Marine Ecology Progress Series. (R/LR-B-38)

Butler, M.J., IV, T. Dolan, W. Herrnkind, and J. Hunt. (in press.) **Modeling the Effect of Spatial Variation in Postlarval Supply and Habitat Structure on Recruitment of Carribean Spiny Lobster.** Marine and Freshwater Research. (R/LR-B-50)

Butler, M.J., and W.F. Herrnkind. (in press.) **Spiny Lobster Recruitment: Field Tests of Ecological Bottlenecks and the Potential for Population Enhancement.** Ecology Applied. (R/LR-B-30)

Butler, M.J., IV, A.B. MacDiarmid, and J.D. Booth. (in press.) **The Cause and Consequence of Ontogenetic Changes in Social Aggregation in New Zealand Spiny Lobsters.** Marine Ecology Progress Series. 188:179-191. (R/LR-B-45)

Carr, W.E.S., W.H. Clark, and J. Nunez. (planned.) **Rock Shrimp Attraction to Odors and Traps: Collaboration with a Fishery to Develop Less Destructive Harvesting Methods.** (R/LR-B-41)

Chanton, and Burnett. (in preparation.) **Preliminary Estimates of Groundwater Discharge in Florida Bay: Sites and Rates.** Bulletin of Marine Science. (R/C-E-37)

Cheng, J., and R.G. Dean. (submitted.) **Statistical Distribution of the Standard Deviation of Shoreline Deviations for Florida's Coastline.** Journal of Coastal Research. (R/C-S-35)

Childress, M., and W. Herrnkind. (in press.) **The Guide-Effect Influence on Gregariousness of Juvenile Caribbean Spiny Lobster.** Animal Behaviour. (R/LR-B-50)

Childress, M., and W. Herrnkind. (in press.) **The Influence of Conspecifics on the Ontogenetic Shift of Juvenile Caribbean Spiny Lobsters.** Marine and Freshwater Research. (R/LR-B-50)

Clarke, M.E., J.L. Paupe, T.J. Fiedler, and D.W. Freshwater. (planned.) **Microtiter Plate Assay Methods for Measurement of Proteins and Citrate Synthase Activity in Tropical Copepod.** Journal of Plankton Biology. (R/LR-A-17)

Clarke, M.E., T. Fiedler, and P.J. Walsh. (planned.) **The Effect of Delayed Feeding on Growth and Condition of Larval Fish.** Fishery Bulletin. (R/LR-A-17)

Clements, L.A., S.S. Bell, and J.P. Kurdziel. (in press.) **Regeneration Rates as Measures of Secondary Production: A Study in Established and Restored Seagrass Beds.** Marine Biology. (R/C-E-28)

Corbett, D.R., K. Dillon, W. Burnett, and G. Schaefer. (submitted.) **Non-Point Source Pollution on Barrier Islands: A Case Study on St. George Island, Florida.** Environmental Pollution. (R/C-E-42)

Dally, W., and C. Brown. (in press.) **A Modeling Investigation of the Breaking Wave Roller with Application to Cross-Shore Currents.** Journal of Geophysical Research. (R/C-S-32)

Dean, R.G., and J. Cheng. (submitted.) **Shoreline Change Characteristics for Florida: Part 1 - East Coast of Florida.** Journal of Coastal Research. (R/C-S-35)

Dean, R.G., and J. Cheng. (submitted.) **Shoreline Change Characteristics for Florida: Part 2 - West Coast of Florida.** Journal of Coastal Research. (R/C-S-35)

Dean, R.G. (submitted.) **Two Problems Related to Orville Magoon's Coastal Engineering Interests: Sand Rights and Breakwaters.** Shore and Beach. (R/C-S-35)

Dillon, K., R. Corbett, J. Chanton, and W. Burnett. (in review.) **A Conservative Tracer Study of the Fate and Transport of Wastewater Injected into Wells in the Florida Keys.** Journal of Hydrology. (R/C-E-37)

Dilon, D., R. Corbett, J. Chanton, W. Burnett, and D. Furbish. (in press.) **The Use of Sulfur Hexaflouride (SF_6) as a Tracer of Septic Tank Effluent in the Florida Keys.** Journal of Hydrology. (R/C-E-37)

Donaldson, K.A., D.W. Griffin, and J.H. Paul. (in press.) **Detection, Quantitation and Identification of Enteroviruses from Surface Waters of the Florida Keys Using Real-Time RT-PCR.** Water Resources Journal. (R/LR-MB-12)

Ehrhardt, N. (in process.) **Risk Assessment of Adopting BRD Designs to Reduce Shrimp Bycatch to Accomplish Management Actions on Directed Fisheries.** Fishery Bulletin. (R/LR-B-42)

Eklund, A.M., A.M. Szmant, and J.A. Bohnsack. (in preparation.) **The Influence of Post-Settlement Processes, Through Food or Shelter Limitation, on Reef-Fish Assemblage Structure.** Bulletin of Marine Science. (R/LR-B-36)

Eklund, A.M. (in preparation.) **Experimental Evidence That Post-Settlement Predation Influences the Structure of Reef Fish Assemblages.** Ecology. (R/LR/B-36)

Eklund, A.M., I. Weil, A.M. Szmant, and A. Woodhead. (in preparation.) **Effects of Reduced Predation and Increased Density on Growth Rates and Condition of Cottonwick, *Haemulon Melanurum*, Recruits.** Journal of Fish Biology. (R/LR-B-36)

Enright, E., J.V. Lopez, C.L. Peterson, and S.A. Pomponi. (in preparation.) **Cloning of a Cyclin Dependent Kinase from the Sponge *Axinella Corrugata*.** (R/LR-MB-5)

Erdogdu, F., M.O. Balaban, and K.V. Chau. (in press.) **Modeling of Heat Conduction in Elliptical Cross-section: II. Adaptation to Thermal Processing of Shrimp.** Journal of Food Engineering. (R/LR-Q-17)

Fonseca, M.S., and S.S. Bell. (in press.) **Examining the Influence of Wave Exposure and Tidal Currents on Seagrass Landscapes.** Marine Ecology Progress Series. (R/EHRP-3)

Frazer, T.K., S.B. Blitch, M.H. Posey, T.D. Alphin, K. Blitch, and T.P. Glancy. (submitted.) **Use of Shallow-Water Habitats by Juvenile Blue Crabs Along Florida's North Central Gulf Coast: The Potential Influence of Seagrass on Distributional Patterns.** Bulletin of Marine Science. (R/LR-B-46)

Frodyma, M., M. Van Ert, M. Breitbart, A. Leonard, B. Baker, and J. Grimwade. (in preparation.) **Drug Resistance and DNA Topology in Bacteria Isolated from Antarctic and Temperate Marine Invertebrates.** Journal of Bacteriology. (R/LR-MB-4)

Frodyma, M.E., M. Van Ert, B. Furrow, A.C. Leonard, B.J. Baker, and J.E. Grimwade. (submitted.) ***Pseudoalteromonas clarkii*, sp. nov., a psychrotrophic bacterium isolated from the Antarctic nudibranch *Tritoniella belli*.** International Journal of Systematic and Evolutionary Microbiology. (R/LR-MB-4)

George, S., J.M. Lawrence, A.L. Lawrence, J. Smiley, L.R. Plank. (in press.) **The Role of Carotenoids on Egg Quality and Development in the Sea Urchin *Lytechinus Variegatus*.** Journal of World Aquaculture Society. (R/LR-A-21)

Hanisak, M.D. (in press.) **Effects of Light and Nutrient Stress on the Seagrass, Halodule Wrightii in Mesocosm Experiments.** Marine Ecology Progress Series. (R/C-E-31)

Heffner, R.A., C.K. Reilly, and M.J. Butler, IV. (in press.) **Pseudoreplication Revisited.** Ecology. (R/LR-B-38)

Herrnkind, W., M. Butler, and J. Hunt. (submitted.) **Artificial Shelters for Early Juvenile Spiny Lobsters: Underlying Ecological Processes and Population Effects.** Atlantic States Marine Fisheries Commission Report. (R/LR-B-38)

Herrnkind, W., M. Childress, and K. Lavalli. (in press.) **Cooperative Defense and Other Benefits Among Exposed Spiny Lobsters: Inferences From Group Size and Behavior.** Marine and Freshwater Research . (R/LR-B-50)

Hirons, A.C., W.J. Lindberg, and C.E. Cichra. (in preparation.) **Larval Abundances of Stone Crabs (Decapoda: Xanthidae: Menippe) in Two Contrasting Gulf Coast Embayments.** (R/LR-B-25)

Jeedigunta, S., H. Fawehinmi, and R.G. Kerr. (in preparation.) **An Enzymatic Production of β-Mercaptopyruvic Acid and Its Involvement in Ecteinascidin Biosynthesis.** (R/LR-MB-6)

Kem, W.R., and F. Soti. (in press.) ***Amphiporus* Alkaloid Multiplicity Implies Functional Diversity: Initial Studies on Crustacean Pyridyl Receptors.** Hydrobiologia. (R/LR-MB-9)

Kim, J., M. Marshall, W. Du, S. Otwell, and C. Wei. (in press.) **Determination of Chlorate and Chlorite and Mutagenicity of Seafood Treated Aith Aqeous Chlorine Dioxide.** Journal of Arig. Food Chemistry. 47:3586-3591.

Kim, G., W.C. Burnett. P.W. Swarzenski, and W.S. Moore. (submitted.) **Measurement of ^{224}Ra and ^{226}Ra Activities in Natural Waters Using a Radon-in-air Monitor.** Environmental Science and Technology. (R/C-E-42)

Knowles, L., and S.S. Bell. (in press.) **The Influence of Habitat Structure in Faunal-Habitat Associations in a Tampa Bay Seagrass System, Florida.** Bulletin of Marine Science. (R/EHRP-3)

Larkins, S.L., and R.L. Degner. (in press.) **The U.S. Wholesale Market for Marine Ornamentals.** Journal of Aquarium Sciences and Conservation. (R/LR-A-23)

Larkins, S., D. Lee, and C. Adams. (in press.) **Volume and Value of Marine Ornamentals Collected in Florida, 1990-98.** Journal of Aquarium Sciencesss and Conservation. 13 pp. (R/LR-A-23)

Lawrence, J.M., and T.S. Klinger. (in press.) **Digestion.** In: Edible Sea Urchins: Biology and Ecology. (R/LR-A-21)

Lawrence, J.M. (in press.) **Edible Sea Urchins.** In: Edible Sea Urchins: Biology and Ecology. (R/LR-A-21)

Lawrence, J.M. (in press.) **Edible Sea Urchins: Biology and Ecology.** Elsevier Science Press. Amsterdam 437 pp. (R/LR-A-21)

Lawrence, J.M., and J. Herrera. (incomplete.) **Stress and Deviant Reproduction in Echinoderms.** Zoological Studies. 39:151-171. (R/LR-A-21)

Lawrence, J.M., and Y. Agatsuma. (in press.) **The Ecology of Tripneustes.** In: Edible Sea Urchins: Biology and Ecology. (R/LR-A-21)

Lee, D., S. Larkin, and C. Adams. (in press.) **A Bioeconomic Model of the US North Atlantic Swordfish Fishery.** Marine Resource Economics.

Lopez, J.V., C.L. Peterson, R. Willoughby, and S.A. Pomponi. (in preparation.) **Application of Anti-Sense Oligonucleotide (ASO) Technology to Inhibit Cell Cycle Regulating Genes for Sponge Culture Optimization.** (R/LR-MB-5)

Lopez, J.V. C.L. Peterson, R. Willoughby, A.E. Wright, E.J. Enright, S. Stacy, and S.A. Pomponi. (in preparation.) **Molecular Genetic Markers for *in vitro* Cell Verification of the Marine Sponge, *Axinella Corrugata*.** R/LR-MB-5)

Luzuriaga, D., M.O. Balaban, and S. Yeralan. (submitted.) **Automated Headspace Ammonia Analysis of White Shrimp.** Journal of Aquatic Food Products Technology. (R/LR-Q-17)

Luzuriaga, D., M.O. Balaban, A.A. Teixeira, and R. Hasan. (submitted.) **Texture Change in White Shrimp During Storage on Ice.** Journal of Aquatic Food Products Technology. (R/LR-Q-17)

MacMahan, J., R.J. Thieke, R.G. Dean, and R.A. Holman. (in preparation.) **Analysis of RipChannel Stability.** Journal of Marine Geology. R/C-S-40)

McDaniel, L., D.W. Griffin, J. Crespo-Gomez, M.R. McLaughlin, and J.H. Paul. (submitted.) **Evaluation of Marine Bacterial Lysogens for use in a Mutagen Detection (Prophage Induction) Assay.** American Society for Microbiology Meeting, Los Angeles, CA, May 21-25. (R/LR-MB-3)

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Moye, H.A., and K.P. Gangadharan. (in press.) **Water: An Alternative to Organic Solvents for Pesticide Analysis.** A.O.A.C. Lab Management. (R/C-E-38)

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Pomeroy, R.S., and C.M. Adams. (in press.) **Financial Analysis of Hard Clam Grow-Out Methods in the Southeastern United States.** Journal of the World Mariculture Society. (SGEP-11)

Pomponi, S.A. (in press.) **Sustainable Use of Marine Resources for Drug Discovery Research.** Sea Technology. (R/LR-MB-1)

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Posey, M.H., T.D. Alphin, T.K. Frazer, S.B. Blitch, J.A. Hartsell, J. Christian, and T.P. Glancy. (submitted.) **Juvenile Blue Crab Use of Shallow Water Habitats in Southeastern North Carolina: Distribution Among Seagrass, Oyster and Marsh Habitats.** Bulletin of Marine Science. (R/LR-B-46)

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Szmant, A. (submitted.) **Recruitment.** Journal of Fish Biology. (R/LR-B-36)

Tajima, K., and J.M. Lawrence. (in press.) **Disease.** In: Edible Sea Urchins: Biology and Ecology. (R/LR-A-21)

Telesnicki, G.J., and W.M. Goldberg. (in press.) **Effects of Turbidity on the Photosynthesis and Respiration of Two South Florida Reef Coral Species.** Bulletin of Marine Science. (R/C-S-29)

Telesnicki, G., and W. Goldberg. (in press.) **Turbidity Measurement by Nephelometry and Transmissonmetry and its Relevance to Water Quality Standards.** Limnology and Oceanography. (R/C-S-29)

Thornton, R., and R. Kerr. (submitted.) **Examination of Stimuli Designed to Induce Pseudopterosin Production in the Soft Coral Pseudopterogorgia Elisathethae.** (R/LR-MB-8)

Thunberg, E.M., J.L. Seale, C.M. Adams, and E.L. Bouchelle. (in review.) **Effect of North Atlantic Swordfish Management on Swordfish and Tuna Markets.** Journal of Agricultural and Applied Economics. (SGEP-11)

Tilghman, G.C. (submitted.) **Acanthurus Bahianus and A. Randalli: An Investigation of Pectoral Fin to Standard Length Ratio as a Criterium for Species Identification.** Journal of Fish Biology. (R/LR-A-30)

Tilghman, G.C., R. Klinger, R. Francis-Floyd. (in press.) **Feeding Electivity in Surgeonfish (Acanthuridae) of the Florida Keys.** Aquarium Sciences and Conservation. 00:1-9. (R/LR-A-30)

Tilghman, G.C., and R. Francis-Floyd. (submitted.) **Nutritional Analysis of Three Algal Phyta of the Florida Keys.** Zoo Biology. (R/LR-A-30)

Ulrich, S.A., G.E. Rodrick, and J.D. Oliver. (in press.) **Oyster and Clam Hemocyte Interaction with Vibrio Vulnificus.** Journal of Invertebrate Pathology. (R/LR-Q-13)

Van Ert, M.N., M. Frodyma, B.J. Baker, A.C. Leonard, & J.E. Grimwade. (in preparation.) **Characterization of Bioactive Metabolite Production in Bacteria Associated with Antarctic and Temperate Marine Invertebrates.** Applied and Environmental Microbiology. (R/LR-MB-4)

Van Ert, M., B. Gancarz, M. Frodyma, J. Grimwade, B. Baker, and A. Leonard. (in preparation.) **Distribution, Size, and Host-range Specificity of Plasmids Harbored by Bacteria Associated with Antarctic and Temperature Marine Invertebrates.** Applied and Environmental Microbiology. (R/LR-MB-4)

Watts, S.A., J.B. McClintock, and J.M. Lawrence. (in press.) **The Ecology of *Lytechinus Variegatus*.** In: Edible Sea Urchins: Biology and Ecology. (R/LR-A-21)

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Wilson, R.R., Jr., M.E. Frischer, and Y.B. Young. (submitted.) **Sequence Variation, Repetition, and Heteroplasmy in the mtDNA Control Region of Common Snook: Prospects for a Heritable Genetic Tag.** Transactions of the. American Fisheries Society. (R/LR-B-39)

V. Graduate Theses and Dissertations

B. In Press

Behringer, D. (pending.) **The Ecology of Juvenile Lobsters.** Dissertation. Old Dominion University. (R/LR-B-45)

Benner, R. (in preparation.) **Shrimp Decomposition Pending.** Thesis. University of Florida. (SGEP-12)

Bernstein, M. (expected August 2001.) **Determination of Crustacean Age Composition in Landings from Size Frequency Data.** Thesis. Department of Marine Biology and Fisheries, RSMAS, University of Miami. (R/LR-E-18B)

Blitch, S.B. (planned.) **Tentative Project "Growth of Juvenile Blue Crabs (Callinectes Sapidus) in Two Different Habitat Types".** Thesis. Department of Fisheries and Aquatic Sciences, University of Florida. (R/LR-B-46)

Bouwma, P. (pending.) **Title pending.** Dissertation. Florida State University. (R/LR-B-50)

DeOliveira, A. (expected 2001.) **Quantification of Quality Attributes of Gulf of Mexico Sturgeon Meat, Including the use of Electronic Nose.** Dissertation. Department of Food Science and Human Nutrition. University of Florida. (R/LR-Q-20)

Donahue, S. (pending.) **The Ecology of Shallow Water Sponges in the Florida Keys.** Thesis. Old Dominion University. (R/LR-B-50)

Fiedler, T. (planned.) **Condition of Atlantic Menhaden, *Brevoortia tyranus*, in the South Atlantic Bight.** Thesis. RSMAS, University of Miami. (R/LR-A-17)

Hale, J.A. (planned.) **Tentative Project "Abundance and Distribution of Seagrasses Along the Gulf Coast of Florida: A Change Analysis Based on Aerial Photographs Acquired in 1992 and 1999".** Thesis. Department of Fisheries and Aquatic Sciences, University of Florida. (R/LR-B-46)

Hays, J. (expected 2001.) **Title Pending.** Thesis. (R/C-S-39)

Heisig, J. (pending.) **Sperm Dynamicsand Reproductive Success in Spiny Lobster.** Thesis. Old Dominion University. (R/LR-B-50)

Kaonongbua, W. (expected 12/01.) **Developing Molecular Protocols to Assess Genetic Diversity of Mycorrhizal Fungi Associated with Sea Oats.** Thesis. (R/C-S-38)

Lear, J. (pending.) **Lobster-Octopus Dynamics in the Florida Keys.** Thesis. Old Dominion University. (R/LR-B-50)

MacMahan, J.H. (in preparation.) **Rip Currents and Development of a Predictive Model.** Dissertation. Department of Civil and Coastal Engineering, University of Florida. R/C-S-40)

McDaniel, L. (in process.) **Evaluation of Marine Bacterial Lysogens for use in a Mutagen Detection (Prophage Induction) Assay.** Thesis. Department of Marine Science, University of South Florida. (R/LR-MB-3)

Michael, J.R. (in progress.) **Planning for a Disaster Resilient Community: An Evaluation of Mitigation Planning in Escambia County, Florida.** Thesis. (R/C-P-22)

Molina, H. (expected 12/2001.) **Title to be Determined.** Dissertation. (R/LR-B-47)

Murray, M. (pending.) **To Optimize the Human Labor Involved With Egg Production We Are Determining If We Can Increase Egg Production by Increasing the Density of Copepods/Culture and Reducing the Number of Cultures That Are Maintained.** Thesis. Deprtment of Biology, Florida State University. (Major professor Nancy Marcus) (R/LR-A-22)

Nagy, B. (in press.) **Title to be Determined.** Dissertation. Department of Fisheries and Wildlife, Michigan State University. (R/LR-B-49)

Randall, M.T. (planned.) **Tentative Project "The Ecology of Drift Macroalgae in a Relatively Undisturbed Shallow Water Estuary Along the Gulf Coast of Florida".** Thesis. Department of Fisheries and Aquatic Sciences, University of Florida. (R/LR-B-46)

Robertson, D. (pending.) **The Ecology, Population Dynamics and Reproduction of the Spotted Spiny Lobster, *Panulirus Guttatus*.** Dissertation. Old Dominion University. (R/LR-B-45)

Ross, P. (in preparation.) **Histamine in Scrombrotoxic Fish.** Thesis. University of Florida. (SGEP-12)

Saiter, S. (planned.) **Habitat Complexity Preference of Syngnathids in Tampa Bay and Charlotte Harbor, FL.** Thesis. (R/C-E-39)

Schmitz, C. (planned.) **Title to be Determined.** Thesis. (R/LR-B-47)

Weege, S.T. (in press.) **Preliminary Title: Differential Activity Budgets of Gag Grouper on Small and Large Patch Reefs in the Gulf of Mexico.** University of Florida. (R/LR-B-49)

VI. Florida Sea Grant Extension Publications

Crane, M. 2001. **Turtle Tracks - Sea Turtle Conservation in Miami-Dade County.** SGEF-141. (SGEP-12)

Florida Sea Grant Extension Program. 2001. **Venting - A Guide to Releasing Reef Fish with Ruptured Swimbladders.** SGEF-46. (SGEP-12)

Tavares, S., and M. Crane. 2001. **Don't Splash Your Trash ... Get a Grip on It!** SGEF-142. (SGEP-12)

VII. Extension Newsletters

Florida Bay Project Staff. 2001. Florida Bay Watch Report. (SGEP-12)
Mangroves in Florida Bay: Dying-Back (Again)? January 2001

Novak, R. 2001. In Charlotte County Extension Newsletter. (SGEP-12)
RedStart. Volume 15, Number 1, Page 5.
New Marine Newsletter. Volume 15, Number 4, Page 3.

Sweat, D. 2001. **Marine Times.** January-March, Volume 24, Number 1, April-June, Volume 24, Number 2. (SGEP-12)

VIII. Miscellaneous Staff Papers and Conference Proceedings

B. In Press or Submitted

Anderegg, D., R.E. Dodge, P.K. Swart, and L. Fisher. (in press.) **Barium Chronologies from Two Southeast Florida Reef Coral Species - an Index of Nutrient Enhancement.** in. Proceedings of the 8th International Coral Reef Symposium, Panama City, Panama, June, 1996. (R/C-E-33)

Antonini, G.A. (in press.) **Blueways Atlas for Sarasota Heritage Trails, Sarasota Bay National Estuary Program and Florida Sea Grant.** (E/CSC-2)

Balaban, M.O., S. Yeralan, and Y. Bergmann. (in press.) **Automated Quality Evaluation of Shrimp.** in. Proceedings of the 5th Computers in Agriculture Conference. (R/LR-Q-17)

Balaban, M.O., Y. Bergmann, S. Yeralan, and W.S. Otwell. (in press.) **Automated Quality Evaluation of Shrimp.** in. Proceedings of the 6th International Conference of Engineering and Food. (R/LR-Q-17)

Balaban, M.O., S. Yeralan, and Y. Bergmann. (in press.) **Computer Vision Determination of Shrimp Quality.** in. Proceedings of the Food Process Automation Conference III. (R/LR-Q-17)

Barkaszi, S.F. Jr., and W.R. Dally. (in press.) **Fine Scale Measurement of Sediment Suspension by Breaking Waves at Supertank.** in. Proceedings of the 23rd Conference of Coastal Engineering. (R/C-S-32)

Butler, M.J., W.F. Herrnkind. (in press.) **Spiny Lobster Recruitment in South Florida: Field Experiments and Management Implications.** in. Proceedings of the Gulf Caribbean Fisheries Institute. 40. (R/LR-B-26)

Butler, M.J. IV. (in press.) **Summary of the Workshop on Benthic Processes: Fifth International Lobster Conference and Workshop.** (R/LR-B-44)

Douligeris, C. (in press.) **Manual on Shoreline Remediation and Wetland Restoration.** (R/COE-1)

Douligeris, C. (in press.) **Oil Spill Conference Proceedings.** (R/COE-1)

Douligeris, C. (in press.) **Study of Gulf Coast Oil Spill Continency Plans with Respect to Remediation and Restoration.** Final Report. University of Miami: Department of Electrical and Computer Engineering. 104 pp. (R/COE-1)

Eklund, A.M. (in press.) **The Importance of Post-Settlement Predation and Reef Resource Limitation on the Structure of Reef Fish Assemblages.** in. Proceedings of the 8th International Coral Reef Symposium, Panama City, Panama. (R/LR-B-36)

Green, D.P., J.R. Maibaum, L.C. Boyd, and W.S. Otwell. (in press.) **Lactates Extend Shelf-Life of Fresh Blue Crab Meat.** Institute of Food Technology Convention Booklet. Journal of Food Science. (SGEP-10)

Havanonda, S., M.R. Marshall, W.S. Otwell, and C.I. Wei. (in press.) **Effect of pH, Ionic Strength and Storage Period on Phosphate-Treated Shrimp.** Institute of Food Technology Convention Booklet. (SGEP-10)

Ives, A., B. Baca, C. Douligeris, and E. Iakovou. (in press.) **Quantitative Pollution Risk Assessment Using a GIS Based System.** in. Proceedings of the 3rd International Ocean Pollution Symposium, Ft. Pierce, Florida. p. 18 (abstract). (R/COE-1)

Lapointe, B.E. (in press.) **The Physiology and Ecology of Harmful Macroalgal Blooms.** in. Proceedings of a workshop held at Snow Mountain Ranch, CO. (R/C-E-34)

Lapointe, B.E. (in press.) **Macroalgal Overgrowth of Fringing Coral Reefs at Discovery Bay, Jamaica: Bottom-up Versus Top-down Control.** in. Proceedings of the 8th International Coral Reef Symposium, Panama. (R/C-E-34)

Meltzoff, S.K. (in preparation.) **The Politics Behind Renovating the San Carlos Institute: Ethnic Identity Among Key West Cubans and the Reinvention of History**. (R/LR-E-11-PD)

Meltzoff, S.K. (in preparation.) **Tourist Myth and History of the Key West Cubans.** (R/LR-E-11-PD)

Milon, J.W., and A. Rimal. (planned.) **Substitution, Sequencing, and Starting Point Effects in Composite Good Valuation.** Working Paper. (R/LR-E-15A)

Moye, H.A. (in press.) **Opportunities for Pesticide Residue Analytical Methods Development: The Potential for Aqueous Extractions of Pesticide Residues from Fruits and Vegetables.** in. Proceedings of the 8th International Congress of Pesticide Chemistry: Options 2000. (R/C-E-38)

Otwell, S. (in press.) **Sanitation Control Procedures - A New Alliance Course for 2000.** 3rd International Association of Fish Inspectors 3 1999.

Pomponi, S.A., R. Willoughby, A.E. Wright, C. Pecorella, J. Lopez, and G. Samples. (in press.) **Development of an *in vitro* System for Production of the Ecteinascidins, Antitumor Compounds from the Tunicate, *Ecteinascidia Turbinata*.** in. Proceedings of the Congress on *in vitro* Biology. (R/LR-MB-1)

Pomponi, S.A., R. Willoughby, A.E. Wright, M.E. Kaighn, and P. Linley. (in press.) **Development of Techniques for *in vitro* Production of Bioactive Marine Natural Products.** in. Proceedings of the 1996 World Congress on *in vitro* Biology. (R/LR-MB-1)

Pomponi, S.A., R. Willoughby, A.E. Wright, C. Pecorella, S.H. Sennett, J. Lopez, and G. Samples. (in press.) ***In vitro* Production of Marine-Derived Antitumor Compounds.** In. Abstracts of the 4th International Marine Biotechnology Conference. (R/LR-MB-1)

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Rubec, P.J., S.G. Smith, M.S. Coyne, M. White, A. Sullivan, T. MacDonald, R.H. McMichael, Jr., M.E. Monaco, and J.S. Ault. (in press.) **Spatial Modeling of Fish Habitat Suitability in Florida.** in. Proceedings of 17th Lowell Wakefield Fisheries Symposium, Spatial Processes and Management of Marine Fish Populations. Alaska Sea Grant College, Fairbanks, Alaska. (R/LR-B-47)

Seaman, W., Jr. (in press.) **Planning Florida Estuaries: Bridging the Gap Between Science and Management**. in. R. Folit, (ed.) SARABASIS: Sarasota Bay Area Scientific Information Symposium. (M/PM-9)

Yeralan, S., M.O. Balaban, and E. Hamouda. (in press.) **Automated Quality Assessment of Shrimp.** in. Proceedings of the International Engineering and Management Systems Conference. (R/LR-Q-17)

----------. (in press.) **Proceedings of 52nd Gulf and Caribbean Fisheries Distitute Conference.** (PD99-12)

IX. **Fathom**

X. **Posters**

None

XI. **Videos**

Carr, W.E.S., W.H. Clark, and J. Nunez. (planned.) **Rock Shrimp Attraction to Odors and Traps: Collaboration with a Fishery to Develop Less Destructive Harvesting Methods.** (R/LR-B-41)

XII. **CD-ROM Releases**

None

XIII. **Software**

Ehrhardt, N. (planned.) **Evaluation of Shrimp Bycatch Impacts of Single Species Fishery Management Alternatives.** AFS Software Manual. (R/LR-B-37)

XIV. **Home Page**

Florida Sea Grant Home Page.

I. Florida Sea Grant Reports

National Seafood HACCP Alliance. 2000. **Sanitation Control Procedures for Processing Fish and Fishery Products.** Seafood HACCP Alliance Course - First Edition for Training and Education. SGR-119. (E/TP-1)

II. Florida Sea Grant Technical Papers

Antonini, G., N. West, C. Sidman, and R. Swett. 2000. **A Recreational Boater-Based Method for Re-designing the NOS Small-Craft Chart.** TP-107. (E/CSC-4)

Antonini, G.A., R. Swett, S. Schulte, and D. Fann. 2000. **Regional Waterway Management System for South Sarasota County.** TD-1 - Revised. (SAR-1)

Blake, N.J., C. Adams, R. Degner, D. Sweat, S. Moss, and Leslie Sturmer. 2000. **Aquaculture and Marketing of the Florida Bay Scallop in Crystal River, Florida.** TP-106. (R/LR-A-20)

Cato, J.C., and W. Seaman. 2000. **Science Serving Coastal Florida: Florida Sea Grant Delivering Results! 2000.** TP-104. (M/PM-12)

Sidman, C., A. Antonini, S. Sauers, G. Jones, and N. West. 2000. **Evaluating Recreational Boating Patterns at Selected Sites in Southwest Florida for Regional Anchorage Management.** TP-105. (E/CSC-3)

Smith, S., S. Jacob, C. Adams, G. Israel, G. Evans, J. Gates, and M. Zacks. 2000. **The Impacts of the Florida Net Ban on Commercial Fishing Families.** TP-101. (R/LR-E-17)

Swett, R.A., D.A. Fann, G.A. Antonini, and L.C. Alexander. 2000 **Regional Waterway Management System for Lee County, Phase 1.** TD-3. (E/CSC-4)

Swett, R.A., G.A. Antonini, and S. Schulte. 2000. **Regional Waterway Management System for North Manatee County.** TD-2 - Revised. (E/CSC-1, E/CSC-2)

III. Books and Book Chapters

Bortone, S.A. 2000. **Seagrasses: Monitoring, Ecology, Physiology, and Management.** CRC Press. Boca Raton, Florida. 318 pp. (PD-98-3)

Butler, M.J., IV, and W.F. Herrnkind. 2000. **Puerulus and Juvenile Ecology.** in. Spiny Lobster Management. B. Phillips, S. Cobb, and J. Kittaka (editors). Blackwell Press, Oxford. 15:276-301. (R/LR-B-50)

Cato, J.C., and C.A. Lima dos Santos. 2000. **Costs to Upgrade the Bangladesh Frozen Shrimp Processing Sector to Adequate Technical and Sanitary Standards and to Maintain a HACCP Program.** in. The Economics of HACCP: New Studies of Costs and Benefits. L. Unnevehr (editor). Eagan Press, St. Paul, MN. pp. 385-402. (M/PM-12)

IV. Journal Articles

Deyle, R.E., and R.A. Smith. 2000. **Risk-Based Taxation of Hazardous Land Development.** Journal of the American Planning Association. 66(4):421-434. (R/C-P-21)

George, S.B., J.M. Lawrence, A.L. Lawrence, and J. Ford. 2000. **Fertilization and Development of Eggs of the Sea Urchin *Lytechinus Variegatus* Maintained on an Extruded Feed.** Journal of the World Aquaculture Society. 31(2):232-238 (R/LR-A-21)

Jeedigunta, S., J.M. Krenisky, and R.G. Kerr. 2000. **Diketopiperazines as Advanced Intermediates in the Biosynthesis of Ecteinascidins.** Tetrahedron. 56:3303-3307. (R/LR-MB-6)

Lawrence, J.M. 2000. **Conflict Between Somatic and Gonadal Growth in Sea Urchins: A Review.** Workshop on the Coordination of Green Sea Urchin Research in Atlantic Canada Moncton, New Brunswick, Canada. 1-2 June 2000. (R/LR-A-21)

Paul, J.H., M.R. McLaughlin, D.W. Griffin, E.K. Lipp, R. Stokes, and J.B. Rose. 2000. **Rapid Movement of Wastewater from On-site Disposal Systems into Surface Waters in the Lower Florida Keys.** Estuaries. 23(5):662-668. (R/LR-MB-3)

Pitcher, T.J., and W. Seaman, Jr. 2000. **Petrarch's Principle: How Protected Human-Made Reefs Can Help the Reconstruction of Fisheries and Marine Ecosystems.** Fish and Fisheries. 1:73-81. (M/PM-12)

Ranamukhaarachchi, D.G., M.E. Kane, C.L. Guy, and Q.B. Li. 2000. **Modified AFLP Technique for Rapid Genetic Characterization in Plants.** Bio Techniques. 29(4):856-866. (R/C-S-36)

Sharp, W.C., W.A. Lellis, M.J. Butler, W.F. Herrnkind, J.H. Hunt, M. Pardee-Woodring, and T.R. Matthews. 2000. **The Use of Coded Microwire Tags in Mark-Recapture Studies of Juvenile Caribbean Spiny Lobster, *Panulirus Argus*.** Journal of Crustacean Biology. 20(3):510-521. (R/LR-B-50)

Willoughby, R., and S.A. Pomponi. 2000. **Quantitative Assessment of Marine Sponge Cells *In Vitro*: Development of Improved Growth Medium.** In Vitro Cell Development Biology-Animal. 36:194-200. (R/LR-MB-5)

V. Graduate Theses and Dissertations

Anastasiou, C.J. 2000. **Temporal Effects of Soil PH, Redox Potential, and Elevation on *Spartina Patens* Planted at a West Central Florida Salt Marsh Restoration Site.** Thesis. Department of Biology, University of South Florida. (AFAMS-2000)

Andorfer, John. 2000. **Physiological Integration and Translocation of Carbon and Nitrogen in the Seagrass *Thalassia Testudinum* Banks Ex König.** Dissertation. Department of Biology, University of South Florida. (AFAMS/OS-2000)

Boswell, M.R. 2000. **Redefining Environmental Planning: Evidence of the Emergence of Sustainable Development and Ecosystem Management in Planning for the South Florida Ecosystem.** Dissertation. Department of Urban and Regional Planning, Florida State University. (R/C-P-21)

Dolan, T.W. 2000. **Modeling Aggregation of Juvenile Caribbean Spiny Lobster, *Panulirus Argus*.** Thesis. Old Dominion University. (R/LR-B-50)

Enright, E. 2000. **cDNA Library Construction in *Axinella Corrugata (=T. Morchella)*.** Non-Thesis agree. Florida Institute of Technology. (R/LR-MB-5)

Glancy, T.P. 2000. **A Comparison of Seagrass, Oyster Reef, and Salt Marsh Edge as Habitat for Decapod Crustaceans.** Thesis. Department of Fisheries and Aquatic Sciences, University of Florida. (R/LR-B-46)

Hepner, T.L. 2000. **Effect of El Niño (1997-98) on the Peninsular Gulf Coast of Florida.** Thesis. Department of Geology, University of South Florida. (PD-98-8)

Hill, S. 2000. **Effects of Abiotic and Biotic Stress on the Energy Budgets of *Arbacia Punctualata* and *Lytechinus Variegatus* (Echinodermata: Echinoidea).** Dissertation. Department of Biology, University of South Florida. (R/LR-A-21)

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IX. Fathom

X. Posters

None

XI. Videos

None

XII. CD-ROM Releases

None

XIII. Software

None

XIV. Home Page

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VIII. Miscellaneous Staff Papers and Conference Proceedings

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IX. **Fathom**

X. **Posters**

None

XI. **Videos**

None

XII. **CD-ROM Releases**

None

XIII. **Software**

None

XIV. **Home Page**

Maintain University of Puerto Rico Sea Grant Home Page.

Maintain Southern Regional Home Page (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina) not released.

Maintain the Southwest Florida Non-Regulatory Anchorage Management Program Home Page.

Maintain the National Sea Grant Display Calendar.

Florida Sea Grant Home Page.

Florida Bay Home Page.

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IV. **Journal Articles**

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IX. Fathom

X. Posters

None

XI. Videos

None

XII. CD-ROM Releases

None

XIII. Software

None

XIV. Home Page

Maintain University of Puerto Rico Sea Grant Home Page.

Maintain Southern Regional Home Page (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina) not released.

Maintain the Southwest Florida Non-Regulatory Anchorage Management Program Home Page.

Maintain the National Sea Grant Display Calendar.

Florida Sea Grant Home Page.

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IX. Fathom

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X. Posters

None

XI. Videos

The Science of Florida Bay (SGEP-11)

XII. CD-ROM Releases

None

XIII. Software

None

XIV. Home Page

Maintain University of Puerto Rico Sea Grant Home Page..

Maintain Southern Regional Home Page (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina) not released.

Maintain the Southwest Florida Non-Regulatory Anchorage Management Program Home Page.

Maintain the National Sea Grant Display Calendar.

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IX. Fathom

Quarterly Magazine. Special Issue: Florida Boating. SGEB-31. Vol. 7, No. 3. 1996. Florida Sea Grant College Program. Gainesville: University of Florida. 21 pp. (COMM-3)

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X. **Posters**

None

XI. **Videos**

None

XII. **CD-ROM Releases**

None

XIII. **Software**

None

XIV. **Home Page**

Maintain University of Puerto Rico Sea Grant Home Page.

Maintain Southern Regional Home Page (Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina) not released.

Florida Sea Grant Home Page.

GS:2001pubs.wpd

7.0 STUDENTS

Introduction

Florida Sea Grant does not "teach" or "graduate" students in the tradition of an academic department. However, funding and support for graduate students is provided in many academic departments statewide through FSG research projects and with student fellowship and scholarship programs. One of FSGs ten management goals keeps student support high. An evaluation of all FSG student programs is currently underway, and by early of 2002, a major report on the accomplishments and achievements of the students supported will be published. Some limited data are presented here.

Beginning in the early-1980s, a decline occurred in the number of students supported by federal Florida Sea Grant funds. This decline began and continued during the "tough" federal budget years for Sea Grant when overall federal Sea Grant appropriations were cut (1981) with recovery not really beginning until the mid-1980s. University funding in Florida also suffered during that time and faculty writing Sea Grant (and other granting agency) proposals included summer salaries to protect employment, at the expense of funding that was formerly used for graduate students. Because of the high priority within Florida Sea Grant for student support, corrective action was taken to reverse the decline in student support.

Graduate Student Support

Sea Grant Project Funding

Beginning in 1993, Florida Sea Grant adopted the policy that, at minimum, 25 percent of the Florida Sea Grant federal research budget would be used to support graduate students. Beginning in 1998, Florida Sea Grant research project funding guidelines indicated that the inclusion of graduate students in proposals would give the proposal a competitive edge, assuming all other review criteria were satisfactory. This policy has been followed since, and funding has been short of the goal only one time, in 1996 (see Table 1).

Table 1. Florida Sea Grant federal funds used for graduate student support, 1993-2001.

Graduate Student Funding	1993	1994	1995	1996	1997	1998	1999	2000	2001
As Percent of Research Funds	40	31	31	24	27	36	30	30	27
As Percent of All Funds	19	13	13	12	13	17	15	14	14

Private Funding

To alleviate the reliance on student support from federal funds, and as an opportunity for private industry to support marine education, a campaign was initiated to provide private funding for graduate students through Florida Sea Grant. Results have been significant.

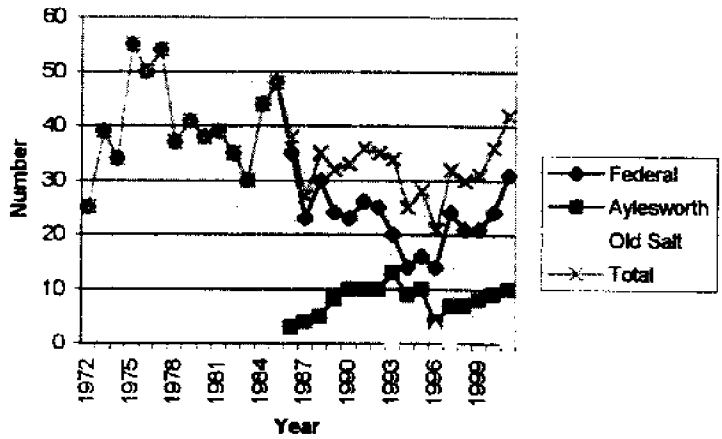
Aylesworth Foundation for the Advancement of Marine Sciences. This program began in 1986. In its 15-year history, 66 students in nine Florida universities have received these prestigious Sea Grant managed and privately funded scholarships. With a total commitment to date of $379,974, the average scholarship is $5,757 over a student's M.S. or Ph.D. program.

Old Salt Fishing Club Scholarship. This program began in 1993 and is funded from the proceeds of a fishing tournament. Only students at the University of South Florida are eligible. Nine students have received a total of $22,850 or an average of $2,538 per student.

Results

The overall impact of these efforts has been to create an increasing trend in the total number of graduate students supported since 1996 (the lowest year ever). For 2001, a total of 42 graduate students are receiving some support, the largest number since 1986 (see Figure 1).

Figure 1. Students receiving full or partial support from Sea Grant programs during a year.



A total of 182 students have completed an M.S. or Ph.D. degree since 1986, using support from these three programs. The year 2000 yielded the most at 20 completed degrees. Fifty-eight degrees are in process (see Table 2). Thesis and dissertation titles for the students from 1996 to 2000 are shown in Section 6.0 (Publications). The list is almost complete with about eight abstracts yet to be added to the list of titles.

Table 2. Number of students by type of Sea Grant support graduating with a M.S. or Ph.D. degree, 1986-2000[a].

	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	Total[b]	In Process
Federal Sea Grant	4	10	7	8	9	8	11	16	5	7	5	10	11	9	14	134	40
Aylesworth Foundation	0	1	2	3	1	3	6	5	2	5	2	4	3	2	4	43	14
Old Salt											2	1	1	0	1	5	4
Total	4	11	9	11	10	11	17	21	7	12	9	15	15	11	20	183	58

[a] Does not include undergraduate, non-thesis or post-doctoral students supported.
[b] 71% are M.S. degrees. 28% are Ph.D. degrees.

A large number of academic disciplines have also been supported. Students graduating with some type of Sea Grant support since 1986 come from 37 different academic departments. For illustrative purposes, these have been grouped to represent 21 academic disciplines. Of the 191 total, 53 majored in biology, 29 in engineering, 22 in food science and human nutrition and 20 in marine sciences, to represent the four largest disciplines (see Table 3). For the Aylesworth Foundation students, of 48 graduated students for which data are available, 15 are pursuing additional educational degrees, 15 are working in industry, 10 are university employees, 7 are involved in government research and one is a high school teacher (see Table 4).

Table 3. Number of students by academic discipline and type of Sea Grant support graduating with a M.S. or Ph.D. degree, 1986-2000.

	Federal	Aylesworth[a]	Old Salt	Total
Biology	34	17	2	53
Chemistry	3	2		5
Coastal Management		1		1
Environmental and Occupational Health	3			3
Environmental Sciences		2		2
Fisheries and Aquaculture	8	2		10
Food Science and Human Nutrition	15	7		22
Economics	5			5
Engineering	25	4		29
Horticulture	1			1
Geography	4			4
Geology	2	1		3
Journalism		2		2
Law	4			4
Marine Botany			1	1
Marine Science	14	4	2	20
Urban and Regional Planning	4	1		5
Oceanography	9	4		13
Pharmacology & Therapeutics	2			2
Soil and Water Science	1			1
Zoology		5		5
Total	134	52	5	191

[a] Includes some undergraduate students.

Table 4. Current or last known occupations of graduate students receiving Sea Grant/Aylesworth Foundation for the Advancement of Marine Sciences support since 1986.

Employer	Number	Type of Work
High School Teacher	1	Biology
University	10	Assistant or Associate Professor, Lab Technician, etc.
Government Research	7	State or Federal Agency Research Laboratory
Industry/Private Organization	15	Research Companies, Aquaculture Farms, Food Companies, etc.
Pursuing Additional Education	15	M.S., Ph.D. or Medical School Students
Total	48	

Undergraduate Student Support

A new, also privately funded, scholarship program began in 1997 through a donation of $25,000 from the Charles Skoch family to Florida Sea Grant. Annual interest on the endowment will fund a $1,000 per year scholarship. The first scholarship was awarded in 1998. In this program, a high school senior

student is selected through marine-science related project competition in Florida Annual State Science and Engineering Fair as conducted by the Florida Foundation for Future Scientists. It is a one-year "jump-start" award for the freshman year in college for the student. The student must enroll in a Florida university. The first year recipient attended UCF and subsequent recipients have attended UF, Stetson and UWF.

Sea Grant Special Competitions

Annually, the National Sea Grant College Program conducts several special student competitions. Florida Sea Grant is an active participant in these competitions.

Knauss Marine Policy Fellowship. Florida Sea Grant did not actively participate in this program until 1982. Since that time, Florida Sea Grant students have been awarded 26 Knauss Fellowships. Active participation in just 18 years of the 29 year-old program has netted remarkable results. Florida Sea Grant now ranks 7th among all programs in winning Knauss Fellowships. Fellows, years and institutions are shown in Table 5.

Table 5. John A. Knauss Marine Policy Fellowship winners sponsored by Florida Sea Grant, 1982-2001.

Year	Student	University
1982	Wim J. Teetfelen	UWF
1983	Mary M. Overbey	UF
1984	Marcus J. Hepburn	FSU
1985	Martin B. Main	FIT
	Vernon Leeworthy	FSU
1986	Stewart E. Holm	FIT
	George Townsend	FIT
1987	Marine Bortman	FIT
1988	James A. Witkowski	FIT
1989	John L. Wickham	FIT
1991	Elizabeth Moore	FIT
	Mark C. Eakin	UM
1992	Wade Bryant	UF
1993	Heather L. Weiner	UF
	Susan Boa	FSU
1994	Peter Barile	FIT
	Mark Brown	UF
1995	Sidney W. Thurston	FIT
	Lynette Cardoch	UM
	Michael Devin	HBOI
1996	Adelaide Rhodes	UWF
1997	Camille Sewell (withdrew)	FIT
1999	Jennifer Rahn	UF
2000	Lillian Becker	FAU
2001	Christopher Yates	UF
	Eileen Alicea	UM
	Audra Livergood	UM

Sea Grant Industrial Fellows. Florida Sea Grant won one of four original three-year Industrial Fellows Program awards in 1995. The post-doctoral student completed the program in 1997.

1995 Maria Sparsis FIT

NOAA Coastal Services Center Fellowship. One Florida student won one of seven NOAA Coastal Services Center Fellowships (competed through the National Sea Grant College Program network) in 1996. This two-year fellowship placed the student in the Massachusetts Coastal Management Program.

1996 Christopher D. Cornelisen FIT

NMFS Marine Economics and Population Dynamics. Florida Sea Grant has not forwarded a candidate in this competition, first begun in 1999 at the national level.

Results

Florida Sea Grant has had remarkable results in securing private funding for graduate student support and in the Knauss Marine Policy Fellowship competition. Our goal is to increase the number of applicants in the industrial fellows, NOAA Coastal Services Center fellows and NMFS fellows competitions.

8.0 PROGRAM AWARDS

The following awards represent a sample of the awards presented to various Florida Sea Grant affiliated faculty during 2000.

Gus Antonini Robert Swett Charles Sidman David Fann	Received a statewide Leadership Award (one of three) from the Florida Council on Sustainable Florida. They were recognized during a statewide awards ceremony in mid-2000 and by the Governor and Cabinet in late November, 2000.
Craig Aubrey	Named Taylor County Employee of the Quarter for activities related to boating safety on the Steinhatchee River. (Summer, 2000)
LeRoy Creswell	Received J.M.Wallace Award in recognition of lifetime achievement in promoting research, understanding and coordination among shell fisheries scientists, culturalists, managers, producers, and regulators. (April, 2000)
Chris Combs	Appreciation Award from Brevard County Board of County Commissioners for service on Brevard County Employee Advisory Board. (2000)
Joe Halusky (now retired)	Received William Q. Wick Visionary Leadership Award from National Assembly of Sea Grant Extension Program Leaders. (October, 2000)
Donald Jackson	Received Award from Agriculture Communicators in Education for Distant Learning Graduate Course WIS 6934, Management and Operations of National Resource Organizations. (July, 2000)
William "Bill" Mahan	A Certificate of Appreciation – from Bay, Franklin, Gulf, Healthy Start Coalition for work and support of the program as the Franklin County Coalition Chairman. (June, 2000)
	A Certificate of Appreciation – from the Chapman Elementary School for in providing school enrichment programs to the school, 4-H/DOT Seat Belt Safety, 4-H/Tropicana Public Speaking and the Butterfly Development Program. (May, 2000)
John Stevely	Certificate of Appreciation from Sarasota Sports Angler Club in recognition of efforts to promote fish conservation through use of fish venting techniques. (November, 2000)

Leslie Sturmer	Certificate of Appreciation from the U.S. Department of Agriculture, Cooperative State Research, Education, and Extension Service. For outstanding service to the shellfish industry and U.S. Department of Agriculture agencies as a leader in developing the nation's first ever federal crop insurance pilot program for a sector of the U.S. aquaculture industry. (May, 2000)
	Superior Accomplishment Award. UF Agriculture and Natural Resources Faculty Service. (2000)
Donald Sweat	Achievement Award from the St. Petersburg Pier Aquarium Board of Directors for serving on Board. 2000
	Service Award from St. Petersburg Pier Aquarium for serving as Tournament Director for Kid's Fishing Tournament. (2000).
	Received certificate of appreciation from the Citrus County Academy of Environmental Science. (2000).

9.0 OUTREACH ACTIVITIES

This section contains a brief description of outreach activities organized into four areas: (1) major program activities, (2) major program plans of work, (3) web pages and (4) monthly summaries. The reader should note that this section reports activities, not impacts. Impacts are noted in section 2.0 of this document as accomplishments and benefits, and are reported under specific goals and tasks. This section contains only summary information to highlight major areas of outreach activity.

Major Program Activities

Many of the most successful outreach activities represent "programs" of work. That is, they are much more than one major workshop or conference. The "program" may utilize research faculty or research findings, may involve several methods of outreach technology or may represent a series of workshops. All these elements are reflected during major activities ongoing during 2000. Several examples follow.

Marine Biotechnology

To complement its ongoing core of research in this field, Florida Sea Grant organized technical exchanges among faculty, graduate students and industry and facilitated efforts to secure legislative support of marine biotechnology research, training and development. FSG convened the Florida Marine Biotechnology Summit II immediately after the annual BIOFlorida conference, in order to engage industry interests. Further, FSG organized a plenary session on marine biotechnology research advances at the BIOFlorida conference, thus educating about 100 business representatives on computer-based technologies in this subject. FSG convened an ad hoc statewide faculty committee to promote initiatives to enhance marine biotechnology research, training and development. The two FSG communicators attended a media biotechnology update at the University of Florida. The FSG associate director continued as a member of the board of directors of BIOFlorida and was appointed to the nationwide Marine Biotechnology theme team of the Sea Grant network.

Hard Shell Clam Production

Hard shell clam production is the fastest growing segment of Florida's aquaculture industry. From 1995, this industry tripled clam sales from $5.4 million to $16 million. Over 430 aquatic farmers are involved in this industry. Florida Sea Grant (FSG) has a major program with this industry. Several 2000 highlights include:

Revising a two-page brochure on clam farming in Florida, containing information on culture components, leases, status and the shellfish aquaculture extension program.

Publishing *Shellfish Aquaculture* that was sent to 673 producers, nursery operators, suppliers, wholesalers, distributors in 11 countries, as well as to state agency representatives, elected officials, and community leaders.

Contributing a column on shellfish aquaculture for *Waterworks*, a quarterly newsletter highlighting UF/IFAS aquaculture programs, with a statewide mailing list of 3,460.

Collaborating with the Florida Department of Agriculture and Consumer Services (DACS) to conduct the 4th annual Hard Clam Industry meeting that focused on product quality and marketing issues to over 60 industry members.

Conducting 4 sanitation workshops for 28 shellfish processing plant owners and staff where they received training and Seafood HACCP Alliance sanitation certification.

Hosting the Florida Clam Crop Insurance School, sponsored by the National Crop Insurance Services where 42 reinsured company field supervisors and loss adjusters learned about Florida's clam industry. Florida was a pilot state allowing clam aquaculturalists to become eligible to purchase federally subsidized crop insurance at reasonable rates. Due to poor growing conditions from La Nina weather phenomenon and hurricane damage, over 100 claims were filed in 2000, with over $1,020,000 in indemnity (loss) payments made to growers in Dixie and Levy counties.

Working on a water quality initiative with UF researchers and DACs staff in which the U.S. Dept. of Agriculture provided $860,000 for a four-year period to develop a Clam Lease Assessment, Management, and Modeling using Remote Sensing (CLAMMRS), a real-time water quality monitoring system for the clam industry.

MarinaNet

As an outgrowth of the Sea Grant MarinaNet project, the Marina Education and Research Committee (MERC) was created to address the education and research needs facing the marina industry. A meeting was held in Baton Rouge in February 2000 to review the status of the projects identified at the final 1999 MarinaNet Task Force meeting. Several projects were recommended to the Marina Industry for future consideration. An Economic Protocols/National Study will establish a methodology for developing a forecasting model for data collecting and analysis; it will also develop a series of protocols for implementing a national study. A Marina Signage Project would develop a CD and website that provides marinas in the US with a standardized set of sign templates for all marina services offered. A Marina Innovative Technology Board will be established to review emerging environmental products (a Consumers Report for the marine industry). A Clean Marina Program National Conference will be conducted in 2002. Regional Pollution Prevention Programs similar to those developed by Washington State will be created. In light of this recommendation, a Florida Sea Grant Staff member attended a regional meeting in South Carolina to discuss Florida's Clean Marina Program. A MarinaNet product written by Florida Sea Grant, *The Panic File for Marinas,* continues to be popular with the industry and is in its second printing. Finally, FSG received funds in 2000 that will be used to deploy 10 low power radio units at various marinas to demonstrate the effectiveness of technology to convey information to boaters. Implementation will take place in 2001.

Clean Marina Program

Florida Department of Environmental Protection and Florida Sea Grant personnel teamed up to produce a series of workshops on Clean Marinas. The curriculum and assembly of literature and materials for handout and show during workshops were responsibilities of Florida Sea Grant. After attending the workshop, the marina operator conducts a "self-assessment" to determine what Best Management Practices (BMPs) are in place and which BMPs need to be adopted in order to qualify for "Clean Marina Designation". A Florida Sea Grant extension agent, a representative from the local marine industries association and a DEP person from that local district do the verification of completion of the program. Marinas completing the program become a certified clean marina. To date, 20 marinas have received clean marina designation, with 100 in various stages of the process. A similar program for Florida's boatyards will be conducted in 2001.

Florida Bay Outreach

Florida Sea Grant continued to assist the "Florida Bay Community" of nine state and federal agencies that are investing millions of dollars in research on issues in Florida Bay. During 1997, Florida Sea Grant opened its Florida Bay Education Office in Tavernier, Florida. This program was

designed to implement the "outreach" component of the overall Florida Bay program. Funded by NOAA/NOS, it represented one of the few examples nationally where Sea Grant and other elements of NOAA were participating in a defined outreach program. Sea Grant Extension educators in this program wrote newsletters, conducted public workshops, wrote profiles for public distribution on each research project, and assisted in the Florida Bay Sea Grant Florida Bay Research radio station, which provided research stories about Florida Bay at a location on U.S. 1 in the Florida Keys, passed daily by 23,000 motorists.

The Florida Bay Education Program continued during 2000. The intent of this project is to educate both scientists and citizens on the massive research effort by about 15 agencies to understand the dynamic ecosystem processes on-going in Florida Bay, and how this new knowledge can be used to manage and improve the water quality of the Bay. A total of 35 research project profiles (in English and Spanish) have been completed and distributed, and are available on the Florida Sea Grant website. NOAA/NOS decided not to continue its support for 2001. Alternative funds are being sought to continue the project. More detail on this project is presented in Section 2.0, task 6.1.

Urban Bay Water Management

Work continued during 2000 to provide science-based regulatory assistance, industry benefits and educational products for both agencies and citizens in promoting a self-regulatory system for boating management in Florida. FSG is a pivotal player in this area. In 1997, FSG developed a standardized regional waterway management system that included GIS data (boats, depths, moorings, facilities, signs), analytical techniques and policy recommendations to assist in waterway management decisions. In 1998, the state adopted these protocols, leading to enactment of the Inland Waterway Management Law. Several selected 2000 program highlights include:

Publishing 5000 copies of *A Historical Geography of Southwest Florida Waterways* and distributing them to all public libraries in Florida, all elected officials, regional governments, Dept. of Environmental Protections district offices and boater volunteers.

Developing a *Recreational Boater-Based Method for Re-designing the Small-Craft Chart*. This NOAA-funded project evaluated recreational boating patterns for a regional anchorage management system. The study was published as FSG Technical Report 105.

Completing a cost analysis and comparison of four navigational dredging projects for the West Coast Inland Navigation District (WCIND). WCIND will use this in its regional management decisions in project development.

Finishing a management analysis of 335 miles of waterways and initiating a boat and signage census of waterways in Lee County.

Providing two workshops to over 40 governmental officials and staff on Manatee and Lee County Management projects that focused on channel restrictions, boat accessibility and potential management applications.

Marine Ornamentals '99 and '01

Florida Sea Grant co-sponsored with about five other Sea Grant programs, the First International Marine Ornamentals Conference '99 in November in Hawaii. About 300 marine ornamental fish harvestors, shippers and environmental group representatives attended. Tropical fish is the largest culture industry in Florida, but less than 10% is marine species. The goal is to reduce wild harvest of marine tropical fish from coral reef areas worldwide, and through research, learn how to culture these species for market replacement. Up from zero two years ago, six of Florida Sea Grant's ten active

aquaculture research projects focus on marine ornamental species. Florida Sea Grant is organizing and hosting the Second International Marine Ornamentals Conference in 2001 in Orlando. Ten Sea Grant programs are contributing to the conference, along with seven agency and industry hosts.

International Activities

Florida Sea Grant is a strong believer in international programs. Faculty are encouraged to become involved when (1) the activity will be helpful to Florida residents (have an impact at home), (2) provide future opportunities to Florida residents, and (3) there is sufficient (sometimes new extramural) funding to support the activity.

The data below show the general activities of extension and research faculty supported by Florida Sea Grant, and also those activities of the program managers, as of October 2000. During the past three years, eight faculty members have been involved in international programs for a total of 403 days. Purposes have included:

Web site development & operation	Puerto Rico
Sponge and fisheries management	Cuba
Artificial reefs	Italy
Artificial reef evaluation	Global
Economics of seafood safety	Italy/England
Seafood safety, HACCP	Argentina, Brazil
Shrimp culture	Nicaragua, Honduras, Costa Rica, Guatemala
Estuarine biology	Russia
Monitoring reefs	Belize

Eleven faculty members and students are currently involved, for a total of 552 days. The purposes include:

Marine ranching	Korea
International coastal cleanup	U.S.
Shrimp industry revitalization	Nicaragua
Impact on Florida of renewed trade	Cuba
Science fairs	Russia
Lobster biology & management	Caribbean-wide
Shrimp safety	Central America

Eight or more faculty members will be involved during the next three years. The purposes will include:

Artificial reefs, GIS database	England & Global
Reef evaluation workshops	Global
Pectinid conference	Chile
Science fair development	Russia
Impact on Florida of post embargo Cuba	Cuba
Shrimp culture	Central America
HACCP	Central America
Marine ornamentals conference	over 25 countries
Sponge research	Belize

Major Program Plans of Work

The long range planning of the Florida Sea Grant Extension Program is carried out under the University of Florida Extension Service's four year plan of work. Every four years, this planning process defines the future needs of the Extension Service (ES). This four year plan is then updated annually through the annual plan of work. In the fourth year, a new Four Year Plan of Work is developed.

FSGEP proposals are developed as a part of the overall Florida Sea Grant College omnibus proposal. Two, three or four year proposals are developed as appropriate. Much of the material for the proposal is taken from the Extension Service Planning effort. FSGEP faculty plans are also integrated into the overall Florida Sea Grant College Program's long range planning process, which helps link research and extension program priorities and programs.

Florida Sea Grant Extension relies heavily on local county and regional advisory committees for identifying program needs, strategic planning and priority setting. Each off-campus faculty has one or more advisory committees to guide the development of their Annual County Plan of Work (CPOW). These CPOWs are then compiled into a State Major Program which is coordinated by each program design team. The design team is usually chaired by an on-campus Sea Grant specialist with expertise in this subject area. The process is:

- Sea Grant County or Regional Advisory Committees provide needs evaluation.
- Sea Grant County Plans of Work are developed.
- Sea Grant County Plans of Work are integrated into Sea Grant State Major Programs.
- State Major Programs are coordinated/implemented by Sea Grant Program Design Teams.
- Quarterly reports of accomplishment are reported by county faculty and specialists.
- Annual Narrative Reports of Accomplishment are submitted for each faculty member.
- State Major Program Reports are developed for CE and Sea Grant.
- Sea Grant County or Regional Advisory Committees give feedback on accomplishments.

Six State Major Programs (SMPs) are in effect for 1998-01. They evolved from the 1995 Annual Staff Meeting. Changes since then include the incorporation of the Sea Grant marine aquaculture State Major Program into the aquaculture State Major Program of the University of Florida Fisheries and Aquaculture Department. They will now be conducted as one State Major Program. This will intensify academic support for the program through the expertise of the faculty in that department. The Marine Education Program has been integrated into the University of Florida 4H Program's Environmental Education Program. This will give the program effort additional resources and a broader base from which to develop programs. The six SMPs in effect during 2000 are below.

- Seafood and Aquaculture Product Quality and Safety
- Coastal Environmental and Water Quality
- Coastal/Marine Recreation/Tourism & Waterway Management
- Sustainable Marine Fisheries
- Marine Aquaculture
- Marine and Coastal Environmental Education

These major program areas have statewide coverage and represent about 65 percent of the educational effort of faculty. The goals and tasks relating to outreach in Section 2.0 result from the planning efforts described above. The remaining 35 percent of faculty time is used for emerging issues, responding to stakeholder questions and dealing with important marine issues that arise outside the six major program planned areas. SMPs are evaluated, updated and annual objectives are planned at the annual staff meeting in October each year.

Web Pages

Features of the Florida Sea Grant web site have been upgraded and are now more user-friendly than ever before, and regular site maintenance ensures that current material is available. Individual pages for Sea Grant faculty and staff have been added to broaden access to personnel, and, in the case of marine agents, have facilitated links to county web sites related to their work. Similarly, a consistent effort has been mounted to establish direct links to Sea Grant partners and collaborators. Publications and presentations are also regularly published on the site. One example is the Internet Directory of Marine Education and Research Organizations in Florida, an electronic update of a previous Sea Grant publication that now links browsers directly to institutional web sites. Administratively, the web site is now routinely used for interactive forms that relate to requests for proposals in the grant application process. In addition, work began on a web-based photographic digital archive to serve agents, specialists and research collaborators, scheduled to premier in 2001.

Florida Sea Grant maintained an Anchorage web site during the year featuring boater friendly information, with emphasis on Southwest Florida. New materials were added during the year as project personnel submitted them. This web site is scheduled to transition in 2001 to a private server, following negotiations for revamping its contents through a different software program.

Quarterly Summaries

All outreach activities are too extensive to report in this document. In fact, it is a real accomplishment to maintain communication among our far-flung off-campus outreach faculty, who are separated by almost 1,000 miles at the extreme of the range (Pensacola – Key West). As an internal communication tool, each person provides highlights of their past activities as well as future planned activities. This is done on a quarterly basis. These reports are then compiled and placed on the Florida Sea Grant web page. Past quarterly reports can be found at this website: www.flseagrant.org.

10.0 SELF EVALUATION

One of the requirements of the new National Sea Grant College Program "Performance Benchmarks for Evaluation" is that Sea Grant College programs conduct an ongoing program assessment or "self evaluation" on an annual basis. Florida Sea Grant has conducted an on-going and annual self evaluation for many years.

Since the late 1980s, the then Provost and Vice President for Academic Affairs (to whom Sea Grant reports) required an annual self evaluation of each academic unit at the University of Florida. Each year, both programmatic and administrative goals were established and agreed upon by the Provost and Sea Grant Director. At the end of each year, progress toward meeting each goal was measured and reviewed by the Provost. Copies of this document were always sent to the National Sea Grant Office (NSGO).

In 1996 a new UF Provost was appointed and the evaluation procedure was revised. Another new Provost was appointed in 1999, and the process was partially revised again. Now, each year the Provost meets with the management staff of each program or academic unit under the direction of the Provost (e.g., Sea Grant). Prior to the meeting, the Provost requests a ten page summary (due one week prior to the meeting) with a focus on topics as requested by the Provost (e.g., student programs, international activities, goals for the next year). The document and any issues are discussed during the meeting. About ten people are involved. Florida Sea Grant is represented by the director, associate director, assistant director for extension, director of communications, fiscal officer and administrative assistant. The Office of the Provost is represented by the provost, associate provost, associate provost for distance education, budget director and others, depending on the topics to be discussed.

During 1997, the NSGO published its "Performance Benchmarks for Evaluation," requiring an annual report. Many of the former measures of performance used for the Provost and the new reporting process are now incorporated into the annual report to NSGO. Others remain and are still used internally by Florida Sea Grant to self evaluate certain functions. These are included as one part of the self evaluation section of this document. The entire annual NSGO progress report is also now given to the Provost and other university administrators to assist in the annual evaluation of Florida Sea Grant.

Other opportunities are also used to evaluate Florida Sea Grant. This includes participating in University of Florida exercises which "connect" to Sea Grant and using a University of Florida evaluation process to evaluate administrators. Evaluations conducted during 2000 are reported in this section.

The following sections reflect our self evaluation for 2000.

1. Programmatic Measures of Performance
2. Administrative Measures of Performance

Programmatic Measures of Performance

1. **Earn larger percentage increase in our biennial federal Sea Grant budget than the average increase for all 30 Sea Grant Programs.**

   A. The National Sea Grant Office is currently changing the way budgets are allocated among the Sea Grant Programs. Our 1997-2000 budgets were "frozen" at 1996 prorated levels. Future funding allocations will be based on "competitive" program evaluations instead of the summation of "individually competitive" research project and extension proposal competitions. The process is

currently being developed and the first competitive program allocation will occur in 2002, based on a spring 2000 Program Assessment Team visit. The overall evaluation of the National Sea Grant Office was to place Florida Sea Grant in Category I, the highest ranking possible. This allowed Florida Sea Grant to maintain its original merit allocation of $100K, plus receive an additional merit increase of $25K for 2002-2005.

B. Program Assessment Team -- Florida Sea Grant hosted its first Program Assessment Team visit in April 2000, and was the 16th program nationally to be reviewed (first of eight in 2000) by this process. Florida Sea Grant was ranked significantly higher in this evaluation when compared to the other one-half (15 of 29) of all Sea Grant programs nationally that have been reviewed. Florida Sea Grant received an Excellent (1.0) in all four categories as shown in the following table. The mean for 1998 (eight programs) was 2.0 and for 1999 (seven programs) was 1.6. It is significant that ten of the fifteen universities Florida is compared with are members (as is the University of Florida) of the American Association of Universities. A few programs may be ranked as high as Florida Sea Grant, but none can be ranked higher!

Table 1. National Sea Grant Performance Evaluations Summary of Evaluation Ratings for 1998 and 1999 and Ratings for Florida 2000 [a].

Criteria	Long Range Planning	Managing for Success	Connecting with Users	Producing Significant Results	Overall Evaluation Ratings 1=Highest 4=Lowest
1998					
Range	1-4	1-4	1-3	1-2	1-3
Mean	2.6	2.4	1.5	1.3	2.0
N=8[b]					
1999					
Range	1-3	1-2	1-3	1-2	1-3
Mean	1.7	1.6	1.3	1.4	1.6
N=7[c]					
2000 Florida [d] [e]	1.0	1.0	1.0	1.0	1.0

Sources: Annual Performance Report, National Sea Grant College Program, Washington, DC, August 2000, and Florida Sea Grant evaluation letter, May 4, 2000.

a. This evaluation is performed by an external Program Assessment Team of government, academic and industry members, appointed by the National Sea Grant College Program Office. Written materials are prepared for the team and a week-long visit is held both on-campus and with stakeholders statewide.
b. Programs reviewed were the University of Hawaii, Massachusetts Institute of Technology, University of Minnesota, Mississippi/Alabama Sea Grant Consortium (Auburn, Mississippi State, etc.), North Carolina State University, University of Rhode Island, University of Southern California and the University of California, San Diego (Scripps).
c. Programs reviewed were the South Carolina Sea Grant Consortium (Clemson, et al.) University of Washington, Texas A & M University, University of Illinois/Purdue, University of Michigan, New Jersey Marine Sciences Consortium (Rutgers, et al.), University of Virginia.
d. Eight Sea Grant programs will be evaluated throughout 2000. The University of Florida was first, in April 2000. Summary rankings for the 2000 group will not be available for comparison with Florida until summer 2001.
e. It is significant that ten of the fifteen universities Florida is compared with are members (as is the University of Florida) of the American Association of Universities.

C. National Sea Grant Initiatives -- Florida Sea Grant also measures its success rates in national competitions. These competitions normally occur every other year, with most of them occurring during 1999. They will occur again in 2001, and FSG's success will be reported in the 2001 annual progress report.

2. **Develop Florida's position of leadership in ocean and coastal subject areas to promote the flow of information for marine resource development and management and expand the funding base to build a responsive marine academic resource capability.**

A. Building Academic Capability -- Florida Sea Grant continued during 2000 to create statewide expertise in marine biotechnology. Beginning in 1998, the Committee to Advance Marine Biotechnology Research and Education in Florida was formed. The effort has grown and has produced the following efforts:

- During 2001, two bills (S296; H111) were introduced into the Florida legislature to create the Marine Biotechnology Research and Education Program, with annual funding of $2M. The program would be jointly administered by Florida Sea Grant and the state's Florida Marine Research Institute of the Florida Fish and Wildlife Conservation Commission. While both bills passed most committees, they were tabled without passage, along with 16 other bills that involved new appropriations. The 2001 legislature in fact, cut statewide university appropriations for 2001-02. It was a tough budget year in Florida.
- 2000 efforts also paid off with the creation of a "virtual" marine biotechnology academic department. A published document (Florida Sea Grant Technical Paper - 110, March 2001) represents the first census of Florida's strong and productive network of collegiate faculty involved in research and education in Marine Biotechnology. It was compiled in autumn 2000, thanks to the efforts of an ad hoc committee and the campus coordinators for Sea Grant. Those individuals include: P. Anderson, UF; N. Blake, USF; J. Cato, UF; R. Dodge, NSU; N. Ehrhardt, UM; K. Haddad, FMRI; J. Fourqurean, FIU; W. Jeffrey, UWF; D. Hanisak, HBOI; R. Kerr, FAU; J. Lin, FIT; K. Leber, MML; B. Mashburn, NSU; N. Marcus, FSU; C. Rafalski, UWF; J. Paul, USF; L. Robinson, FAMU; S. Pomponi, HBOI; A. Rossi, UNF; W. Seaman, UF; P. Walsh, UM; G. Tolley, FGCU; L. Walters, UCF.

  This initial listing identifies 78 faculty. For each, areas of scientific expertise and research and teaching focus are described. Further, potential applications and benefits to Florida are indicated. The first publicity of this material was at the Florida Marine Biotechnology Summit II, held October 16-17, 2000. From that meeting came the concept of establishing an electronic network to link faculty, students, laboratories and classrooms across Florida. This document is the starting point for such a network. For an electronic version, go to the website www.flseagrant.org.

3. **Evaluate the relevance of Florida Sea Grant priorities (Repeated from 1999 annual progress report).**

A. The University of Florida Cooperative Extension Service developed a statewide survey during early 1999 to assess citizen's perceptions of the importance of selected issues and educational needs as related to their community. Florida Sea Grant was able to suggest questions for the survey, which was completed in April 1999 with a precision level of ± 5 percent.[1] The survey provided information regarding the percentage of Floridians ranking highly certain areas as priority educational needs.

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[1] Jacob, S., W.R. Summerhill and L.A. Arrington. 1999. Self-Identified Educational Needs of Florida Citizens. Fact Sheet PE-1-99. Florida Cooperative Extension Service. University of Florida.

- Among the top ten (of 45 possibilities) educational needs, prevention of water pollution (#2; 72.4%) and protecting the marine environment (#9; 63.7%) are highly ranked.
- Among educational needs (of 6) in health, nutrition and food safety, restaurant and commercial safe food handling (#1; 59.1%) is the highest ranked.
- Among environmental educational needs (of 8), prevention of water pollution (#1; 72.4%), protecting the marine environment (#2; 63.7%) and water recreation and safety (#4; 53.5%) are highly ranked.

A comparison of these educational needs with Florida Sea Grant research and extension ten-priority goals clearly indicate that the priority program areas are on target with the educational needs of Florida citizens. The ten goals are:

1. **Economic Leadership**
   - Goal 1: Create Products and Processes from Florida's Coastal Resources Using Marine Biotechnology
   - Goal 2: Determine Production and Management Techniques Which Make Florida's Fisheries Sustainable and Competitive
   - Goal 3: Develop the Food and Hobby Segments of Florida's Marine Aquaculture Industry
   - Goal 4: Improve the Product Quality and Safety of Florida's Seafood Products
   - Goal 5: Increase the Economic Competitiveness and Environmental Sustainability of Coastal Water-Dependent Businesses

2. **Coastal Ecosystem Health and Public Safety**
   - Goal 6: Protect and Enhance Coastal Water Quality and Safety
   - Goal 7: Protect, Restore and Enhance Coastal Ecosystem Habitats
   - Goal 8: Prepare and Respond to Coastal Storms

3. **Education and Human Resources**
   - Goal 9: Produce a Highly Trained Workforce
   - Goal 10: Create a Scientifically and Environmentally Informed Citizenry

Finally, 9.2 percent of Florida's citizens indicated they had received information from Extension. Of these approximately 1,400,000 Floridians, 6.6 percent (top ranked) indicated receiving information in marine sciences. This percentage was higher than those receiving information in agriculture or horticulture, wildlife, forestry or fisheries, family and consumer sciences, 4-H/youth, community or public affairs and energy conservation. Even while being one of the smaller programs in Extension, Sea Grant Extension is being effective and is focused on the coastal areas where 80% of Florida's population resides.

4. Fully engage in regional and national projects.

A. During 2000, Florida Sea Grant was an active participant in at least nine different research or extension projects or activities in which each participant was investing funds. These are presented below in summary form.

Regional Sea Grant projects or activities in which Florida Sea Grant research, extension and communications faculty are involved during 2000.

	Project	Sea Grant Partner/Agency Partner/Industry Partner
1	Seafood Hazard Analysis & Critical Control Point (HACCP) Education and Training Program. Continuing as Seafood Alliance for Continuing Education and Technology Transfer. Over 10,000 industry and regulatory personnel trained to date nationwide. Florida is lead partner for project. (ongoing during 2000)	Florida (UF); Virginia (VPI); Oregon (OSU); Alaska (UA); Louisiana (LSU); California (UCD); North Carolina (NCSU); Association of Food & Drug officials (plus six regional chapters); U.S. Food & Drug Administration (USFDA), NMFS; Interstate Shellfish Sanitation Conference; USDA Cooperative Research, Education & Extension Service/National Fisheries Institute; National Food Processors Association
2	Marine Ornamentals '01 Conference. Florida is organizing co-chair of Steering Committee. Conference will be in Florida. (Planning began in early 2000.)	Florida (UF); Hawaii (UH); Virginia (UVA); Texas (TAMU); Maryland (UM); Oregon (OSU); Mississippi/Alabama (MASG); Louisiana (LSU); North Carolina (NCSU); New York (SUNY-SB); Florida DACS, Division of Aquaculture; FAO Fisheries; Florida International University; Tropical Aquaculture Lab (UF); The Living Seas EPCOT; Tropical Fish Hobbyist Magazine; Ornamental Fish International
3	Cultured Techniques for Marine Ornamental and Consumable Fish: A Better Larval Diet? (ongoing during 2000)	Florida (FSU); Texas (UT)
4	Ecophysiological Assessments of Critical Juvenile Fish Habitat: Applications for Stock Enhancement and Habitat Conservation. (ongoing during 2000)	Florida (MML); North Carolina (NCSU); Texas (TAMU)
5	Regional Patterns of Habitat Use by Juvenile Blue Crabs: Assessing the Relative Importance of Alternate Habitat Types in Florida and North Carolina. (ongoing during 2000)	Florida (UF); North Carolina (NCSU)
6	Assessment of Sea Urchins as Fishery and Aquaculture Candidates in the Gulf of Mexico. (ongoing during 2000)	Florida (USF); Mississippi/Alabama (USM)
7	National Sea Grant Marina Network: Enhancing the Economics and Environmental Sustainability of the Marina Industry. (ongoing during 2000)	Florida (UF); Oregon (OSU); New Jersey; Louisiana (LSU); Texas (TAMU); Michigan (MSU)
8	Invasive Species and Ballast Water Management in the Gulf of Mexico Region. (ongoing during 2000)	Florida (UF); Texas (TAMU); Louisiana (LSU); Mississippi/Alabama (AU, MSU)
9	A National Invasive Aquatic Plant Outreach/Research Initiative. (ongoing during 2000)	Connecticut (U.Conn); Minnesota (UM); Illinois-Indiana (P); North Carolina (NCSU); Florida (UF)

Measures Of Accountability: Administrative

Certain administrative objectives will be met which will ensure that the overall administrative goal can be achieved. They are:

1. **Long range planning documents in both research and extension will be maintained/updated as appropriate, to enable the development of highly competitive proposals and insure that Sea Grant programs do not duplicate other academic programs.**

   A. The Florida Sea Grant Strategic Plan: 1998-2001, guided two two-year Florida Sea Grant research proposal competitions for 1998-99 and 2000-01 projects. It also guided four year proposals for Extension, Communications and Management. The call for two-year research proposals (for 2002-03) and the need for new four-year Extension, Communications and Management proposals (for 2002-05) was issued at the beginning of 2001. This required the development of a new four-year Strategic Plan for 2002-2005. This plan was developed during 2000, used in the 2002-03 request for core proposals, and formally printed in early 2001.
   B. Florida Sea Grant also continued its noted annual implementation plan for 2000. This is the third year of this process. The program accomplishments and benefits section of this 2000 Annual Progress Report is based on the 2000 implementation plan. Specific objectives scheduled for completion in 2000 are contained in section 2.0, and accomplishments and benefits under each goal are reported. Beginning 2001, this document will be called FSG's annual work plan.

2. **Enhance the visibility of Sea Grant, the University of Florida, and the State University System and provide service statewide, regionally and nationally by participation on boards of both academic and non-academic interests.**

Selected Examples
(of Director and Associate Director)

A. International

   1. Artificial Reef Conference: Converting Unused Ships and Structures to Enhance Ocean Environments. San Diego Oceans Foundation. July 12-15, 2000. Invited luncheon speaker, "So Much Ocean, So Many Questions, So Little Time." (Seaman)
   2. International Symposium on Marine Ranching Toward 21st Century. Ministry of Marine Affairs and Fisheries, Republic of Korea. November 20-26, 2000. Invited keynote speaker, "Evaluating Human-made Reefs for Economic, Engineering and Ecological Performance." (Seaman)
   3. National Fisheries Research Development Institute, Pusan, Korea, November 17, 2000. "The Sea Grant University-Advancement of Marine Fisheries and Habitat Science." (Seaman)
   4. Organizing Co-chair of the 2nd International Conference on Marine Ornamentals 2001: Collecting, Culture and Conservation, scheduled for Orlando, Florida in November 2001. (Cato)
   5. Lead principal investigator on a USAID funded project to promote the economic validity and access to credit financial systems for the Nicaragua shrimp industry. (Cato)

B. National

   1. Chair, External Relations Committee, Sea Grant Association. (Cato)

C. State

1. Member, Board of Directors, Florida Institute of Oceanography, USF. (Cato)
2. Member, Board of Directors and Executive Committee of BOD, The Florida Aquarium, Tampa. (Cato)
3. Member, Board of Directors, Florida Ocean Alliance. (Cato)
4. Member, Board of Directors, Aylesworth Foundation for the Advancement of Marine Sciences, St. Petersburg. (Cato)
5. Member, Board of Directors, BIO+Florida. (Seaman)

3. Provide faculty and cooperators with an efficient, understandable and streamlined administrative structure in order to expedite research, education, and extension programs.

A. A Faculty Progress Report is written bi-monthly and distributed via our campus coordinators at 15 locations to about 700 faculty members. The report is also available on our web page (www.flseagrant.org) and covers faculty and student funding opportunities and other items of information for faculty and students. For several years, all national and Florida Sea Grant funding opportunities have been advertised via our web page and all proposal guidelines and forms are available there for faculty use and downloading. For the last three funding cycles, Florida Sea Grant has accepted pre-proposals and interim and final reports via email.

B. A quarterly Sea Grant Extension report is also published and distributed statewide. This document provides accomplishments during the preceding quarter and plans for the next quarter, for each of the Sea Grant Extension major program areas, e.g., marine aquaculture. The report also highlights major activity in communications, marine education, legislative and government interactions and staff development. Finally, new faculty (to Extension) are highlighted and upcoming workshops and conferences are announced. This document is distributed electronically and via the website at www.flseagrant.org.

4. Work closely with the National Sea Grant Office, NOAA, to insure that Florida's program is competitive and responsive to national priorities.

A. Florida Sea Grant continues to evaluate NSGO drafts of program evaluation guidelines and other documents. Constructive comments are always provided. During proposal preparation, Florida Sea Grant develops a detailed "proposal notebook" for our NSGO program monitor and reviews that information with the monitor on an ongoing basis, both by telephone and through personal visits to Washington, D.C.

5. Maintain personal professional skills and reputation by publishing, making presentations or organizing academic activities. At least two each will be performed by the Director and Associate Director.

a. Allemand, D., E. Debernardi and W. Seaman. 2000. Artificial reefs for the protection and enhancement of coastal zones in the Principality of Monaco. Pp. 151-16 in: A.C. Jensen, K.J. Collins and A.P.M. Lockwood, eds. Artificial reefs in European seas. Kluwer Academic Publishers, London.
b. Seaman, W., Jr., editor. 2000. Artificial reef evaluation – with application to natural marine habitats. CRC Press, Boca Raton, 246 pp.
c. Seaman, W., Jr., and A.C. Jensen. 2000. Purposes and practices of artificial reef evaluation. Pp. 1-19. in: W. Seaman, Jr., ed. Artificial reef evaluation. CRC Press, Boca Raton.
d. Pritcher, T.J., and W. Seaman, Jr. 2000. Petrarch's Principle: how protected human-made reefs can help the reconstruction of fisheries and marine ecosystems. Fish and Fisheries 1: 73-81.
e. Seaman, W., Jr. and J. Whitehouse. 2000. Florida Sea Grant: A resource for marine educators. Florida Sea Grant Fact Sheet SGEF-123. 2 pp.

f. Seaman, W. 2000. Evaluating human-made reefs for economic, engineering and ecological performance. Pp. I-xiv in Soon Kil Yi, ed. Proceedings of the International Symposium on Marine Ranching Toward 21st Century, Ministry of Marine Affairs and Fisheries, Republic of Korea, Seoul.

g. Cato, J.C. and C.A. Lima dos Santos. 2000. Costs to upgrade the Bangladesh frozen shrimp processing sector to adequate technical and sanitary standards and to maintain a HACCP Program. In *The economics of HACCP: costs and benefits*, L. Unnevehr, ed. St. Paul, MN: Eagan Press. Pp. 385-402.

h. Cato, J.C. 2000. "The economics of seafood safety and quality and HACCP implementation in world seafood markets." In *Proceedings of the 3rd international fish inspection and quality control conference*. Halifax, Nova Scotia, Canada. In Press

i. Cato, J.C. 2000. "Annual Conference of the Florida Ocean Alliance. "Ocean Economics Sector in Florida." Presentation. Miami, Florida.

6. Develop an Investigator Profile to ensure that Florida Sea Grant funded faculty represent diversity and all academic ranks and that at least 25 percent of the research faculty in each biennial core program proposal did not receive funds during the preceding two years.

These data indicate that this goal was achieved for 2000-2001 research projects.

	2000-2001	
	Number	Percent
Total Number of Investigators Receiving Funding	44	27
Investigators[a] Receiving Funding in the Previous Two-Year Core Program	12	27
Investigator[a] Profile		
Male	35	80
Female	9	20
Investigator[a] Academic Rank		
Professor	12	27
Associate Professor	13	30
Assistant Professor	7	16
Post-doc	2	5
Other[b]	10	23

[a] Includes Principal Investigators, Co-Principal and Associate Investigators.
[b] Includes such academic titles as senior scientists (at research labs), lawyers and veterinarians (at professional schools), etc.

Florida Sea Grant core proposal competitions also remain highly competitive. During 1999, for projects beginning in February 2000, a total of 88 proposals reviewed resulted in 17 funded projects as shown below.

Number of proposals submitted and funded, core proposal competition, 2000-2001 two-year cycle.	
Regular (core) proposal competition	2000-2001
Preproposals received	88
Full proposals requested	39
Full proposals received	36
Proposals funded	17 (19%)

7. **Conduct an ongoing evaluation process to determine the effectiveness of Sea Grant management.**

   A. Florida Sea Grant participates in a formal University of Florida process that evaluates administrators using input from both inside and outside the university. Every three years an evaluation form is sent to 30-50 individuals who rank the administrator. The responses are then summarized and reviewed by the administrator and their supervisor. Positive evaluations are reinforced and suggested areas for improvement are discussed and plans made for improvement in these areas. The forms focus on leadership skills, communication skills, management of personnel and resources and overall performance in fulfilling the mission and goals of the organization, i.e., Florida Sea Grant.
   B. Jim Cato, Director, was evaluated in mid-1997 by the Provost. Forty-five survey forms were sent to a sample of campus coordinators, National Sea Grant Office personnel, Sea Grant research faculty, extension/communications faculty and other UF administrators. Sixty percent (27) of the forms were returned for the evaluation.
   C. Bill Seaman, Associate Director, was evaluated during mid-1998. Fifty-seven survey forms were mailed with a 51% return rate used in the evaluation. This represented input from campus coordinators, National Sea Grant Office, research faculty, extension/communications faculty, Florida Sea Grant administrators and representatives of agencies, industry and stakeholders.
   D. Marion Clarke, Sea Grant Extension Program Coordinator, (now retired), was evaluated during fall 1998. Survey forms were sent to 47 individuals representing Sea Grant extension and communications faculty, Sea Grant Administration, Extension administration, academic department chairs, and National Sea Grant Office. A total of 31 forms (66%) were returned and the results were reviewed jointly with Dr. Clarke by the Sea Grant Director and Dean of the Cooperative Extension Service.
   E. No evaluations were scheduled for 2000. The Director will be evaluated during 2001.

11.0 ADVISORY PROCESS

The Florida Sea Grant College Program uses a multi-layered advisory process involving a number of advisory committees. These committees, both permanent and ad-hoc, provide valuable advice on both programmatic direction and administrative function and processes. Each committee will be described along with a list of the members of each committee. In addition, Figure 1 provides a schematic representation of how these committees provide input into the research, Extension and communications functions of Florida Sea Grant. Figure 2 provides detail on their advisory input according to the administrative level of Florida Sea Grant.

Programmatic (State Level)

Overall Strategic Planning/Priority Setting

Every four to six years, Florida Sea Grant engages in an in-depth strategic planning process. This provides overall programmatic guidance to Florida Sea Grant research, communications and extension priorities and ultimately results in the Florida Sea Grant strategic plan. The strategic plan is then adjusted each two years based on the input of leaders of the overall strategic planning process, until it is time to repeat the in-depth process once again.

Florida Sea Grant's Strategic Plan addresses issues that are important both nationally and in Florida, and reflects the input of hundreds of Floridians representing academia, government, industry and citizens. This plan defines Florida Sea Grant's strategic issues within the context of a number of strategic planning activities. First, it builds on seven Florida Sea Grant statewide workshops in 1996, involving hundreds of faculty, agency, industry and citizen participants. The priorities developed through this process were updated for this 2002-2005 strategic plan. They are presented within the context of the National Sea Grant Network Plan: Coastal and Marine Resources for a Sustainable Economy and Environment 1995-2005, which in turn defines overall Sea Grant issues at the national level within the context of NOAA's Strategic Plan: A Vision for 2005. The plan also considers Florida Sea Grant's role in Florida through participation in the development of Florida's Ocean Strategies, a 1999 planning process completed by the Florida Governor's Ocean Committee, and a follow-up Florida ocean research priority agenda being developed in 2000-2001. Finally, the plan also considers Florida Sea Grant's role in research, education and extension through participation in the Florida FIRST strategic planning process of the Institute of Food and Agricultural Sciences (IFAS) at the University of Florida. This latter involvement allows Florida Sea Grant priorities to consider land-based actions that affect the coast, activities along the shoreline, bays and estuaries, and ocean priorities in planning its research, education and extension goals.

Advisory Board/Campus Coordinators

The Florida Sea Grant College Program is established as a Type I Center of the State University System of Florida. Type I Centers are created when at least two of the ten public universities in the State University System are involved in an academic program with statewide coverage. Each Type I Center is managed by a host campus on behalf of the participating universities in the Center. The Director of each Center reports to the Vice President for Academic Affairs of the host campus. Each Type I Center has an advisory board with a member from each university appointed to the board by the President of each institution. For Sea Grant, several private universities and non-profit laboratories participate in the program. Thus, at the invitation of Florida Sea Grant, each private university also nominates a member to the advisory board.

Florida Sea Grant calls this group its "Campus Coordinators". They meet at least biennially, and usually annually, depending on the need and advice of the group. The Campus Coordinators provide

programmatic direction as well as administrative direction regarding the way the Sea Grant program is operated. Florida Sea Grant Management requests their input on such major issues as whether to do annual or biennial proposals, how the review process is organized, and on operational issues including how best to communicate with 700-800 faculty statewide interested in Sea Grant. All maintain on-campus e-mail or hard mail mailing lists for communicating with faculty regarding calls for proposals and distributing Florida Sea Grant's bi-monthly Faculty Progress Report. The membership at the end of 2000 is given below.

Florida A&M University - Larry Robinson
Florida Gulf Coast University - Greg Tolley
Florida Atlantic University - Russell Kerr
Florida Institute of Technology - Junda Lin
Florida International University - James Fourqurean
Florida State University - Nancy Marcus
Harbor Branch Oceanographic Inst. - Dennis Hanisak
Mote Marine Laboratory - Ken Leber
Nova Southeastern University - Brenda Mashburn
University of Central Florida - Linda Walters
University of Florida - William Seaman
University of Miami - Nelson Ehrhardt
University of North Florida - Kelly Smith
University of South Florida - Norman Blake
University of West Florida - Carol Rafalski

Aquatic Food Products Laboratory

Based on a private fund raising effort throughout the early 1990s, led by the Florida Sea Grant seafood extension specialist and Sea Grant Director, private funds and state matching funds provided enough construction capital to build a new Aquatic Food Products Laboratory at the University of Florida. The lab opened in 1997. The laboratory provides research lab space and teaching space for industry workshops on seafood safety, quality and technology. The lab is managed by the Florida Sea Grant seafood extension specialist with an advisory committee established to guide its programs and activities. The committee, which is international in nature, meets on a 12-18 month schedule. The membership is below. It is currently being revised and will be restructured in 2001.

ABC Research, Dr. William L. Brown, Gainesville, FL
Air Products and Chemicals, Inc., Mr. Richard Reider, Allentown, PA
Aylesworth Foundation, Robert and Dawn Aylesworth, St. Petersburg, FL
Bayside Shellfish, Inc., Roger R. Newton, Apalachicola, FL
Beaver Street Fisheries, Inc., Mr. Harry Frisch, Beaver Street Fisheries, Inc., Jacksonville, FL
Bee Gee Shrimp, Mr. Byron W. Bailey, Lakeland, FL
Bio-Cide International, Inc., Al Reeves, Norman, OK
BK Ladenburg, Dr. Wolfgang Schneider, Postfach, Germany
Mr. Horst Wendt, Simi Valley, CA
Budenheim, Dr. Karlheinz Dorn, Dr. Rainer Schnee, Budenheim, Germany
Captain Mike's Fresh Fish & Seafood, Inc., Mike and Judy Abrams, Davie, FL
Chemie Research & Manufacturing Co., Inc., Elizabeth & Franz Harich, Casselberry, FL
Cox's Wholesale Seafood, Inc., Steve Cox, Tampa, FL
Cultor Food Science, Ariella Gastel, New York, NY
Darden Restaurants, Inc., Dee Clingman, Ms. Patty DeYoung, Orlando, FL
Pinellas Seafood, Jack O'Neil, St. Petersburg, FL
Diversey Corporation, Mr. Eric S. Deerwester, Livonia, MI
Ecolab, Inc. - Klenzade, Dr. Bruce Cords, St. Paul, MN
FMC Corporation, Karen M. Kowalewski, James Ballard, Princeton, NJ

Food Management Consultants & Associates, Inc., Mr. Tom G. Ambrosia, Burnsville, MN
General Mills Foundation, Dr. Reatha Clark King, Minneapolis, MN
Gold Kist, Inc., Mr. H.O. Chitwood, Paul G. Brower, Atlanta, GA
Golden Dipt Company, Arthur L. Douty, III, Jim O'Leary, St. Louis, MO
Harbor Branch Oceanographic Institution, Mr. David E. Vaughan, Ft. Pierce, FL
Harbor Seafood, Inc., Mr. Peter Cardone, New Hyde Park, NY
Kash N' Karry Food Stores, Ron Brown, Tom Petrillo, Kenneth Whitmire, Tampa, FL
Keys Fisheries, Inc., Gary Graves, Keys Fisheries, Inc.,
King & Prince Seafood Company, Dr. Domiciano Broce, Bob Brubaker, n-Brower Company Des Plaines, IL
Leavins Seafood, Inc., Grady and Alice Leavins, Apalachicola, FL
Lombardi's Seafood, Inc., Tony Lombardi, Jr., Orlando, FL
The J. Willard Marriott Foundation, Robert E. Arnold, Donald B. Grim, Kay Bodeen, Marriott International Corp., Washington, DC
Richard E. Marriott, Bethesda, MD
The Martin-Brower Company, Daniel J. Adzia, The Marti, Barney Barnett, Lakeland, FL
Monsanto Company, Nancy C. Stachiw, Sharon Bull, St. Louis, MO
National Fisheries Institute, Lee Weddig, Roy Martin, Bob Collette, Arlington, VA
Publix Supermarkets, Inc., George W. Jenkins Foundation, Inc., Barbara O. Hart, Lakeland, FL
Clip Hopkins, Jacksonville, FL
Carol Jenkins Barnett
Rhône-Poulenc, Inc., William E. Swartz, Richard Kennedy, Jim Elfstrum, Fred Bender, Dr. Kenneth Lewis, Cranberry, NJ
Rich-SeaPak Corp., Frank W. Holas Foundation, Frank W. Holas, St. Simons Island, GA
Sanofi Bio-Industries, Inc., James M. Carr, Donald H. Combs, Waukesha, WI
Save On Seafood Co., Gib Migliano, St. Petersburg, FL
Seacliff Seafoods, Inc., Jolene M. DiMaggio, Wilmington, CA
Shaw's Southern Belle Frozen Foods, Inc., Howard Shaw, Jacksonville, FL
Silliker Laboratories Group, Inc., Dr. Russell Flowers, Silliker Laboratories Group, Inc., Chicago Heights, IL
Singleton Seafood Co., Jesse Gonzalez, Don Toloday, Bernie Gilly, Nina Burt, Tampa, FL
Southeastern Fisheries Association, Bob Jones, Tallahassee, FL
Standard Marine Supply Corp., James B. Hardee, Jr., Tampa, FL
National Sea Products, Ltd., Treasure Isle, Herb Oakes, Lunenburg, N.S. Canada
Turner Food Corporation, John C. Norris, Punta Gorda, FL
Wilson/Seafresh Seafood, Inc., Donny Wilson, Apalachicola, FL

Marine Biotechnology

Based on the 1996-1997 strategic planning process, marine biotechnology became a priority for Florida Sea Grant. Not only did the research faculty express a high level of interest, they advised Florida Sea Grant to engage in more marine biotechnology outreach and extension. They also identified the need for a Florida-wide assessment of needs and limiting factors for overall research and education capabilities in marine biotechnology. In April 1997, Florida Sea Grant organized a half-day roundtable discussion of invited academic and agency representations. The consensus was that Florida Sea Grant initiate efforts to build capabilities statewide.

The first priority for follow-up to the roundtable was formation of the six-member Committee to Advance Florida Marine Biotechnology Research and Education. This group was convened by FSG and drafted a prospectus for building financial sponsorship of academic programs, thereby establishing a pool of independent funds for the most meritorious research (including matching Sea Grant budgets) and training. It is working on behalf of an informal group of scientists from major institutions across the state. This is the first such effort in Florida, in order to raise the state's international capabilities, profile

and credibility. As appropriate, we seek to emulate the few states where funding is dedicated to academic marine biotechnology programs, from legislative or industry sources.

This ad-hoc advisory group (now with members) continues to stay active in advising Florida Sea Grant how to achieve its statewide goal. It meets by conference call and is called the Committee to Advance Florida Marine Biotechnology Research and Education.

Peter Anderson, Professor and Director, University of Florida, Whitney Laboratory, St. Augustine, FL
James Fiore, Life Science Group, Boca Raton, FL
Russell Kerr, Professor, Florida Atlantic University, Dept. of Chemistry, Boca Raton, FL
Shirley Pomponi, Division Director, Harbor Branch Oceanographic Institution, Ft. Pierce, FL
William Seaman, Professor and Associate Director, Florida Sea Grant College Program, University of Florida, Gainesville, FL

Marine Ornamental Fish

During 1998 the Sea Grant Programs nationwide endorsed aquaculture as a high priority area. Within that, marine ornamental aquaculture is receiving extra attention. Because of the potential for this industry in Florida, and due to the fact that Florida is the nation's leading freshwater tropical fish state, marine ornamentals are a high priority. Florida Sea Grant was a co-sponsor of the November 1999, Marine Ornamentals '99 Conference in Hawaii. Accordingly, and following the success achieved with a focused advisory group in marine biotechnology, during late 1998 discussions began with interested individuals from the tropical fish industry in establishing an industry advisory committee. The committee was established and first met twice in 1999 and again during 2000. This advisory committee provides the roots for Florida Sea Grant to aid in the development of the marine ornamental culture industry while at the same time ensuring the environmental compatibility of the wild captive segment of this industry. The members are:

Ilze Berzins, Curator of Animal Health & Research, Florida Aquarium,Tampa, FL
Ray Davis, Curator, Sea World, Orlando, FL
Roy Herndon, President, Sea Critters, Dover, FL
Denise Petty, Veterinarian, Segrest Farms, Gibsonton, FL
Marty Tanner, President, Aquatica Tropicals, Inc., Plant City, FL 33566
Jeff Turner, President, Oceans, Reefs and Aquariums, Inc., Ft. Pierce, FL

Sea Grant Extension Advisory Committees Programmatic (County Level)

Each Sea Grant Extension off-campus faculty member at the county level has an advisory committee. These committees usually meet at least twice each year. They provide direct input into the faculty members annual work plan and program direction. They also provide guidance in assisting the faculty members in evaluating the success or impact of the educational effort for the previous year. Each faculty member's plan of work then provides input into the state major programs designed for the statewide Sea Grant Extension Program. The state major programs then become the priority educational themes of the Sea Grant Extension Proposal as part of the overall Florida Sea Grant College Program. While a major proposal for Sea Grant Extension is developed every four years, the plan within Florida is revised every year to take advantage of the advisory committee input.

The off-campus faculty and their advisory committees are listed below.

Craig Aubrey (Taylor)

Tom Baumgardener - Buckeye Cellulore
Clay Bethea - Buckeye Cellulore
Aaron Hendry - Retired

Lonnie Houck - Recreational Fisherman
Carl Jeffery - Recreational Diver, Fisherman
Pat McGriff - Charter Captain
Mike McKinney - Software Engineer
Mark Dickeert - Citizens Bank of Perry

Chris Combs (Brevard County)

Mr. David Bates - President, Fleet Marine, Inc., Port Canaveral, FL
Mr. Robert Day - Project Scientist, Indian River Lagoon National Estuary Program, St. Johns River Water Management District, Melbourne, FL
Mr. Clarry Edwards - Chairman, Brevard Marine Advisory Committee, West Melbourne, FL
Mrs. Sandra Hines - Park Ranger, U.S. National Park Service, Canaveral National Seashore Headquarters, Titusville, FL
Mr. Doug Jaren - President, Banana River Marine Services & Marina, Merritt Island, FL
Mrs. Andrea Leibzeit - IMCOPEX America, Inc., Melbourne, FL
Mr. Frank Sewell - President, Tropical Seafood/Aquaculture, Cocoa, FL
Mr. Rodney Thompson - President, Cape Canaveral Shrimp Co., Inc., Dixie Crossroads Seafood Restaurant, Titusville, FL
Paul Williams - Wilbro U-Pic Farms, Palm Bay, FL

Marella Crane (Dade County) - Hired in 2000. Advisory Committee to be re-established.

LeRoy Creswell (St. Lucie County) - Hired in 2000. Advisory Committee to be re-established.

Andrew Diller (Escambia County) - Hired in 2000. Advisory Committee to be re-established.

Doug Gregory (Monroe County)

Tina Brown - Marathon, FL
Richard Hanson - Islamorada, FL
Karl Lessard - Gulf of Mexico Fishery Management Council, Marathon, FL
John Magursky - Islamorada Charter Boat Association, Key Largo, FL
Ron Meyers - Little Torch Key, FL
George Niles - Summerland Key, FL
Bennett Orr - Marathon OFF Chapter, Marathon, FL
Monroe County Commercial Fishermen, Marathon, FL
Mike Sands - Bama Sea Products, Key West, FL
Capt. Jim Sharpe - Summerland Key, FL
Greg DiDomenico
Simon Stafford - Lower Keys OFF Chapter, Key West, FL
Bill Wickers - Key West Charter Boat Asociation, Key West, FL

Joe Halusky (Nassau, Duval, St. Johns, Putnam, & Clay County) – Retired in 2000. Position to be filled in 2001. Advisory Committee to be re-established.

L. Scott Jackson (Okaloosa/Walton counties) Hired in 2000. Advisory Committee to be established.

William T. "Bill" Mahan (Franklin County)

Polly Edmiston, Apalachicola High School Science Department
Anita Gregory, Executive Director, Apalachicola Bay Chamber of Commerce
Van Johnson, Director, Franklin County Solid Waste Department

Woody Miley, Director, Apalachicola National Estuarine Research Reserve

Rich Novak (Charlotte County)

Bruce Laishley, Laishley's Marine World, Partner in SWD, Partner in Palm Yamaha
Jerry Tremblay, Past President of the Charlotte Marine Research Team, Regional Director for Disabled Outdoorsmen of Florida, Board of Directors for the Punta Gorda Isles Fishing Club
Captain Ralph Allen, Owns and operates the Kingfisher Fleet out of Fisherman's Village, teaches several fishing classes and writes a fishing column for the Charlotte Sun Herald
Gene Kingery, Past President of the Charlotte County Chapter of the Coast Conservation Association of Florida, Organizes two fishing tournaments for the CCA
Frank Hemmema, Fishin' Franks Bait and Tackle Shop, Weekly fishing show on cable television, "Wishin I Was Fishin' with Fishin' Frank"
Jim Joseph, Fantasea Scuba, Teaches the First Aid, CPR and 02 Provider classes
Stan Swast , Shoal Marine, Commercial fisherman, blue and stone crabbing, shrimping, and lobster diving guide, clam farmer
Pete McLewin, President of the Punta Gorda Fishing Club, Active volunteer in artificial reef program

John Stevely (Manatee, Sarasota & Collier Counties)

Buddy Watts - City of Bradenton Beach
Bill Ireland - Coastal Conservation Association
Pat Wilcox - Trailer Estates
Charlie Hunsicker - Ecosystems Manager
Jonathan Davis - Fishing Guide
Larry Borden - Scuba Diver
Clayton Robertson - Conservation Consultants, Inc.
Diane Murray - SBNEP
Jim Cutway - Scuba Quest
Greg Fagan - Manatee County Parks and Recreation
Gail Cole - Mayor, Bradenton Beach
Kevin Lausman - Coastal Conservation Association
Joe Burnhard - Manatee County Sheriff's Department
Jack Gorseman - Manatee County Environmental Management Department
James Zacharis - Fishing Guide
Karen Bell - Bell Fish Company
Rick Meyers - Manasota Fish & Game Association
Todd Barber - Reef Balls, Inc.
Sheila Mora - Sigma Inc.
Bob Fluke - Manatee County Environmental Management Department
Wayne Hamblen - Trailer Estates
Jack Wieler - Boaters World

Leslie Sturmer (Multi-County Aquaculture)

Ricky Cooke, Cooke's Oysters and Seafood, Cedar Key, Clam Farmer, Project OCEAN Graduate, Nursery Operator, Wholesaler, Retailer
Pam Colson, Suwannee, Clam Farmer, Project OCEAN Graduate, Member of Dixie County Aquaculture Task Force
Bill Delaino, Cedar Key, Clam Farmer, Nursery Operator
Jerry Fulford, Cross City, Clam Farmer, Treasurer of Hidden Coast Shellfish Producers Association
Paul Ridaught, Old Town, Clam Farmer, Member of USDA/FSA Advisory Committee
Harriet Smith, Harriet Smith Clams, Cedar Key, Clam Farmer, Project OCEAN Graduate, Wholesaler, Member of Levy County Aquaculture Task Force

Dan Solano, Cedar Key Aquaculture Farms, Inc., Cedar Key – Clam Farmer, Hatchery & Nursery Operator, Seed Supplier, Wholesaler
Shawn Stephenson, Yankeetown, Clam Farmer
Carole Strobach, Bag Lady, Inc., Suwannee, Clam Farmer, Project OCEAN Graduate, Equipment Manufacturer, FL Aquaculture Association Board Member
Rick Viele, Rick's Seafood, Inc., Cross City, Shellfish Dealer & Wholesaler
Anna White, Steinhatchee - Clam farmer, Project OCEAN Graduate

Don Sweat (Citrus, Hernando, Pasco and Pinellas Counties)

Citrus/Hernando

Jeff Carter – Marina Owner, Homosassa
Brian Thompson - Scallop Aquaculture Participant
Bob/Cathy Gill - Owners, Shrimp Landing Fish House
Gary Maidof - Citrus County Planning Department
Andy Rose - Sumter County Cooperative Extension Service
Sam Lyons - Charter Dive Shop Owner
Pat Purcell - Director, Marine Science Center
Walter Wynn - Retired
Art Cannon - Chapter President, Organized Fishermen of Florida
Kelly Tyler - County School System
Kevin Cunningham - Local Businessman
Bobby Witt - Scallop Aquaculture Participant

Pasco/Pinellas

Blake Longacre - Businessman, Sport Fisherman/Boater
Dr. Norm Blake - Dept. Of Marine Science, USF, St. Petersburg, FL
Jarvis Everett - Suncoast Tarpon Roundup Committee, St. Petersburg, FL
Dr. Larry Doyle - Dept. Of Marine Science, USF, St. Petersburg, FL
Dave Zalewski - Charter Boat Service Owner/Captain, Largo, FL
Terry Newkirk - Boat/Yacht Broker, St. Petersburg, FL
Mike Ramsey - Pinellas County Government Access Television, Clearwater, FL
Phil Steele – National Marine Fisheries Service, St. Petersburg, FL

Sacheen Tavares (Broward County) Hired in 2000, Advisory Committee to be established.

Chris Verlinde (Santa Rosa County) – Hired in 2000, Advisory Committee to be established.

Robert "Bob" Wasno (Lee County) - Hired in 2000, Advisory Committee to be established.

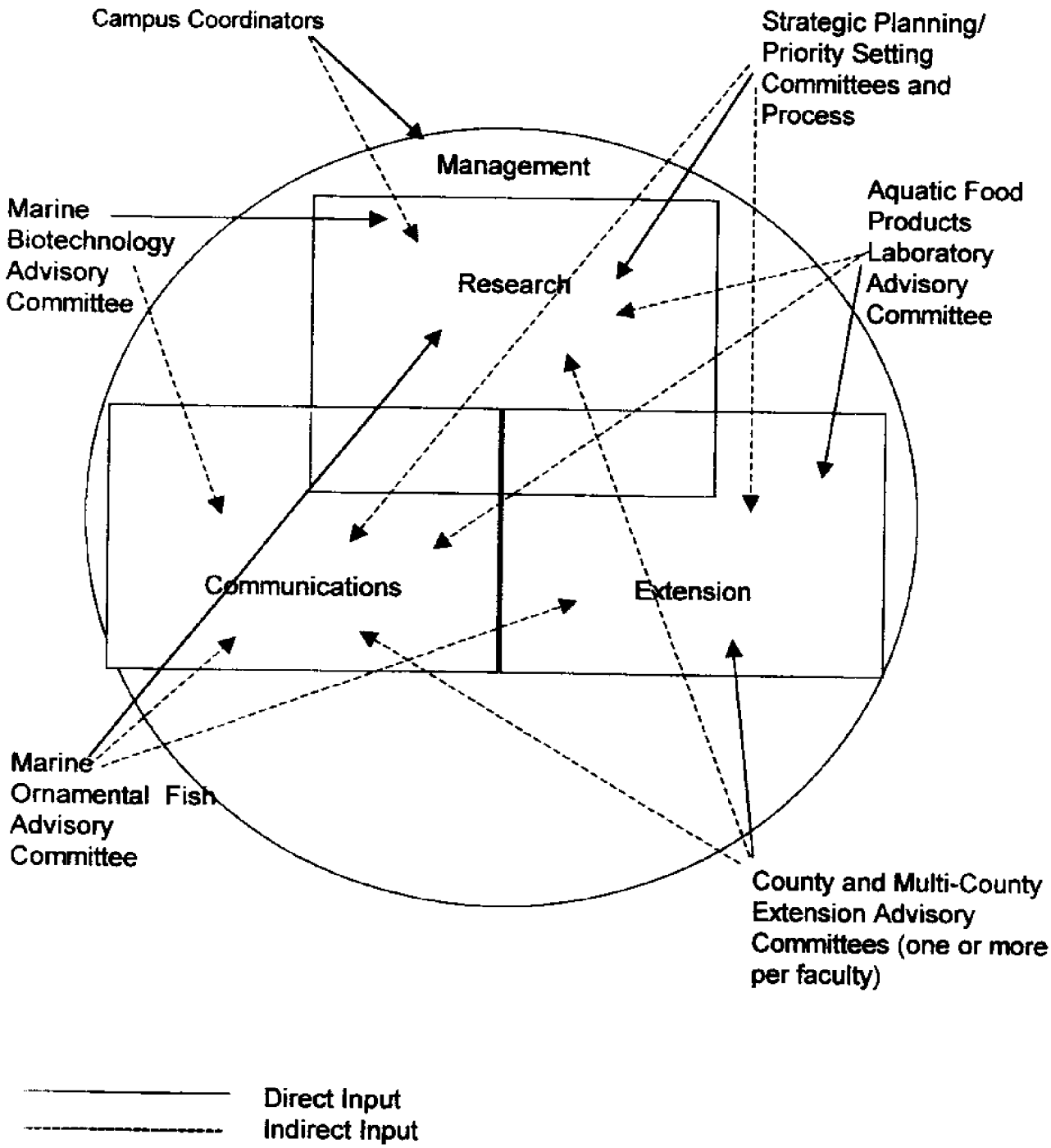

Figure 1. The input of advisory committees into research, extension and communications functions of Florida Sea Grant.

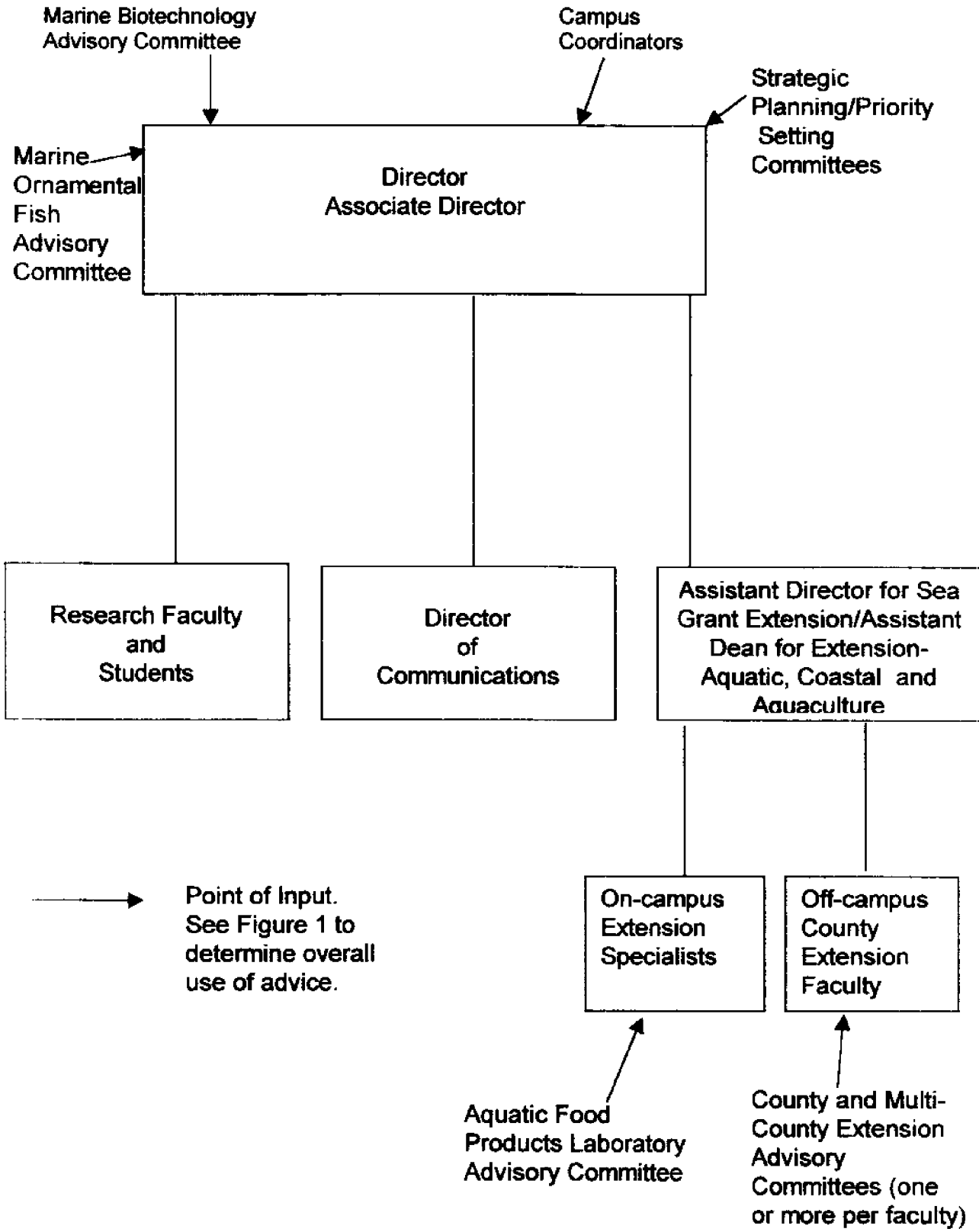

Figure 2. The point of first contact or direct input of advisory committees into the administrative structure of Florida Sea Grant.