

AHEAD of the CLASS


Sea Grant
Florida

*Florida Sea Grant
Delivers Marine Education*



Florida is sometimes called a state with two oceans back-to-back. And each day, educating Floridians about their coastal environment becomes more essential to protecting these ocean resources for future sustainability.

It is not surprising that numerous academic, governmental, private and nonprofit organizations devoted to marine research and education exist here. Florida Sea Grant collaborates with these groups to provide specialized programs and opportunities to a wide range of users, from highly technical industry groups to scientists and resource professionals to traditional K-12 teachers and students.

All Sea Grant county faculty, regional faculty and statewide specialists contribute to this effort. The investment is equivalent to 2 1/2 people dedicated to marine and aquatic science education, full time, year long. Florida Sea Grant continues to make this investment because it pays off in increased public literacy about coastal issues and more responsible ocean users.

At the same time, investing in coastal and marine education is only part of what the Florida Sea Grant College Program does. Florida Sea Grant also brings a network of university-based researchers to bear on the state's coastal problems. Sea Grant fosters collaboration between the education and scientific communities to ensure that research findings and scientific information are available to Floridians.

Over time, this investment in research, education, and extension has influenced important issues and produced substantial positive results. This publication reviews a selected assortment of collaborative efforts and educational activities that are helping our state's citizens and businesses better manage their fragile coastal resources.

Please also visit the Florida Sea Grant website (www.flseagrant.org), which provides a thorough documentation of our mission and goals, our research and extension programs, and the partnership we build between NOAA and Florida's universities, marine research organizations, businesses, governments and citizens.

Jim Cato
Director
Florida Sea Grant College Program

FRONT COVER: Florida Sea Grant county extension faculty often work with K-12 audiences, providing marine education inside and outside the classroom to thousands of youth annually. LeRoy Creswell of St. Lucie County conducts his 4-H youth "lagoon days" program. He also works closely with the county's marine center and school district providing programs such as "motion in the oceans" and "ecosystem explorers." (Tom Wright, UF/IFAS)



This publication was supported by the National Sea Grant College Program of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) under NOAA Grant No. 16 RG-2195. The views expressed are those of the author and do not necessarily reflect the views of these organizations.

April 2005

TP 139

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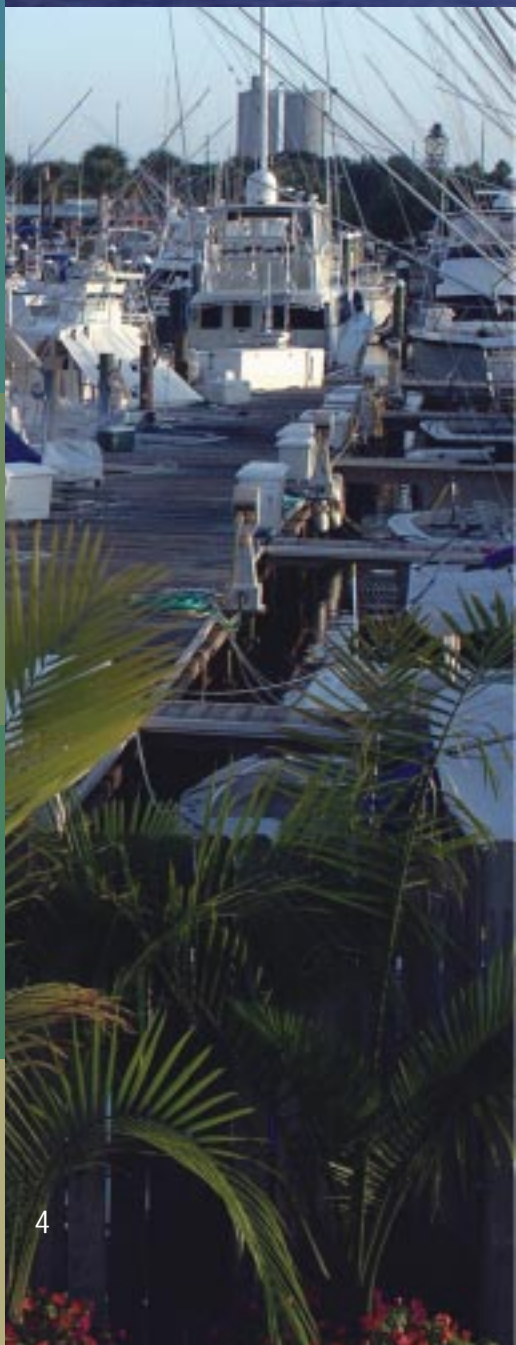
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Investing in Coastal and Marine Education



For Florida's 17.1 million residents and about 78 million annual visitors, the coast is a major attraction and an important part of their environment. Nowhere in the United States are so many people so close to such an extensive and economically valuable coastline.

The pressures, wants, and needs users place on coastal resources all combine to make understanding and managing one of the most fragile environments on earth a difficult and often controversial undertaking.

Florida Sea Grant has a vital role to fill in this complex endeavor, and has assumed a leadership role in the creation of a better-informed and more responsible populace — one that recognizes its impact on the quality of the environment. This understanding is essential for Floridians to rationally manage continued growth in the coastal zone, as well as to equitably resolve the ever-increasing competition for coastal resources.



Beyond the Traditional Classroom

While Florida's schools and universities provide structure and visibility for how our citizens and visitors learn about the marine environment, Sea Grant educational programs often move into more informal classroom settings where specialized learning and practical skills can be acquired more effectively.

Using a combination of research, education and technology transfer, Sea Grant extension and communications programs interpret and deliver information to audiences in a format they can use. Efforts are focused among six principal stakeholder groups: citizens of local communities; the state's industry; scientists and academic professionals; governmental and non-governmental managers of coastal resources; K-12 educators; and youths. Some of the programs may be recognized as continuing education, professional development, or executive education; all are delivered with a strategic approach designed to solve specific problems or help its citizens make Florida a better place to live.

(Clockwise, from top) Riviera Beach's scenic, all-weather harbor is a popular stopover for sailboats headed to the Bahamas. School children examine water samples taken from an estuary in Brevard County during a Sea Grant summer marine camp. The Fort Pierce City Marina, located in the heart of the city's historic downtown riverfront, has earned Clean Marina designation. (Tom Wright, UF/IFAS)



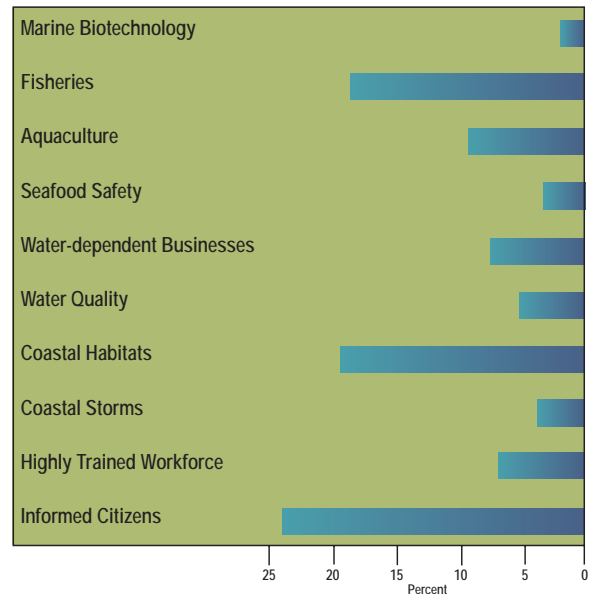
Recent Educational Events

Workshops and conferences are a major outreach activity of Florida Sea Grant's non-formal education initiative. In most cases, these events are held to accomplish specific objectives planned by Sea Grant's research or extension faculty. From 2002 to 2004, they delivered a total of 1,570 educational events, including presentations at scientific conferences, workshops organized by Sea Grant Extension faculty, marine science 4-H camps, K-12 teacher education events and international conferences.

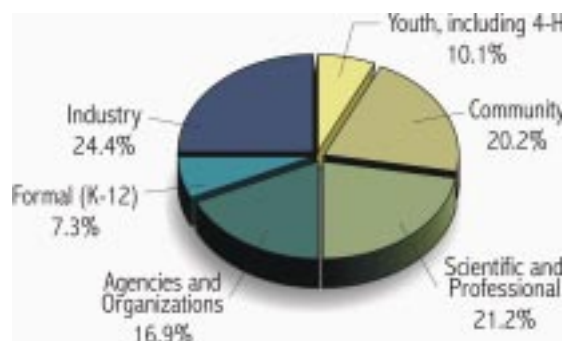
As the figures (right) indicate, the activities are organized along at least one of Florida Sea Grant's ten goal areas, although the number of events in each goal area may vary. The principal areas of emphasis are informed citizens (23.4%), coastal habitat (18.7%), and fisheries (17.3%) education.

When organized among the six principal stakeholder groups, about one quarter (24.4%) of Sea Grant programs is delivered to the state's industrial users, closely followed by scientists and other academic professionals and communities.

Few organizations have the breadth and depth of focus on multi-disciplinary marine and coastal issues statewide that Florida Sea Grant brings to the educational process. The following pages review how Sea Grant invests in the scientific and environmental education of the state's citizenry, a necessary step for the state to remain competitive in the national and world economy while conserving its coastal resources.



Activity by Florida Sea Grant goal areas, 2002-04



Florida Sea Grant audience type, 2002-04



Educational events by Florida Sea Grant geographic area of delivery, 2002-04



Educating Floridians about the state’s marine environment is essential to ensuring the responsible use and sustainability of coastal resources. Here, swimmers enjoy the waters off Gulf Islands National Seashore near Pensacola. (Eric Zamora, UF/IFAS)

CommunityEducation

Community education programs are less technical and thus more general in nature than other Florida Sea Grant (FSG) programs. Some call this “informal education,” a lifelong process where individuals acquire awareness, attitudes, values, skills, and knowledge from daily experiences. FSG efforts may focus on the value of estuaries, how to be good citizens and protect the coastal environment, or the biological reasons a new fishery regulation is put in place. Methods may range from a presentation to community leaders at a Rotary or Kiwanis Club meeting, to participating in a television show on coastal conservation that reaches millions, to showing a condominium association the way to protect coastal dunes with sea oats.

five million residents of South Florida with information about dozens of ongoing NOAA research projects in the area. More than 65 bilingual project profiles were written and distributed; a resource directory, a quarterly newsletter and a series of *Florida Bay Watch* synthesis and analysis reports were also completed with partners. A low-power radio station and weekly radio programming reached Keys residents and visitors alike. The Florida Bay Project productions are archived at: www.floridabay.org.

Enriching Environmental Awareness

The Florida Master Naturalist Program, an award-winning adult education program developed by faculty from the University of Florida's Institute of Food and Agricultural Sciences (IFAS), offers courses in three subject areas: freshwater wetlands, coastal systems, and upland habitats. Florida Sea Grant provided substantial funds and technical assistance to the program's coastal systems module, a program that earned a national award for best video series in the 2003 Association for Communication Excellence competition. Since 2001, Master Naturalist has graduated nearly 2,000 people; many of these 'graduates' received additional instructor training and now provide training at the community level, with course offerings in 45 counties throughout Florida involving more than 85 organizations.

REDstart: Volunteers Restock Redfish

REDstart is a fishery stocking program involving sport fishermen, fishery biologists, local volunteers and others concerned about the sustainability of sport fish stocks in the Charlotte Harbor area, particularly redfish (*Sciaenops ocellatus*). Under the Florida Sea Grant umbrella, REDstart involves a dedicated group of citizen-volunteers, Lee County Cooperative Extension, the J.N. Ding Darling National Wildlife Refuge and the Fisheries Stock Enhancement Program (a partnership program between Mote Marine Laboratory and Florida Fish and Wildlife Conservation Commission). It also involves an impressive line-up of fishing tournaments, the South Florida Water Management District and the City of Sanibel, which have all contributed to a \$350,000 grow-out facility that has been built at the Sanibel-Captiva Conservation Foundation Marine Laboratory on Sanibel Island.



Bob Wasno, Florida Sea Grant marine agent in Lee County, displays a young REDstart redfish ready for release. Volunteers from the community have logged more than 6,200 hours building and maintaining the REDstart aquaculture facility on Sanibel Island. (Florida Sea Grant)

in collaboration with eight other state Sea Grant programs in the U.S., produced and distributed thousands of rip current brochures and posters during 2002 and 2003. In 2004, Sea Grant was one of a group of NOAA agencies that, together with the U.S. Lifesaving Association, launched a nationwide rip current safety awareness campaign, supported with informational videos, signage, brochures, and the definitive website, <http://www.ripcurrents.noaa.gov>, featuring "Break the Grip of the Rip."

Florida Sea Grant-funded researchers are also developing scientific models that may predict rip current formation. Early in 2004, Florida convened a national researcher's workshop in Jacksonville to give scientists the opportunity to explore the use of their predictive methodologies in surf zone forecasting.

Scallops are a popular Florida catch for snorkelers in hot summer months, and thanks to recent restoration efforts, portions of the state's west coast once closed to scalloping have reopened in the past few years. Since the reopening, Florida Sea Grant has produced and distributed more than 20,000 "how-to, where-to" informational brochures for this fun and easy pastime that appeals to anglers of all ages. Florida Sea Grant played a major role in helping restore the fishery, and now community businesses are reaping dividends, too. Economists estimate Citrus County's 2003 scallop season provided 35 new jobs and an additional \$1.5 million in business revenues. (Florida Sea Grant)

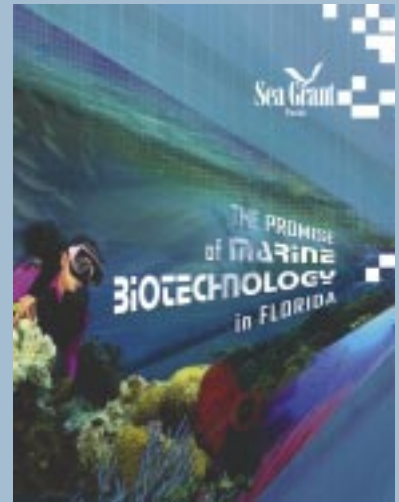




Seafood HACCP training developed by Sea Grant remains the national program for seafood processing and importing in the United States. It has become a world standard for food safety; recently, the protocol was adopted by U.S. processors of juice products. (Tom Wright, UF/IFAS)

IndustryEducation

“Science Serving Florida’s Coast” perhaps describes industry education as well as any of Florida Sea Grant’s education programs. Teaching industry requires science-based information that is highly technical in nature and specifically targeted so businesses can better manage operations, develop new product lines, cut costs, increase revenues, or respond to yet another regulation. Examples include an annual shrimp school that draws the world’s major shrimp companies; a workshop for oyster processors to learn the latest techniques to increase the safety of their products; or a marina operators’ meeting designed to teach how to make their marina “clean” with no detrimental effect on coastal waters.



Florida Sea Grant is fostering an effort by scientists and educators to promote marine biotechnology research to venture capitalists and legislative staff. Sea Grant coordinates a marine biotechnology summit, which has grown into an important opportunity for Florida's academic community to showcase achievements to investors. A collection of publications, including a corporate prospectus titled *The Promise of Marine Biotechnology in Florida*, and pages on the National Sea Grant program's marine biotechnology web site, are written in non-technical language to de-mystify complex topics and support the outreach effort. (Florida Sea Grant)

Marine Biotechnology

A comparatively young sector of Florida's overall biotechnology industry, marine biotechnology seeks to develop products and processes from the ocean's living resources through advanced cellular and molecular investigations. Florida Sea Grant is working to enhance both the immediate quality of and future funding base for research and education in marine biotechnology. By closely targeting leaders in academic research and economic development, Florida Sea Grant encourages decision making that enhances lines of investment and research. Ultimately, this will promote job growth, international economic competitiveness, and environmental benefits for the state.

For the academic community, William Seaman, professor and associate director of Florida Sea Grant, has initiated a series of marine biotechnology summits for scientists and their graduate students to build cohesion among Florida's faculty and students. Summits often feature out-of-state keynote speakers, a

commercialization panel, poster sessions, laboratory site visits, and plenary scientific presentations. Attendees have repeatedly praised the emphasis on science and the opportunity for technical networking that these gatherings afford, and continue to support them with increased turnout. From the group of 15 that convened the initial summit, attendance has risen steadily, from 45 to 74 in subsequent years. In 2004, the prestigious BIOFlorida trade association invited the fourth summit to be held in conjunction with its annual meeting. Attendance was 430, a new high for both meetings.

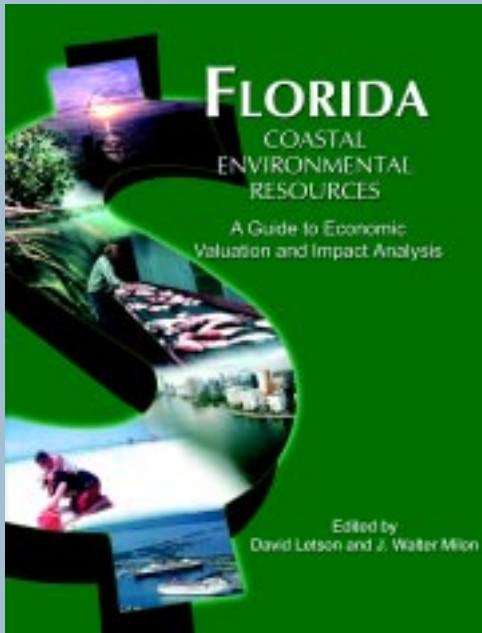
The relationship with BIOFlorida provides an important link to industry professionals, both for developing cooperation between faculty and industry, and for informing industry leaders about the opportunities for funding, application and commercialization of discoveries. Sea Grant participated in the founding organizational committee for BIOFlorida, and is represented on its current board of directors. In addition to the joint 2004 meetings, Florida Sea Grant has organized sessions on marine biotechnology for two previous BIOFlorida annual meetings.



Educating with Economics

Florida Sea Grant has a long track record of supporting the state's marine industries by providing essential economic information through a one-two combination of research and extension. In fact, Florida hired one of the first extension marine economists in the entire Sea Grant network (1973), and has maintained this as a major program element ever since. Researchers and Sea Grant extension economist Chuck Adams, a professor of food and resource economics at the University of Florida, work hand-in-hand to identify high priority needs for research, and then feed the research results back to industry leaders in a form they can use.

As part of a USAID/NOAA Hurricane Mitch recovery program, Florida Sea Grant collaborated in the demonstration of a commercial-scale shrimp culture system in Nicaragua using zero water-exchange technology. Sea Grant director Jim Cato and marine economist Chuck Adams presented a complete economic analysis of the project to the local shrimp farmers, bankers, and regulators in two workshops. Most of the attendees said they would use the information during the next growing season. (Florida Sea Grant)



To help coastal community leaders, managers and industry professionals better understand the importance of using environmental economics in their decisions, Florida Sea Grant provided publishing support for *Florida Coastal Environmental Resources: A Guide to Economic Valuation and Impact Analysis*. Collaborators included researchers from the universities of Maryland, Miami, and Central Florida; and economists from NOAA. Copies were distributed to more than 200 environmental consulting firms and virtually every college and university library in the state. (Florida Sea Grant)

In recent years, Sea Grant's economists have analyzed the costs and returns from a zero-water exchange shrimp aquaculture demonstration in Nicaragua; summarized domestic and international market trends for the state's growing marine ornamental species industry; and assisted Florida's commercial shrimpers with their application for financial relief granted by the federal Trade Adjustment Assistance program. The ongoing baseline economics research Sea Grant generates for the hard clam, scallop, and recreational fishing industry sectors, among others, gives trade groups, potential investors, and managers the science-based information they need to make decisions that provide for the sustainable use of Florida's marine resources.

Fact-Finding Capacity

Due to its reputation as an "honest broker" of information, Florida Sea Grant often coordinates fact-finding projects and meetings that bring together the fishing industry, scientists, and resource managers to discuss the current state of a fishery, as well as its future research needs.

In 2002, the Florida Fish and Wildlife Conservation Commission asked Florida Sea Grant to collect opinions and information from stakeholders in the blue crab industry as the commission pondered changes to an existing permit moratorium. Florida Sea Grant used its network of county extension faculty to hold 16 workshops for more than 200 individuals. Extension faculty learned the industry had concerns about what should replace the moratorium, and trap and license limitations, but supported stronger measures to reduce poaching and environmental degradation. The report served as the basis for a subsequent set of public hearings in 2003.



As part of its organizational effort, Florida Sea Grant prepared these publications for the international Marine Ornamentals 2001 conference, which attracted 336 participants from 23 countries. (Florida Sea Grant)

Aquaculture and Marine Ornamentals

The commercial aquaculture industry in Florida continues to grow in economic importance and diversity. Florida Sea Grant is providing technical assistance to support the sustainable growth of this industry, internationally as well as statewide. More species are aquacultured in Florida than any other U.S. state, and the rising industry is now valued at about \$100 million. Most of that value comes from the culture of freshwater ornamental fish, but a growing marine aquaculture sector is becoming more visible and attractive to potential investors.

Chuck Adams has teamed with researchers Donna Lee and Sherry Larkin, both in the University of Florida's Food and Resource Economics Department, to provide industry groups, potential investors, and fisheries managers with research on the value of the marine ornamental species industry in Florida and an evaluation of international trade in live species. Florida Sea Grant was also one of the sponsors for Marine Ornamentals '04, the third in a series of international conferences for the marine ornamentals industry to meet and discuss issues critical to its future. In 2001, Florida Sea Grant was the lead sponsor and organizer. In between, Florida Sea Grant Director Jim Cato, having served on the organizing committee for all three international conferences to date, co-edited *Marine Ornamental Species: Collection, Culture and Conservation*. This book is the most comprehensive resource available on the growing and economically important marine ornamental industry.

U.S. consumers are eating more shrimp than ever, but increased imports of farmed shrimp have sent earnings of U.S. shrimpers to historic lows. Imports now supply as much as 85 percent of the U.S. market, and many domestic harvesters are facing bankruptcy. Florida Sea Grant coordinated a series of 16 trade assistance workshops to Florida's shrimp fleet through the federal Trade Adjustment Assistance program. To receive the program's cash benefits, producers had to attend one of the workshops for technical assistance and training. Sea Grant extension economist Chuck Adams provided the economic analysis that qualified shrimpers for the benefits; seafood specialists and 13 Sea Grant extension faculty coordinated delivery of the workshops. Adams also provides technical support to the industry through timely presentations. In a recent conference on international agricultural trade disputes attended by policymakers, industry groups, and trade lawyers, Adams examined the use of trade barriers, import quotas, and import tariffs to relieve the plight of U.S. shrimp fishermen. (Tara Piasio, UF/IFAS)

Professional and Organization • Formal K-12 • Youth • Community • Industry • Scientific and Professional • Agency and Organizational



The annual Shrimp School at the University of Florida, part of national seafood HACCP training, helps industry comply with safe seafood regulations. Seminars use lectures and hands-on labs to cover topics on product quality and safety, from production through retail. Over the past eight years, participation in this world-renowned program has included representatives from every major shrimp company in the world. The program incorporates current and relevant material tailored to a commercial audience. (Florida Sea Grant)

Seafood Safety

Food safety training for the nation's seafood industry ranks among the most successful extension education undertakings in Sea Grant history. More than 20,000 people have completed HACCP (pronounced HASS-ip) courses, including all federal FDA seafood inspectors in the nation, most state-based inspectors and over 90 percent of all nationally based seafood processing firms, plus another 5,000 international participants from 30 nations.

HACCP, which stands for Hazard Analysis and Critical Control Point, describes a series of food-preparation procedures that promote the safe and sanitary processing and importing of seafood. Federal regulations require all U.S. seafood importers and processors to implement a HACCP system.

To help the industry comply, the National Sea Grant Program, federal agencies, trade associations, university researchers, and extension services formed the National Seafood HACCP Alliance in 1995 to develop a training and technical assistance curriculum. The program was organized by and continues to be coordinated by Florida Sea Grant seafood safety specialist Steve Otwell, a professor of food science and nutrition at the University of Florida.

The training now includes the traditional 3-day HACCP courses, 1 1/2-day sanitation courses taught biannually in Florida, and a special one-day support course taught for individuals that complete an established Internet course developed by Alliance members at Cornell University. The Alliance publications used for this training are based at and distributed from the University of Florida, coordinated by the Florida Sea Grant program. These training materials are the most successful and demanded of Sea Grant publications.

Seafood HACCP training remains the national program for seafood processing and importing in the U.S. and has become a world standard for food safety. Recently, the protocol was adopted by U.S. processors of juice products.

The HACCP program has also received presidential recognition, including the Al Gore Hammer Award in 2000 for excellence in service to America. Otwell's leadership of the HACCP Alliance — and a consequence of the program's success — is his recognition by the Institute of Food Technologies in 2004 as the first recipient of the Myron Solberg Award for providing leadership and the successful development and continuation of an industry/government/academia cooperative organization.

Research Presentations

Researchers and extension faculty routinely contribute to the educational arena as presenters at professional meetings, conferences and workshops. At the same time, researchers funded in whole or in part by Florida Sea Grant publish their findings through research journals, departmental or university productions and through Sea Grant publications. Sea Grant faculty are routinely sought out by the media for their expertise in coastal and marine issues. These efforts combine to help ensure that science-based knowledge becomes public information.

Including journal articles, reports, brochures, posters, and videos and the like, Florida Sea Grant generated more than 475 productions from 2000-04 to provide science-based, educational information resulting from Sea Grant's research and extension program goal areas.



TOP: Florida Sea Grant associate director William Seaman fields questions from a media crew covering an artificial reef workshop. As interest by sport fishermen and divers continues to grow in artificial reefs, Florida Sea Grant supports the transfer of technical information among resource managers, researchers, and others that study and evaluate reef performance. (Florida Sea Grant)



BOTTOM: Sea Grant researchers who make presentations at professional conferences and workshops help ensure that information is transferred in a timely fashion, so that research results can be implemented in academia, industry, and through the regulatory process. Above, William Kem of the University of Florida and Carolina Moller of Florida Atlantic University discuss findings at a BioFlorida conference. (Florida Sea Grant)

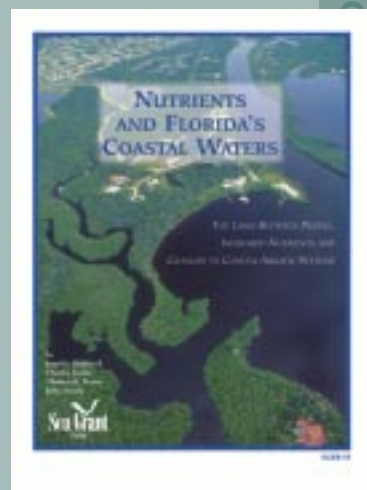
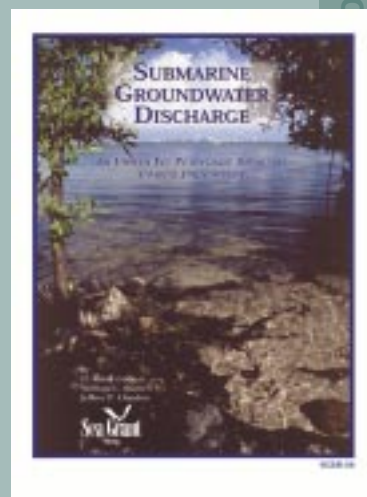
Artificial Reefs

Artificial reefs can enhance recreational fishing, create dive sites, and mitigate damage to ocean habitat. Florida's coastal waters are estimated to contain about half of all artificial reefs deployed in the U.S., and their popularity with a diverse set of stakeholders has made this a priority topic for Florida Sea Grant research and outreach efforts. Technical results from more than a dozen research projects have been transferred to select fishery and habitat resource managers through regional fisheries management councils; synthesis of this research and other information, coupled with a proactive educational effort, has had an impact on artificial reef technology globally.

After inaugurating a periodic statewide summit of reef users, managers and scientists in 1987, Sea Grant turned over lead responsibility for subsequent meetings to the (agency now known as the) Florida Fish and Wildlife Conservation Commission. These summits provide up-to-date technical training on how to more effectively plan, construct and monitor artificial reefs. In 2001 and 2004, Sea Grant coordinated these summits and contributed presentations. In addition, Sea Grant published the results of its survey of artificial reef monitoring efforts in Florida counties to help educate county staff in methods of documenting reef performance. As a follow-up to the latest meeting, Sea Grant made plans to organize a short course on Geographic Information Systems applications to Florida county artificial reef programs.

In the national and international setting, Florida Sea Grant associate director William Seaman has delivered reef evaluation research to an American Fisheries Society continuing education workshop; reef planning conferences in Korea and Canada, and the 2004 World Fisheries Congress. Seaman has also edited a comprehensive guide to artificial reef evaluation topics written by an international team of experts; the book is recognized as the first volume to combine such essential disciplines as engineering, economics, biology, and statistics for proper evaluation of reef performance.

Through a Florida Sea Grant coastal environmental and water quality design team that involved faculty from four universities, two publications were produced to support educational efforts in subjects identified by field personnel as needed. The first, *Nutrients and Florida's Coastal Waters*, examines the links between people, increased nutrients and changes to coastal aquatic systems. The companion piece, *Submarine Groundwater Discharge*, addresses groundwater basics, provides Florida examples of the influence of groundwater discharge on water quality, and the complexity of water management. (Florida Sea Grant)



Professional Development

In order to effectively transfer technology and the latest scientific information to marine and coastal users, Florida Sea Grant extension faculty receive annual, ongoing training in delivery skills and technical content. Sea Grant actively supports professional training and development – each county faculty member receives, on average, at least 15 days of professional development training. Delivery techniques may cover dealing

with conflict, project design, program evaluation, management and development, and leadership and communication. Typical in-service training may cover current topics in fisheries conservation, marine education, ocean observation systems, invasive species, coastal water quality, Florida Everglades restoration, marine aquaculture, seafood safety, rip currents, or waterway and boating management. Sea Grant faculty often take the leadership in developing these in-service training sessions. Examples include:

- ▶ Sea Grant economist Chuck Adams has developed an annual workshop on sustainable marine fisheries that addresses a variety of national and state management and conservation issues for county extension faculty. The workshops lead to the development of county plans of work that emphasize fishery issues.
- ▶ Sea Grant estuarine ecologist Chuck Jacoby has coordinated a series of workshops focusing on contemporary watershed issues during 2002-2004. University of Florida/IFAS Extension state and county faculty, including Sea Grant faculty, attended these interdisciplinary workshops.
- ▶ Many of Sea Grant's county faculty have completed Florida Master Naturalist Program Workshops, and become certified in both the wetlands and coastal modules. Some of these faculty have gone on to develop Master Naturalist Programs in their respective counties.

The annual Florida Sea Grant extension faculty meeting provides staff with the updates on topics in coastal issues they need to effectively plan programming for the coming year. Scientists and agency personnel also attend. Recently, representatives from NOAA Fisheries and the Florida Museum of Natural History provided presentations on fishery management and shark issues. Program leaders from Sea Grant programs in the Gulf of Mexico region provided a discussion on mercury in fish and its potential impacts. Researchers from the University of South Florida discussed ocean observation systems and potential educational activities. This annual meeting is designed to allow Florida Sea Grant extension state and county faculty time to discuss and develop annual plans of work at both the state and county level. (Florida Sea Grant)





prohibited species in four of five investigations, resulting in fines of more than \$100,000. In one case, a fish dealer suspected of selling white shark filets was exonerated when the analysis showed the products were obtained from legal species. The team's research has received extensive international media coverage in *Science*; *Nature*; *the New York Times*; *National Geographic Today*; New Zealand radio; NBC TV's "EcoWatch" program and AAAS radio, among others. Thus, Florida Sea Grant-supported science has led not only to direct application, but has gone a long way in educating the public about the seriousness and need for fisheries management.

Clean Marinas and Clean Boatyards

There are nearly 2,000 marinas operating in Florida today and hundreds of thousands of boaters using Florida's waters every day, all contributing to constant and growing pressure on the state's fragile aquatic and marine ecosystems. Clean water is essential to the multi-billion dollar boating industry.

Florida Sea Grant has responded by partnering with the Florida Department of Environmental Protection, Marine Industries Association of Florida, U.S. Coast Guard, and International Marina Institute to form the Clean Boating Partnership, the original clean marina program in the nation. The partnership's goal is preventing pollution in Florida's waterways by providing incentives to marinas, boatyards and related facilities that adopt environmental best management practices.

The partnership approach motivates public and private entities to work together and removes bureaucratic roadblocks to wise resource stewardship. Florida Sea Grant has contributed to the partnership by writing curriculum for workshops on clean marinas and boatyards, giving presentations in workshops, and

A rapid and reliable DNA test developed by team of scientists led by Mahmood Shivji of Nova Southeastern University (left) can identify shark species from fins and other body parts, which in turn helps fisheries managers enforce protective measures for overfished shark populations. Shivji's work has fostered close cooperation between Sea Grant funded research and NOAA Fisheries. (NOAA Fisheries)



SEACOOS

Why observe the oceans? A significant proportion of our world's population and economic activity depend on the sea, yet we have a limited understanding of the complexity and interconnectivity of the ocean and marine ecosystems. Learning more about the forces at work could lead to improved marine transportation and coastal storm preparedness; reduced public health problems associated with contaminated seafood, rip currents and harmful algal blooms; and, enhanced efforts to protect ocean habitats and endangered species.

SEACOOS, the Southeast Atlantic Coastal Ocean Observing System, is a collaborative university partnership funded through the Office of Naval Research that has initiated an integrated coastal ocean observing system for a four-state region of the southeast U.S. Data from buoys, remote sensors, and other field instruments that measure wind, tides and currents will be compiled and transformed into a variety of products useful to coastal communities and marine user groups.

Careful crafting of these products is an essential part of SEACOOS. Florida Sea Grant and cooperating extension programs from Georgia, South Carolina and North Carolina have taken the lead in creating an outreach and education work group to coordinate this activity. Their goal is to provide information products according to the needs of key users. County extension faculty conduct needs assessments with their clientele to determine how the application of real-time observational systems can benefit their daily activities. In 2004, Florida Sea Grant co-sponsored a national ocean observation system workshop in South Carolina attended by over 60 educators to develop a plan for incorporating ocean observation data into national and state educational standards.

Florida Sea Grant also employs a SEACOOS outreach coordinator, Chris Simoniello, to deliver educational programs that increase the awareness and potential use of SEACOOS products and services, and to develop educational materials and products. Simoniello contributes to the outreach and education portion of the SEACOOS web site (right).

Florida Sea Grant is a founding partner in the Southeast Atlantic Coastal Ocean Observing System, known as SEACOOS, a network which provides reliable information on the coastal oceans for people who live and work in the Southeast. Jay Law, a technician in the University of South Florida's College of Marine Science, performs maintenance on an ocean monitoring buoy deployed in the Gulf of Mexico by the Coastal Ocean Monitoring and Prediction System at USF, also a SEACOOS partner. (Chris Simoniello, Florida Sea Grant)





Providing K-12 educators with a greater capacity to understand and deliver high-quality teaching on the ocean sciences is the goal of Florida Sea Grant's participation in a National Science Foundation initiative linking scientists and educators. At this workshop in Cedar Key, teachers participated in a variety of training activities on proper marine collecting techniques and identification of common coastal marine life. (Tom Wright, UF/IFAS).

Formal K-12 Education

This area is one of two that target youth either directly or indirectly. Formal K-12 Education includes those programs that reach youth through a structured, graded, education system as the students move through the formal educational process from kindergarten to the completion of high school. Florida Sea Grant faculty get involved through lectures in the classroom, but more importantly, by working with teachers to upgrade their curricula to include math or science components that also incorporate coastal or marine issues. Examples of "teaching the teachers" include directing a coastal field trip as part of a classroom activity, providing in-service training (for which the teachers receive credit) and making presentations at educator conferences, including the Florida Marine Science Educator's Association.



The Centers for Ocean Science Education Excellence, or COSEE, initiative provides middle school science teachers with professional development opportunities during summer months. Florida Sea Grant participates in the COSEE group focused on the Gulf of Mexico, one of a network of seven centers across the U.S. (Tom Wright, UF/IFAS)

Center for Ocean Science Education Excellence (COSEE)

Florida Sea Grant is collaborating with four other states (Texas, Louisiana, Mississippi, Alabama) to strengthen ocean sciences education with a focus on the Gulf of Mexico. The Centers for Ocean Science Education Excellence, known by its acronym COSEE, is a National Science Foundation initiative that bridges the gap between research and education. Florida Sea Grant leads implementation of Gulf of Mexico COSEE programs in Florida, which in turn is one of seven COSEE centers nationwide.

In 2003, both formal and nonformal COSEE programs were conducted. Over a three-month period (June-August) a one-week, field-based COSEE Teachers Institute was held in Cedar Key and Gainesville, supplemented by a two-month online program for the entire Gulf of Mexico region. Content of the institute focused on marine habitats, processes and technologies. Topics covered by the online program included harmful algal blooms, sharks, hypoxia, coral reefs, environmental stewardship and ocean technology.

Also in 2003, a two-day COSEE Nonformal Educator's Workshop was held for Sea Grant and 4-H Extension agents, aquarium educators, nature center educators and youth volunteers. Nearly 90 participants engaged in discussions that allowed researchers to gain a better understanding of educational organizations, and provided educators with programs and material to enhance their classroom content and delivery.



At the Cedar Key summer institutes held in 2003 and 2004, teachers partnered with a research scientist and spent five days in the field, learning about global positioning systems (GPS), harmful algal blooms, coral reefs, marine technology, and coastal habitats. Participants supplemented their field work with online internet training. (Tom Wright, UF/IFAS)

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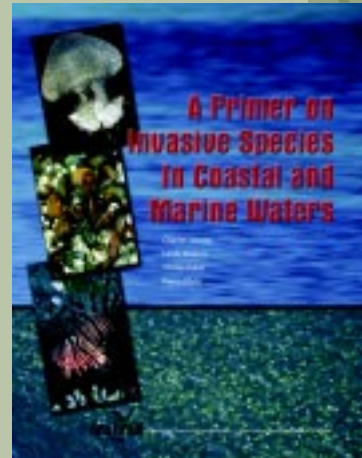
In addition, he served as a member of the National Sea Grant theme team on marine and aquatic literacy which developed the nationally distributed 2004 report, "Marine and Aquatic Science Literacy: Educating the 21st Century Workforce." The report called for making marine and education literacy a national priority, both in terms of outreach and research activities.

In another national effort, Florida Sea Grant provided funding support in 2003 for a NMEA report requested by the Research, Education, and Marine Operations working group of the United States Commission on Ocean Policy. The report, titled "The NMEA Membership Profile Data Analyses and Interpretation," provided baseline information and analysis on formal and nonformal marine education activities for the commission, and was included as an appendix to the commission's final report, delivered to the President in October, 2004.

Promoting Knowledge of Invasive Species

Aquatic invasive species, which have affected all of the U.S. coast, may constitute the largest single threat to our coastal ecosystem, our coastal economy, and human health in the coastal region. Working with groups such as the Florida Aquarium and the Tampa Bay Estuary Program, Florida Sea Grant is part of SERANSE, the Southeast Regional Aquatic Nuisance Species Education and Outreach Network. The network involves educators from three states – Mississippi, Alabama and Florida – and develops programs and materials for both formal and nonformal educational audiences. For the school systems, programs are offered as in-service training for elementary, middle and high school teachers. Similarly, programs are tailored for agency managers, university researchers, extension specialists and agents, and an array of nonformal marine science educators.

Within the state, Florida Sea Grant has offered more than 20 programs and workshops in the last three years. Participants included coastal community leaders, agency managers, university researchers, extension faculty, youth educators, program assistants and camp staff. These one- and two-day sessions considered the status of Florida marine invasive species, familiarized participants with available resources to use in their educational efforts, and provided participants with educational programming and source materials on invasive species. In a succession of specialized in-service opportunities for elementary, middle and high school teachers, participants received training to qualify for Florida's marine educator's marine collection permit.



Florida Sea Grant is well suited to address the problem of invasive species because it provides the necessary breadth of scope in research, education and outreach. In recent years, Sea Grant has produced a "Primer on Invasive Species in Coastal and Marine Waters," fact sheets, "diver alert" cards and other materials designed to support training programs for K-12 and nonformal educators. (Florida Sea Grant)

Coastal Counties Involve Thousands of Youth

At any given moment, Florida Sea Grant's county extension faculty may be running beach and coastal cleanups, marine youth camps, or interactive exhibits at schools, fairs and special events. These programs involve thousands of youngsters in hands-on activities that help foster an appreciation for the coastal environment. Often Sea Grant faculty work through organizations such as 4-H, Boy Scouts and Girl Scouts, or serve as the local liaison for a nationwide or statewide effort, or organize their own long-standing event that has become a community tradition.

Monofilament recycling and beach clean-ups — Many of Florida Sea Grant's marine agents serve as local coordinators for beach stewardship programs in their areas. The state's monofilament recycling effort has proven to be especially popular with youth. In Brevard County, 80 students from one local high school constructed approximately 100 monofilament collection bins, then distributed them to Clean Marinas around the state.

Scott Jackson, Sea Grant agent for Okaloosa and Walton counties helped his local 4-H teen council initiate a monofilament recycling program for the surrounding communities. The group raised funds and then set up information displays and recycling bins throughout the county. They also built and set up bins at the local 4-H coastal youth camp, and conducted a beach cleanup.

To the south, more than 40 Boy Scouts and their parents in Miami-Dade county volunteered with the Sea Grant agent, Marella Crane, to build, install and maintain monofilament recycling bins. Two in the group received Eagle Scout badges for their role; in all, more than 20 bins were installed at county and state parks, marinas, and fishing piers.

Maia McGuire, the northeast Florida Sea Grant agent, held a poster contest to raise awareness of monofilament recycling. Winning posters were displayed at the Greater Jacksonville Agricultural Fair, and featured in a 2004 recycling calendar.

Teaching recreational fishing — Don Sweat, the southwest central marine extension agent, has organized the annual St. Petersburg Pier Aquarium Kid's Fishing Tournament for more than 16 years. The tournament attracts some 500 to 600 youth under 12. Trophies, lunch and drinks are provided through sponsorships of more than \$9,000. In one tournament, the kids caught 23 species of fish from the pier.

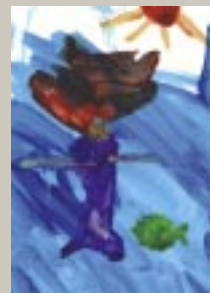
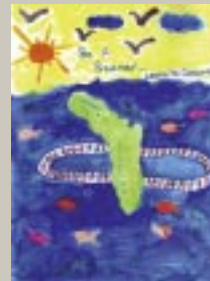


Extension faculty teach marine education by involving thousands of Florida's youth in hands-on beach stewardship activities. Above, Maia McGuire demonstrates proper sea oat planting techniques at a restoration area along one of northeast Florida's coastal stretches. Scott Jackson involved dozens of high schoolers at a sea oat planting event along Fort Walton Beach in the Panhandle. (Florida Sea Grant)

The Lee County Sea Grant extension agent, Bob Wasno, has constructed an educational two-panel kiosk depicting fundamental fishing techniques at the Yankee Beach Fishing Pier to teach children about species of fish that may be caught in that area, typical baits and lures that are successful for their targeted species, and fundamental knots and landing techniques that minimize fish injury. He also holds a sport fishing camp for 4-H youth to teach casting, tackle crafting, local pond biology, fish cleaning and equipment maintenance.



Ocean Day poster contest winner Jessica Nederlanden's enthusiasm was shared by her Representative, Adam Hasner (Broward County) following the awards ceremony at the Capitol. (Florida Sea Grant)



Oceans Day in the Capitol

Kids stole the show when winners of a Florida Sea Grant-sponsored poster contest converged on Tallahassee as part of the 2003 observance of Oceans Day in the state capitol. Florida 4-H members shared their artistic impressions of why it's important to protect coastal habitat by submitting colorful drawings of ocean-related subjects. Winners selected from among more than 80 contestants earned a trip to Tallahassee to meet their state legislator. One legislator escorted the group on a tour of the Capitol House Chambers. The winning entries were published and distributed by Florida Sea Grant as an Oceans Day 2003 commemorative poster.



Seine nets and touch tanks provide a never-ending source of fascination as youth discover what lives beneath the surface of coastal waters. Sea Grant extension faculty provide essential programming and curriculum support for state marine camps, 4-H field trips, and the state's marine ecology competitions. (Florida Sea Grant; Tom Wright, UF/IFAS)

Resource Rangers

Sea Grant agents Andrew Diller and Chris Verlinde assist in writing, providing technical advice, and appearing in the award-winning *Resource Rangers* television show that airs on WUWF-TV Cox Channel 4 in Escambia County and on MediaCom Channel 27 in Santa Rosa County. Episode topics include watersheds, storm water pollution, seagrasses, and the water cycle. *Resource Rangers* is a curriculum-based program that includes classroom activities, field trips and a series of videos focusing on environmental education for grades 5-8 and their families. Diller and Verlinde have also teamed to conduct 4-H and youth educational events under the *Resource Rangers* program for five elementary schools in their region. Approximately 300 children learned about sea turtles, marine debris, and coastal dune and aquatic ecosystems.

Marine Science Camps, Competitions

Sea Grant's Florida Panhandle marine agents – Diller, Verlinde, Jackson, and Bill Mahan – routinely provide youth education in marine concepts and issues at Camp Timpooshee, a 4-H center where an annual state marine camp, and county marine camp programs are offered. The program gives campers first-hand experience with Florida's marine environment, learning identification of marine vertebrates and invertebrates, plants and habitat. About 20 kids a week choose the marine science camp adventure as part of their summer experience.

The northeast marine extension agent, Maia McGuire, has helped revise and provide materials for the 4-H Marine Ecology Judging Event, an annual statewide competition that gives 4-H members an opportunity to learn about the marine and aquatic world. Kids can demonstrate their skills in identification of marine vertebrates and invertebrates, plants, and coastal habitats. McGuire and Brevard County marine agent Chris Combs have also provided specimens for and helped run the competition, held each fall at Camp Ocala.

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Florida Sea Grant uses academic research, education and extension to create a sustainable coastal economy and environment.

We are a partnership program among the Florida Board of Education, the National Oceanic and Atmospheric Administration and Florida citizen's, industries and governments.



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Through its website, Florida Sea Grant gives those who manage, use and enjoy the coast immediate access to current research and timely publications on coastal issues considered most critical to the state's future. Most of the site's publications are readily available in full-text format and free to download. A popular item is the online directory of the state's marine education and research organizations.

You can also link to the National Sea Grant library, which give visitors access to the entire Florida Sea Grant collection, plus thousands of publications from the 31 other Sea Grant programs. In fact, the National Sea Grant Library reported for 2003 and 2004 — the first two years that a comprehensive report was compiled — that Florida Sea Grant ranked first among the top 10 (in funding) Sea Grant programs in both total documents submitted, and in electronic downloads by users.

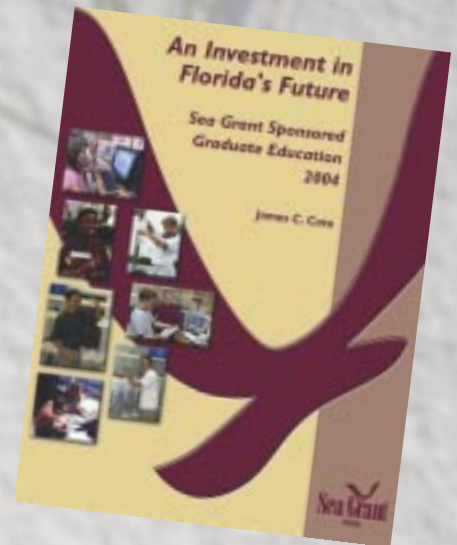
What's more, Florida Sea Grant was tops by a notable margin. Of the 422,577 downloads, 183,659, or 43 percent, were for Florida Sea Grant documents.

Graduate Education

Keeping track of college students is not easy; trying to track them down after graduation is harder still. *An Investment in Florida's Future: Sea Grant Sponsored Graduate Education* does just that. First published by Florida Sea Grant in 2002 (TP-117) and revised in 2004 (TP-140), this report traces the program's investment in scholarships and fellowships, and, more importantly, showcases the investment and contributions of the recipients in their commitment to research and their chosen careers.

It features degree information for students supported by Florida Sea Grant, the Aylesworth Foundation for the Advancement of Marine Sciences and the Old Salt Fishing Club, 1986-2004. Included is a summary of students' last known occupations and locations, and degree completed. It also tracks the Florida Sea Grant Knauss Fellows of the last 22 years by university, placement, current occupation, employer, and current location.

For additional information on Florida Sea Grant support for graduate education, and to locate an online version of this report, go to Florida Sea Grant's website at www.flseagrant.org.



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