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SGEF- 66

FLORIDA SEA GRANT RESEARCH PROJECTS 1998-2000

Although headquartered at the University of Florida, Florida Sea Grant is a state university system program that is able to apply the scientific expertise of 15 private and public universities and research facilities toward solving the state's coastal problems. Through the funding of timely research, Florida Sea Grant is able to bring the "best and the brightest" researchers together to resolve problems that are clearly of major importance in the state.

Before being selected for funding, every proposed Florida Sea Grant research project undergoes a detailed evaluation. To be selected, a project must satisfy three simple but tough criteria: (1) it must be based on a strong rationale; (2) it must demonstrate scientific or educational merit; and (3) it must produce results that are clearly useful and applicable in industry, management or science. In 1998, 17 projects were selected for funding in the following categories:

Fisheries Aquaculture Marine Biotechnology Coastal Processes



FISHERIES:

Biological and Economic Modeling and Assessment of Limited Entry Strategies in Multi-Species Fisheries in South Florida.

(R/LR-E-18) Commercial fishing is big business in Monroe County, which includes all of the Florida Keys. Unfortunately, there is so much commercial fishing in the Keys that too many of some fish species are being caught. As a result, there are concerns about the long term health of some fish

populations--they may not be able to produce enough young fish to replace the ones that are caught. As a result, more and more restrictions are being placed on the number of some fish that can be caught. In most cases, these restrictions are developed for a single species at a time and the impact of the restrictions on other species is not considered. This project looks at what needs to be done to develop computer

models that would provide the best answers for collectively managing many different fish species in the Keys.

Principal investigator: *Wally Milon, University of Florida. e-mail: wmilon@gnv.ifas.ufl.edu*

Establishing the Importance of Postlarval Supply to Recruitment and Management of Spiny Lobsters in the Florida Keys.

(R/LR-B-45) The spiny lobster is one of the most valuable marine species found in Florida's waters. It supports a thriving commercial fishery and brings tens of thousands of divers to the Keys each year in hopes of catching spiny lobsters. The goal of this project is to create a computer model that will help fishery managers accurately predict the size of the adult spiny lobster population. The predictions will be based on changes in the ecology and biological activity in Florida Bay--the primary nursery for spiny lobsters.

Principal investigator: *William Herrnkind, Florida State University. e-mail: herrnkind@bio.fsu.edu*



AQUACULTURE:

Assessment of Sea Urchins as Aquaculture Candidates in the Gulf of Mexico. *(R/LR-A-21)* While the worldwide demand for echinoderms such as sea urchins, sand dollars, and starfishes as seafood commodities is growing, the wild population of these creatures is declining. This project seeks to determine whether or not the sea urchin *Lytechinus variegatus* can

Regional Patterns of Habitat Use by Juvenile Blue Crabs: Assessing the Relative Importance of Alternative Habitat Types in Florida and North Carolina. *(R/LR-B-46)* Blue crabs are 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, looks at both 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.

Principal investigator: *Tom Frazer, University of Florida. e-mail: frazer@nervm.nerdc.ufl.edu*

be produced as an aquaculture product. If it can, the project will also develop a demonstration system to show how this sea urchin could be grown for profit. This project is being conducted jointly with Mississippi-Alabama Sea Grant.

Principal investigator: *John Lawrence, University of South Florida. e-mail: lawr@chuma.cas.usf.edu*

Culture Techniques for Marine Ornamental and Consumable Fish: A Better Larval Diet? (R/LR-A-22)

Tiny marine animals called copepods are the natural food of many fish larvae. Unfortunately, difficulties in getting copepods from the wild or growing them in controlled conditions have prevented their use as a food for aquacultured fish. This project, conducted in cooperation with Texas Sea Grant, will determine (1) if the growth and development of ornamental fishes can be improved by feeding them copepods; (2) if the survival and growth of marine fish grown commercially, such as red drum, can be improved by using copepods as a food for them; and (3) the food quality of copepod nauplii obtained from adults raised on different diets in the laboratory and from the field.

Principal investigator: *Nancy Marcus, Florida State University. e-mail: marcus@ocean.fsu.edu*

Structure and Competitiveness of Florida's Tropical Ornamental Marine Species Industry. (R/LR/A/23)

Approximately 300 different species of marine life are collected in Florida each year for sale by the marine aquarium industry. These species are valued at \$4 million annually to Florida collectors, but have an estimated total value to the industry of more than \$30 million per year. Although this is obviously a thriving industry, little is known about its structure. This project will take a thorough look at the demand for Florida's marine life products. It will identify the product value for individual species, market channels, substitutes, and future trends; assess the competitiveness and the future economic potential of Florida's marine life industry; and assist in insuring its long-term sustainability.

Principal investigator: *Donna Lee, University of Florida. e-mail: donna@fred.ifas.ufl.edu*

Atlantic Surgeonfish as a Model for Description of Normal Anatomy, Histology and Natural Diet of Herbivorous Ornamental Reef Fish. (R/LR-A-24)

Atlantic surgeonfish are routinely captured off the Florida coast for sale through the aquarium trade and for display in oceanaria. Unfortunately, captured reef fish often suffer from two important illnesses that probably result from improper nutrition. This project uses Atlantic surgeonfish as a model for finding ways to improve the nutritional management of captive reef fish and to hopefully improve their health, their longevity, and their ability to reproduce in captivity.

Principal investigator: *Ruth Francis-Floyd, University of Florida. e-mail: rff@gnv.ifas.ufl.edu*

Ecophysiological Assessments of Critical Juvenile Fish Habitat: Applications for Stock Enhancement and Habitat Conservation. (R-LR-A-25)

Fish populations living in estuaries can be improved by both adding fish raised in hatcheries and by protecting their habitats. However, for these techniques to be effective, methods need to be developed to determine which habitats in the estuary are the "best" for stocking and protecting. The purpose of this project is to develop tools such as computer models and surveying techniques that can be used to accurately evaluate fish nursery habitats in estuaries. The project is being conducted in cooperation with Texas and North Carolina Sea Grant.

Principal investigator: *Ken Leber, Mote Marine Laboratory. e-mail: kleber@marinelab.sarasota.fl.us*



MARINE BIOTECHNOLOGY:

Development of a Marine Prophage Induction Assay for Detection of Mutagens in Seawater Samples.

(R/LR-MB-3) Many coastal environments in Florida and nationwide receive effluent or seepage from waste disposal sites that contain carcinogens. There is an obvious need to rapidly identify genotoxic pollutants in seawater to prevent widespread mutations in marine flora and fauna and to minimize the health risks posed by human exposure to these pollutants. Unfortunately, current techniques for identifying the presence of such mutations do not work with seawater samples. The goal of this project is to develop a method for detecting carcinogens in coastal waters by using a marine prophage induction assay.

Principal investigator: *John Paul, University of South Florida. e-mail: jpaul@seas.marine.usf.edu*

Marine Invertebrate-Associated Microorganisms as a Source of Novel Agents for Biotechnology. *(R/LR-MB-4)*

The discovery of new compounds that can be used to improve human health has slowed due to the fact that scientists have looked nearly everywhere such compounds might be found. This is particularly disturbing due to the increase in the number of harmful microorganisms that are resistant to the antibiotics that were previously used to control them. Fortunately, marine microbes,

especially those associated with such invertebrates as sponges and tunicates, may contain the desired compounds. So far, the potential of these marine creatures as a source of these compounds has not been adequately explored. This project will identify, isolate and grow microorganisms associated with marine invertebrates in hopes of discovering new and effective compounds for pharmacological evaluation. **Principal investigator:** *Bill Baker, Florida Institute of Technology. e-mail: bbaker@fit.edu*

Marine Invertebrate Cell Culture for In Vitro Production of Compounds with Therapeutic Potential. *(R/LR-MB-5)*

Recent discoveries indicate that natural marine products exist that can be developed into drugs for fighting human diseases. Unfortunately, these products are found in such small numbers that it is difficult to remove enough of them from the sea to conduct pre-clinical and clinical tests of their effectiveness. Even if larger numbers of them were found, removing them could harm the environment. The goal of this project is to identify, clone and produce invertebrate growth-regulating genes that can then be used to improve the success of growing large quantities of these valuable marine products in the laboratory.

Principal investigator: *Shirley Pomponi, Harbor Branch Oceanographic Institution. e-mail: pomponi@hboi.edu*

Development and Optimization of *In Vitro* Production Methods of Bioactive Marine Alkaloids. (R/LR-MB-6) The development of promising pharmaceutical agents from marine invertebrates is often hampered by the fact that these invertebrates are frequently in short supply. There are also concerns that removing the needed amounts of invertebrates could be harmful to the marine environment. As a possible alternative, this project looks at ways two important groups of bioactive marine alkaloids, the ecteinascidins and stevensine, could be produced in sufficient quantities under laboratory conditions.

Principal investigator: *Russell Kerr, Florida Atlantic University. e-mail: RKerr@acc.fau.edu*

Cellular Localization and Production of Bioactive *Discodermia* Metabolites. (R/LR-MB-7) Discodermolide is a potent anti-tumor compound that shows great promise as an anticancer agent. So far, however, scientists have been unable to obtain sufficient amounts of this compound to conduct clinical tests. Recent studies suggest that discodermolide is produced by a microorganism associated with sponges. This project seeks to discover ways this microbe can be isolated and grown under controlled conditions in order to produce enough discodermolide for clinical testing.

Principal investigator: *Susan Sennett, Harbor Branch Oceanographic Institution. e-mail: sennett@hboi.edu*



COASTAL PROCESSES:

Evaluation of Nearshore Sea Severity at Hurricane Landing for Application to Florida Coast Conservation. (R/C-S-37) The type of sea bottom located just offshore plays a major role in determining the strength of waves striking the shore in a hurricane. Because the bottom type varies so much along the Florida coast, the resulting damage from a hurricane can be expected to vary as well. The objective of this project is to provide information on the expected sea severity in the nearshore zone during a hurricane at 12 Florida locations. The resulting information should be of major benefit to those involved in law, policy, trade and engineering as they relate to hurricane damage and to defining

strategies for conserving Florida's coastline.

Principal investigator: *Michel Ochi, University of Florida. e-mail: ochi@coasta.ufl.edu*

Post-storm Model for the Reconstruction of Habitable Coastal Structures. (R/C-D-17) One of the most difficult problems confronting officials in the aftermath of a hurricane is deciding which damaged homes and buildings should be rebuilt and which should be razed. This project will result in the development of a model that will allow planners to quickly assess and categorize structures that have been damaged by hurricanes. Researchers working on this project will receive

guidance from an advisory committee consisting of members representing various interest groups.

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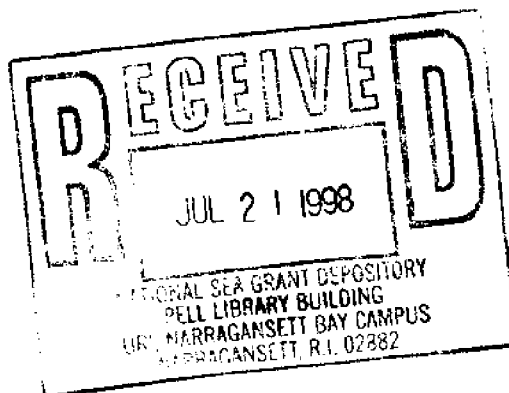
Development and Implementation of a Gaming Simulation of Community Planning for Hurricane Mitigation and Disaster Recovery. (R/C-P-22) Both the federal and state government have recently begun encouraging or requiring local governments to prepare various plans and strategies for reducing the impact of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

Principal investigator: Richard Smith,
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The Legal and Institutional Framework for Regional Coastal Waterway Management in Southwest Florida.

(R/C-P-23) In Florida, recreational boating is a \$2 billion economic activity--and it's still growing. Unfortunately, this level of boating activity cannot be maintained unless better ways are found to reduce conflicts between boaters, other coastal resource users, and the marine environment. This project will develop alternatives for implementing a cooperatively developed regional plan for managing anchorages and associated boating activities in Southwest Florida. It will provide the legal and institutional analysis needed to develop an innovative, locally-produced plan for meeting the waterway management needs of Southwest Florida.

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This information is provided by the Florida Sea Grant College Program. For more information, call, 352-392-5870, or write to us at: PO Box 110409-Bldg 803 - Gainesville Florida - 32611-0409. Be sure to check out our web site at: WWW.FLSEAGRANT.ORG/

