

HOOK, LINE & SINK 'EM

Rapid descending gear shows promise for improving survival of released fish

There's always something biting in Florida, the "Fishing Capital of the World." Unfortunately, if reef fish are what's biting and being caught – grouper, snapper, amberjack, triggerfish, porgy, sea bass, hogfish or tilefish – they must often be released due to bag limits, closed seasons and other management measures.

State and federal regulations in the Gulf of Mexico and South Atlantic also require the use of specialized gear to reduce mortality of released fish. All these measures are ineffective, however, if the released fish do not survive.

Talk to any experienced deep-sea angler, and you will learn about the problems of releasing fish caught in deep water.

Fish retrieved from depths greater than 60 to 80 feet often experience problems caused by the rapid change in pressure. Gas in their swim bladder, which is used to control their buoyancy, expands and ruptures the bladder, releasing gas into the fish's body cavity. The gas keeps the fish afloat, unable to swim back to the lower depths from which it came.

Florida Sea Grant is now part of a national deep-water release working group to test and implement best practices that the sportfishing community can use to improve reef fish survival.

Under the leadership of extension agents **John Stevely** and **Bryan Fluech**, Florida Sea Grant and fishing volunteers are testing the practicality and efficiency of a range of weighted descent devices that can return reef fish to the depth of capture faster.

"This is a tough issue," said Stevely. "It just might be that fish caught from extremely deep water may not be able to survive. There are no magic bullets. But even if we only achieve a small improvement, that would be a big success."

Florida Sea Grant



Florida Sea Grant extension agent John Stevely is testing a modified Cabela's Fish Gripper and other descending gear to improve survival of released grouper, snapper and other reef fish.

Data from the field trials are still being collected, but early results are promising. The volunteers have been impressed with how easy it is to use some of the gear, and testers are able to return the fish to water in one to two minutes. This is consistent with descending gear trials on the U.S. West Coast, which indicate the survival of some species can be significantly increased if fish are quickly returned to depths where they can recompress.

Recent snapper and grouper closures in the Southeast have heightened awareness of the role that recompression can play in the survival of reef fish. For now, fishermen in the Gulf of Mexico can only use descending devices in conjunction with venting.

"I believe federal fishery resources managers will probably consider allowing anglers to use descending devices in the Gulf in the future, as use of all types of venting and descending devices is currently permissible in the Atlantic," said Stevely. "Our trials are putting us one step closer to making that future a reality."

FLORIDA SEA GRANT NETWORK MEMBER INSTITUTIONS

University of Florida (Host) Gainesville, FL

Florida Atlantic University/
FAU at Harbor Branch Oceanographic
Boca Raton/Ft. Pierce, FL

Florida Gulf Coast University
Ft. Myers, FL

Florida A&M University
Tallahassee, FL

Florida Institute of Technology
Melbourne, FL

Florida International University
Miami, FL

Florida State University
Tallahassee, FL

Jacksonville University
Jacksonville, FL

Mote Marine Laboratory
Sarasota, FL

New College of Florida
Sarasota, FL

Nova Southeastern University
Dania Beach, FL

University of Central Florida
Orlando, FL

University of Miami
Miami, FL

University of North Florida
Jacksonville, FL

University of South Florida
St. Petersburg, FL

University of West Florida
Pensacola, FL

Dear Friends,



This issue of our Program Highlights comes during the 150th anniversary of the Land Grant University system, and Florida Sea Grant is proud to be hosted by Florida's Land Grant University, the University of Florida.

Sea Grant and Land Grant have much in common, providing solution-oriented research, outreach and education. Our mission is to conserve coastal resources and enhance economic opportunities for the people of Florida. We do this by working closely with local governments, agencies, the private sector and non-governmental organizations, to ensure that we wisely use our funds to tackle the most pressing issues.

Through a research grant program funded by NOAA, we support Florida university faculty who work to address pressing issues using cutting-edge research. Extension faculty, located in Gainesville and throughout the state, guide their communities on issues ranging from recreational fishing and aquaculture to energy conservation, while providing support during times of crisis caused by nature and man.

Our scholarship programs allow more than 30 students a year to pursue undergraduate and graduate degrees, fostering the next generation of scientists, engineers and decision-makers. Our work with youth builds awareness of how actions affect the coastal zone, while teaching important concepts and immersing kids in projects to restore valuable habitat.

In this report, we showcase examples of success from 2011-12, which are possible due to long-standing partnerships with the University of Florida, the State University System, NOAA, and coastal communities of our Sunshine State.

Sincerely,

Karl Havens, Director
Florida Sea Grant

NEW AQUACULTURE CURRICULUM RAISES SCHOOL'S GRADE

Add middle and high school students to the growing list of Floridians learning about aquaculture, a relatively new industry that already generates a \$250 million economic impact annually in the state.

In a remarkable 900-square-foot greenhouse on their campus, students at the Crystal Lake Middle School in Lakeland are trying their hand at raising tilapia and redfish, using the same methods and facilities found in private farms across the state.

The students' goals are not so much financial as they are academic. Principal **Chris Canning** believes implementing aquaculture education into his school's curriculum has helped turn around Crystal Lake's reputation as a chronic underachiever.

"The aquaculture program has brought about a whole change in the community of kids," Canning says. "It's really been a wonderful project for both our teachers and our students."



Florida Sea Grant photos

Students use math and chemistry principles learned in the classroom to calculate salinity levels and analyze water quality in growout tanks.

Crystal Lake is one of a growing number of Florida schools implementing technology-driven aquaculture programs to provide students with practical applications that reinforce concepts in math, science and even the social sciences. **Carlos Martinez**, an aquaculture extension specialist with the University of Florida Institute of Food and Agricultural Sciences' Tropical Aquaculture Laboratory and Florida Sea Grant affiliate, has helped Crystal Lake and more than a dozen middle and high schools across Florida implement aquaculture programs.

He and a larger team of IFAS extension professionals have recently written the "Teach Aquaculture" curriculum for middle and high schools that conforms to Florida's educational standards.

The curriculum is available online without charge and has already been downloaded more than 500 times. "In the short term, Teach Aquaculture stimulates a student's interest in learning," said Martinez. "In the long term, it gives a whole new generation the chance to think about aquaculture and marine science as a career."

"This program has put our school on the map."

-Chris Canning
Principal



Canning has used the aquaculture facility as the centerpiece of the school's revitalization efforts. They include the creation of the Crystal Academy of Science and Engineering, a magnet program for middle schoolers in Polk County wanting to follow a science or engineering academic path to high school. "When I came here, students were flying out of here. Now, a lot of those kids that left one and two years ago are all coming back," Canning said.

By another significant measure, the investment has paid off. In 2010, the school's grade rose one full letter, from a C to a B, based on students' improved scores on the Florida Comprehensive Assessment Test in reading, writing, math and science.

"That's the first time we've broken that barrier," Canning says. "We have an attractor now. It's an aquaculture facility that led to an academy setting, where kids that normally wouldn't come near this place are involved in this school. Parents are involved in this school. And there aren't two days that go by that a group doesn't want to come see what we're doing. This program has put our school on the map."



Read more about Teach Aquaculture at flseagrant.org.

SPOTLIGHTS

Meet our new extension agents! In 2011, **Libby Carnahan** joined Florida Sea Grant as the



marine extension agent for Pinellas County, and in 2012, **Rick O'Connor** became the marine extension agent for Escambia County. Carnahan, who holds a bachelor's degree in biology from Truman State

University and a master's degree

in marine science from the University of South Florida, works at the Weedon Island Preserve Center. O'Connor, who

holds a bachelor's degree in marine biology from Troy State University and a master's degree in science education and vertebrate zoology from the University of Southern Mississippi, is located at the Escambia County extension office in Cantonment.



Florida Sea Grant researcher **Arindam**

Chowdhury received a Faculty Early Career Development, or CAREER, Award from the National Science Foundation to fund research on the effect of hurricanes and winds on building and structures. An associate professor of civil and environmental engineering at Florida International

University, Chowdhury received Sea Grant funds to help construct a new 12-fan "Wall of Wind" to simulate Category 5 hurricanes. The WoW has led to better building codes and practices for the design of hurricane-resistant buildings in coastal areas.

Whitney Gray is Florida Sea Grant's sea-level rise coordinator. In this new position, which is funded through a partnership with the Florida Fish and Wildlife Conservation Commission, Gray will serve as the primary technical resource on sea-level rise. In addition



to helping incorporate sea-level rise planning into coastal natural resource programs, she will develop outreach materials for extension agents. Gray works at the FWC headquarters in Tallahassee.

LEADING SHARK CONSERVATION EFFORTS

In January, a new Florida law went into effect that protects tiger sharks and three species of hammerheads from harvest in state waters.

"Florida waters are one of the final bastions for shark diversity in North America, yet these waters are also revered recreational fishing grounds for multiple species," said **Neil Hammerschlag**, Florida Sea Grant researcher and assistant professor of marine affairs and policy at the University of Miami Rosenstiel School of Marine and Atmospheric Science. "As such, there is a growing research interest in how non-harvest activities like recreational catch-and-release fishing may affect shark health in these critical feeding and nursery areas."

Hammerschlag and Florida Sea Grant scholar **Austin Gallagher** assessed the impacts of catch-and-release fishing on sharks in a year-long study. In addition to determining which sharks are most sensitive to catch-and-release fishing, the scientists were able to recommend the best release tactics for each species and develop a field test for determining shark stress. The test, which costs less than \$1, uses a syringe to squirt saltwater on a landed shark's eye to determine if the shark is under stress. If the shark is under stress, the angler should return it to the water immediately. The test and new release tactics are part of a new Florida Fish and Wildlife Conservation Commission educational campaign highlighting handling techniques that will increase the survival rates of sharks.



Emma Smith

University of Miami researchers Dr. Neil Hammerschlag, right, and Ph.D. student Austin Gallagher, center, prepare to test a massive female bull shark's blood for stress in the Florida Keys.

RIDING THE SPACE COAST ECOTOURISM WAVE

Ecotourism is the fastest-growing segment of Florida's \$65 billion-a-year tourism industry, and Florida Sea Grant extension agent **Holly Abeels** is bringing a little piece of that pie to Brevard County.

Abeels teamed up with the Space Coast Office of Tourism to develop an ecotourism certification program for local boat captains. The 12-hour course includes information on wildlife in Brevard County, business development and nature tourism practices.

"The program helps the captains enhance their businesses and gives them an opportunity to provide a different kind of chartering experience to clientele," said Abeels. "The tours themselves focus on the enjoyment and conservation of the Space Coast's ecological and historical waterways."

Seven boat captains have completed the program, and started a joint business, Space Coast Boating Adventures. The business is currently working to develop an online tour reservation system. The Space Coast Tourism Office is assisting with marking and recruiting hotels to promote the ecotourism boating charters.

The captains have committed a great deal of time and effort into development of this business and continue to be involved in educational opportunities that arise. Florida Sea Grant and Brevard County Extension will continue to offer the certification program for new captains, while offering continuing education units every year for certified captains.



RESEARCHERS ADAPT MULTI-SPECIES MODEL TO GULF GROUPER FISHERY

Florida Sea Grant is currently funding research that is the first in the southeastern U.S. to adapt the forerunner of new fisheries models to grouper populations off Florida's Gulf of Mexico coast.

The Ecopath modeling software suite generates powerful computer simulations that could help fisheries managers better estimate the size of grouper, snapper and other reef fish populations.

Managers currently depend on single-species models, but the Ecopath suite brings a multi-species capability that allows scientists to better calculate direct and indirect effects from a multitude of factors in the ocean environment.

In this case, the project team is particularly focused on exploring how regulations influence the economic value of the grouper fishery as well as reef fish diversity.

Using this approach may help fishery managers, commercial fishermen and recreational fishermen understand how tradeoffs in the value of recreational and commercial fisheries can be balanced with the need for healthy reef ecosystems.

"Groupers represent some of the most prized fisheries in the Gulf of Mexico," says lead researcher **Mike Allen**, a professor of fisheries at the University of Florida. "However, regulations put



Keith Millie, FWC

Gag grouper school beneath a reef in the Gulf.

in place to protect grouper could have influences on red snapper and the rest of the reef fish community. Fisheries managers need tools to explore how management actions can influence both the economic value of fisheries and the health of reef ecosystems."

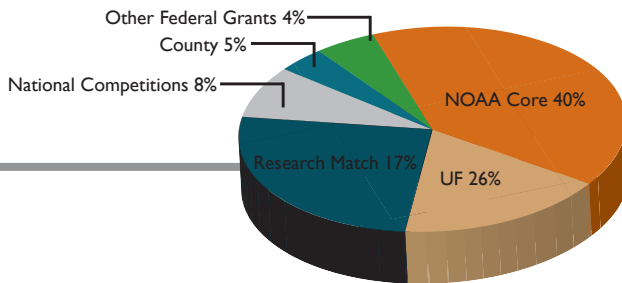
A portion of the project has entailed customizing the model to more accurately reflect neighboring species, environmental conditions, human fishing effort, and existing management controls for the grouper fishery in the Gulf.

At a recent workshop organized by cooperating researchers **Dave Chagaris** and **Behzad Mahmoudi** at the Florida Fish and Wildlife Conservation Commission, fisheries managers and representatives from commercial and recreational fishing groups worked with the model to examine its ease of use, and explored its potential as a management tool.

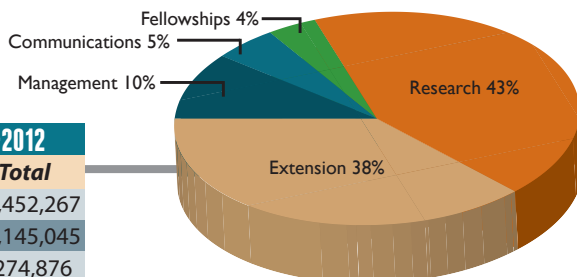


"What we have now is the ability to highlight the types of tradeoffs we're going to encounter when we're simultaneously trying to maximize our economic and ecological goals for grouper," Allen says. "The next step will be to begin the process of incorporating it into the complex stock assessment process."

2011-2012 CUMULATIVE BUDGET



WHERE OUR MONEY COMES FROM AND HOW WE USE IT



| CUMULATIVE BUDGET 2011-2012 | |
|-----------------------------|---------------------|
| Funding Area | Total |
| Research | \$ 2,452,267 |
| Extension | \$ 2,145,045 |
| Communications | \$ 274,876 |
| Management | \$ 556,881 |
| Fellowships | \$ 246,000 |
| Total | \$ 5,675,069 |

2011 EDUCATION & OUTREACH ACTIVITIES

| | EDUCATION | | |
|----------------------------|-----------|----|-------|
| | Undergrad | MS | Ph.D. |
| College Students Supported | 7 | 34 | 22 |
| Students Graduated | 7 | 18 | 6 |

| Outreach | # Attendees |
|-----------------------------------|-------------|
| K-12 Teacher Trainings | 1,240 |
| Meetings/Workshops/Conferences | 2,500 |
| Public/Professional Presentations | 26,908 |
| K-12 Students Reached | 3,766 |
| Citizen Volunteer Hours | 7,308 |

| 2011 PUBLICATIONS | |
|-----------------------------------------|---------|
| Type | Number |
| Peer-Reviewed Journal Articles | 17 |
| Proceedings/Symposia | 1 |
| Brochures/Fact Sheets | 18 |
| Newsletters/Periodicals | 9 |
| Websites Developed/Maintained | 15 |
| National Library Downloads of Documents | 189,409 |

SCHOLARSHIP AND FELLOWSHIP RECIPIENTS

The **Knauss Fellowship** provides qualified graduate students pursuing careers in ocean and coastal resource policy with a one-year paid fellowship in Washington, D.C., in selected legislative or executive branches of the federal government.



Julia Galkiewicz holds a Ph.D. in biological oceanography from the University of South Florida. Executive branch fellowship with the NOAA OAR Communications Office.

Robert Jones

has an M.S. in marine affairs and policy with a focus on fisheries and aquaculture management from the University of Miami. Executive branch fellowship with the State Department Office of Marine Conservation.



Sponsored by the **Aylesworth Foundation for the Advancement of Marine Science**, this scholarship is available to students interested in any academic discipline having direct application in marine science.



Michael Dickson is an M.S. student in fisheries and aquatic sciences at the University of Florida studying species in benthic habitats of Florida.

Jeffrey Ellis is a dual

M.S. student in marine biology and coastal zone management at Nova Southeastern University's Oceanographic Center modeling mortality rates at haul back and by-catch of the pelagic longline fleets in the Atlantic.



Christy Foust is a Ph.D. candidate in ecology and evolution at the University of South Florida examining how stressors related to climate change such as increased salt marsh salinity affect genetic structure of plants.

The **Skoch Scholarship** is awarded to a Florida high school senior competing at the State Science and Engineering Fair of Florida.

Darah Nason is a senior at the Academy of Environmental Science in Crystal River plans to attend the University of West Florida to major in environmental psychology and ultimately get a Ph.D in marine biology.



In partnership with the **Guy Harvey Ocean Foundation**, this scholarship recognizes students whose research focuses on improving sustainable management of large fish and sharks.

Sean Bignami is a Ph.D. candidate at the University of Miami Rosenstiel School of Marine and Atmospheric Science examining the effects of ocean acidification on the development, growth and behavior of cobia and mahi-mahi.



Felipe Carvalho

is a Ph.D. candidate in fisheries and aquatic sciences at the University of Florida researching blue shark stock assessments.

Laura Habegger

is a Ph.D. candidate at the University of South Florida studying bill mechanics and feeding adaptations in marlin, swordfish, sailfish, and other pelagic predators.



Kier Smith is an M.S. student at Florida Atlantic University seeking to reduce the incidental catch of sharks and rays in longline commercial fisheries through his research.

Sarah Stephens

is an M.S. student in fisheries and aquatic sciences at the University of Florida researching the migratory patterns and populations of Permit, a large game fish, through a tagging study.



Florida Outdoor Writers Association scholarship is for students whose career goals are to communicate an appreciation for the outdoor experience.



Andrew Barbour is a Ph.D. candidate in fisheries and aquatic sciences at the University of Florida researching snook habitats.

Jim Harper is

a graduate student in environmental studies at Florida International University who works as a freelance writer and columnist for the "Biscayne Times."





LEGAL PARTNERSHIP SUPPORTS COASTAL COMMUNITIES

Florida Sea Grant is supporting waterfront communities by providing legal research and extension to state and local policymakers through a unique partnership with the Conservation Clinic at the University of Florida's Levin College of Law.

The clinic works directly with coastal communities to help them address specific coastal planning and policy issues. For instance, the group helped clam farmers in Cedar Key, the epicenter of the state's clam aquaculture industry, receive a major new tax benefit.



"We advised the Cedar Key Aquaculture Association on a policy framework that led to the clam farmers receiving \$16,000 in property tax reductions," said **Tom Ankersen**, Conservation Clinic Director and Sea Grant legal specialist. "For the average clam farmer who works hard under difficult circumstances, that savings was a big deal."

Recently the clinic surveyed 2,500 coastal property purchasers to determine if they received adequate notice of erosion issues and other information required by a 2006 law. More than eight in 10 respondents could not recall seeing the information, so Ankersen and his team proposed revisions to the law to better accomplish its purpose. The revisions are included in Florida Sea Grant publication TP-194, *Florida's Coastal Hazards Disclosure Law: Property Owner Perceptions of the Physical and Regulatory Environment*.

FREEZING SEA OATS NOURISHES BEACHES AND BUSINESSES

Sea oats are much more than decorative beach foliage. The wispy grass creates a natural barrier between land and water by trapping wind-blown sand and stabilizing beach dunes. A Florida Sea Grant researcher is developing novel deep-freeze techniques for sea oats that will keep this natural barrier in place for years to come.



2001

Sea oats planted on Fernandina Beach in 2001 were thriving by 2005 and trapped enough sand by 2010 to create a natural barrier between this house and the ocean.



2005



2010



Mike Kane

Students at Matanzas High in Palm Coast grew out sea oats in a greenhouse and later planted them in dunes. "There's no doubt this experience gave them a greater appreciation of the importance of maintaining Florida's coastal resources," said Maia McGuire, Florida Sea Grant extension agent for Flagler and St. Johns counties.

"The 2004 hurricane season showed us how important it is to have effective ways of rebuilding our dunes," said **Mike Kane**, the University of Florida horticulture professor leading the study. "Dune plants are an essential part of that rebuilding."



Kane is testing how cryopreservation, the freezing of young sea oat shoot tips and seed at sub-zero temperatures, might alleviate the shortage of plants that commercial nurseries experience when storms decimate existing stands of sea oats and their valuable seed.

After cryogenic storage and recovery, the seed and shoot tips can be rapidly cultured in greenhouses using commercially viable micropropagation techniques that Kane developed with previous Sea Grant funding.

One of the principles underlying Kane's research is giving Florida's native plant nurseries the means to produce enough sea oats to replant and restore dunes with varieties best suited to their environment.

"Sea oats are extraordinarily genetically diverse," Kane said. "Beaches can have very different growing conditions. It's important to try to plant the kinds of sea oats that are best adapted to local conditions. It is also important to maintain a high level of genetic diversity in the dune populations."

Gary Hennen of Oglesby Plants International in Florida said he hopes to put Kane's research to good use. "There is a need for millions of these plants, and this is the sort of work that is going to allow us to fill that need. That's not only going to be good for our beaches, but it's potentially a major boon for a lot of businesses as well."



Florida Sea Grant College Program
PO Box 110400
University of Florida
Gainesville, FL 32611-0400
(352) 392-5870

flseagrant.org

This publication is supported by the National Sea Grant College Program of the United States Department of Commerce, National Oceanic and Atmospheric Administration, under NOAA Grant NA06OAR-4170014. The views expressed herein do not necessarily reflect the views of any of these organizations.

Florida Sea Grant is committed to responsible and sustainable printing practices. This document is printed on recycled paper using vegetable-based ink.