



Tidings

A publication of the Florida State University Coastal & Marine Laboratory

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Too Salty? Effects of salinity on Apalachicola oysters

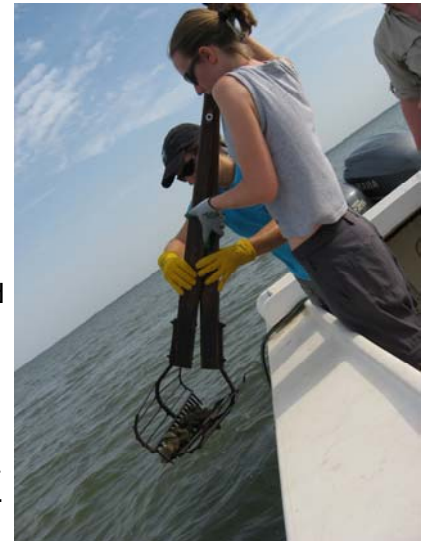
By Laura Petes

How does altering freshwater flow affect downstream estuarine oyster reef communities? Water allocation issues are pressing in the U.S. Southeast, particularly under drought conditions like those we had in 2007. Atlanta uses water from the Chattahoochee River, which is a major tributary to the Apalachicola River. Downstream is Apalachicola Bay, a pristine and productive ecosystem that supplies 90% of the oysters for the state of Florida. Reduced freshwater input can lead to high salinity in estuarine environments. In this context, I am studying how temperature and salinity affect Apalachicola oyster survival, condition, and disease. Dermo disease, caused by the protozoan parasite *Perkinsus marinus*, thrives in warm water at high salinity. This parasite is typically kept at low levels due to freshwater input, but when salinity remains high for prolonged periods, particularly during warm summer months, disease-related oyster mortality occurs.

Through my research, I work closely with the [Apalachicola National Estuarine Research Reserve](#) performing field surveys to determine how oyster disease prevalence and intensity fluctuate with seasonal changes in temperature and salinity. My laboratory experiments at the FSUCML address the effects of temperature and salinity on oyster disease. The results indicate that, as predicted, disease-related mortality of oysters is high with warm water and high salinity. In addition, mortality tends to be size-specific, with large oysters having much higher disease-related mortality rates than small individuals. These results have important implications for both oyster population dynamics and water allocation policy in the Apalachicola River watershed.



Two undergraduates from the Department of Biological Sciences' "Certificate Program in Marine Biology" are participating in the project this summer. **Alicia Brown** will determine the relationship between oyster size and infective Dermo cell size. **Carley Knight** will test the effects of salinity on the physiology and feeding ability of oyster drills, predators of oysters that are more abundant in the estuary during periods of high salinity.



Going Green

There is a movement afoot worldwide to change the way we live and do business that focuses on stewardship and the inextricable linkage of environmental and social justice. The movement sprang from individuals who understood the finite nature of many of the natural resources on which we depend and who recognized the need for change at the grass-roots level. Many of you may already be involved, simply by minimizing your ecological footprint at home. Certainly change—like charity—starts at home. But has it carried over to your workplace? This is something to ponder as corporations from Toyota to General Electric go green.



We at the FSUCML have embarked on our own journey to greenness, initiated by a Progress Energy audit two years ago. That audit revealed, among other things, an overpowered seawater system that accounted for half of our energy use, delivering water at a rate far faster than necessary. The solution? Install control systems to bring pumping rates in line with user needs and thereby reduce energy use while increasing water quality. Thanks to **Dennis Bailey**, Associate Vice President of Facilities, those controls are now in place. We've also reduced the number of lights in use, installed motion sensors, and replaced worn heat and air systems and appliances with those rated for high energy efficiency. This year, Dennis Tinsley, FSUCML facilities manager, will start the conversion to solar water heating. Next—highlighted in the FSUCML strategic plan—is incorporating environmentally friendly designs that meet the green standards of the *Leadership in Energy and Environmental Design* (LEED) system (<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222>) into all building upgrades and expansions. We'll hold several meetings this year to get your input and insights.

This interest in “going green” compliments our overall mission to conduct research that helps solve the ecological problems of the coastal and marine ecosystems in this part of the world by providing the scientific underpinnings for informed policy decisions. Indeed, we hope that this laboratory, because of its proximity to the coast and direct access the renewable resources of sun and wind, can serve as a model for others.

Special Thanks!

We would like to express our appreciation to those individuals who have contributed their energy, time, or financial support to the Lab. **Scott Cisson**, Director of FSU Grounds, and **Jody Walthall**, Native Nurseries, provided plants and muscle for re-landscaping around the Lab entrance. **Plato Smith**, Digital Initiatives Librarian, had the entire check-list of marine fauna and flora scanned into PDF format. Donations came from **Mike Greenberg**, **Bill Herrnkind**, **Dennis Swanson**, **Des O'Neill**, **Patrick Hamilton**, and **Nick Baldwin**. Nick also allowed us permission to use some of his excellent underwater images. **Tom Shewan**, Director of Maintenance, **Joe Adams**, Project Manager, and **Mark Bertolami**, Director of Facilities Planning, have all been tremendously helpful in our efforts to upgrade and maintain the Lab. Finally, we give thanks to **Dama Murphy**, Office Manager for the FSUCML, who has moved on to new challenges. Dama worked hard during her tenure at the Lab to bring order to our fiscal operations. We wish her good luck in her future endeavors!

Research Highlights

Resident faculty member **Dr. Dean Grubbs** recently completed a two-week expedition to Hawaii sponsored by National Geographic Television. The purpose was to continue his studies of the biology of bluntnose sixgill sharks (*Hexanchus griseus*). Despite being one of the world's largest predatory fishes (reaching at least 500 cm or 16 feet in length), very little is known about this species due to its deepwater habits. Bluntnose sixgill sharks are distributed worldwide in tropical and temperate seas, but are usually associated with continental and insular slopes at depths of 300 to 1000 meters (~1000-3300 feet).

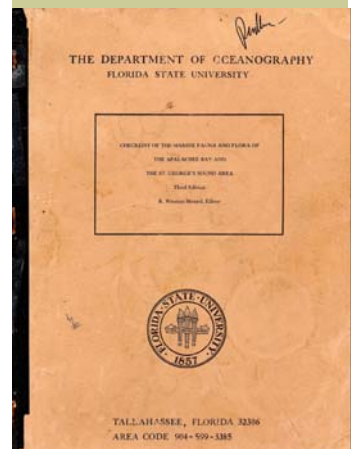
During the expedition, six adult sixgill sharks were captured, including the recapture of a shark Dean originally tagged in 2005. Dean equipped three of these sharks with pop-off archiving satellite transmitters (PSATs) in hopes of investigating daily, lunar, and seasonal patterns in vertical habitat use. The PSATs will record depth, temperature, and light every few seconds for several months, then will release from the sharks at pre-programmed dates, float to the surface, and upload the archived data to a satellite. The data will then be transmitted to the researchers for analysis. A large (431 cm) sixgill shark Dean tagged last January showed distinct daily vertical migrations. This shark spent the daylight hours at depths of 600-800 meters where temperatures were 5-6°C. At each sunset, she ascended to depths of 250-300 meters and temperatures as warm as 15°C where she remained throughout each night, returning to deeper, colder waters just before sunrise.

Dean and his colleagues also captured other fascinating species including huge tiger sharks (*Galeocerdo cuvier*), the very poorly known deepwater stingray (*Plesiobatis daviesi*) and a gulper shark (*Centrophorus* sp.) that had never been recorded in the central Pacific Ocean and could represent a new species to science. All of the work in Hawaii was filmed by National Geographic Television for an episode of "Dangerous Encounters" to air later this year.

Big Bend Biodiversity Project

In 1956 Winston Menzel updated a study of the Florida State University Oceanographic Institute into an "Annotated Check-List of the Marine Fauna and Flora of the St. George's Sound-Apalachee Bay region, Florida Gulf Coast." The third edition of this work, published in 1971, listed over 1,600 species of plants and animals. This document, the fruit of efforts by 75 biologists, listed species and provided general abundance and distribution information.

Two FSUCML volunteers, **Dennis Swanson** and **Emily Smith**, did the lion's share of entering the scientific names for the Check-list into a spreadsheet. Now we are in the process of adding the habitat and abundance data, updating the scientific and common names, providing the naming authority for each group, and searching for images of the species. At the very least, the Check-list is a potentially valuable resource for contemporary studies and education. If we are lucky, it might provide the basis for re-surveys of selected areas to provide insights into changes in biological diversity over a 50-year period. A meeting has been scheduled for this summer to discuss possible collaboration on the project with **Jessica Avant** (Central Panhandle Aquatic Preserve, FL-DEP) and **Jack Rudloe** (Gulf Specimen Marine Lab). This project will integrate with the FSUCML effort to create a bibliography of the research that has been done at the Lab and other important research conducted in the area.



Winter and Spring 2008

Marine Ecology for Teachers Program at FSUCML

by Bill Herrnkind

An occupational hazard for a research scientist is that everyone expects you to know the answer to any question. The attitude that a scientist is an information compendium stems from the *fact-heavy* science education we receive. In reality, doing research is mainly recognizing what is unknown and applying the inquiry process to discern how nature works. However, making observations and pursuing scientific methods to evaluate possible hypothetical explanations is not the educational norm. Laboratory exercises are usually self-demonstrations - stepwise directions assure the correct outcome. How can we expect a K-12 teacher to inculcate science inquiry in students if he or she has not experienced the process?



Marine Ecology for Teachers is a NSF-sponsored 6-week summer program at FSUCML (in its seventh year) providing ~20 K-12 teachers opportunity to investigate questions generated by their own spontaneous curiosity about the amazing sea creatures of our shores and shallows. On the "Science" side, Professor Emeritus Bill Herrnkind serves as their mentor and often assistant, collector, technical advisor or "gofer". On the "Pedagogy" side, Jeff Dutrow (master teacher and past instructor of the Saturday-at-the-Sea research camp) guides the participants through a reflective analysis of the inquiry process so each is able to translate his or her research experience into classroom practice. We expect that their experience and self-confidence gained "doing science" will inspire them to provide analogous experiences to their students.



MET is administered by Dr. Ellen Granger with able assistance of Dr. Robin Smith and Barry Golden of the Office of Science Teaching Activities. This team also directs the follow-up evaluations as teacher participants put their experiences into practice.

Facilities Update



- ◆ Spruced up gift shop



- ◆ Replaced decking on dock



- ◆ Upgraded electrical switching system



- ◆ New landscaping around sign and along fence



- ◆ Painted dorm interiors



- ◆ Upgraded to variable speed pump on seawater system



- ◆ Moved de-ionized water filtration into main lab



- ◆ replaced sliding glass doors



- ◆ Renovated 2 labs for new faculty

Whew!

Publications and Grants

Scientific Papers

(Note: The research for some of these papers was conducted while our faculty and post-doctoral researchers were at other institutions, but at least some of the writing and editing was accomplished at the FSUCML.)

Grubbs, R.D. and J.A. Musick. 2007. Spatial delineation of summer nursery areas for juvenile sandbar sharks in Chesapeake Bay, Virginia. In: C.T. McCandless, N.E. Kohler and H.L. Pratt, Jr. (editors). Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States. American Fisheries Society Symposium 50: 63-86.

Grubbs, R.D., J.A. Musick, C.L. Conrath, and J.G. Romine. 2007. Long-term movements, migration, and temporal delineation of summer nurseries for juvenile sandbar sharks in the Chesapeake Bay region. In: C.T. McCandless, N.E. Kohler and H.L. Pratt, Jr. (editors). Shark nursery grounds of the Gulf of Mexico and the East Coast waters of the United States. American Fisheries Society Symposium 50: 87-108.

Holland, K.N. and **R.D. Grubbs**. 2007. Chapter 10: Fish Visitors to Seamounts Section A: Tunas and Billfish. Pp. 189-207. In: T. Pitcher, T. Morato, P. Hart, M. Clark, N. Haggan and R. Santos, (editors). Seamounts: Ecology, Fisheries & Conservation. Blackwell Publishing: Fish and Aquatic Resources Series 12. Oxford, UK.

Mann, D.A., J.V. Locascio, **F.C. Coleman**, and **C.C. Koenig**. *In press*. Goliath Grouper (*Epinephelus itajara*) Sound production and movement patterns on aggregation sites. Endangered Species Research.

Koenig, C.C., **F.C. Coleman**, A.M. Eklund, J. Schull, and J. Ueland. 2007. Mangroves as essential nursery habitat for goliath grouper. Bulletin of Marine Science 80(3):567-586.

Petes, L.E., B.A. Menge, and G.D. Murphy. 2007. Environmental stress decreases survival, growth, and reproduction in New Zealand mussels. Journal of Experimental Marine Biology and Ecology. 351:83-91.

Petes, L.E., M.E. Mouchka, R.H. Milston-Clements, T.S. Momoda, and B.A. Menge. 2008. Effects of environmental stress on intertidal mussels and their sea star predators. Oecologia. Online First.

Smith, M.D., J. Zhang, and **F.C. Coleman**. 2007. Structural modeling of Marine Reserves with Bayesian estimation. Marine Resource Economics 22:121-136.

Smith, M.D. J. Zhang, and **F.C. Coleman**, 2008. Structural econometric modeling of fisheries with complex life histories. *J. Environmental Economics & Management* 55:265-28.

Non-technical Papers

Fisher, R. and **D. Grubbs**. 2007. Everybody loves ray? Virginia Marine Resource Bulletin. Volume 39(2):13-18. Virginia Sea-grant

Grants

Florida Sea Grant Newell Seminar Series Grant. \$1,088. Ecological forecasting of intertidal ecosystems: triaging the train wreck of climate change (Speaker: Brian Helmuth, USC). PI: **Laura Petes**; Co-PI: **Felicia Coleman**.

NOAA Saltonstall-Kennedy. \$77,000. Indirect effects of the bait-shrimp fishery on juvenile gag grouper. PI: **Chris Stallings**; Co-PI's: **Felicia Coleman**, **Chris Koenig**.

Florida Fish and Wildlife Conservation Commission. \$55,000. Faunal communities of the Big Bend seagrass meadows. PI: **Chris Stallings**; Co-PI: **C. Koenig**.

North Gulf Institute. \$10,000. How does the proximity to salt marsh habitat affect prey communities of late-state juvenile gag in seagrass meadows? PI: **Chris Stallings**; Co-PI: **Felicia Coleman**.

NOAA/Center for Sponsored Coastal Ocean Research. 8/1/05-7/31/2009. \$576,667. Linking hypoxia-induced habitat degradation to fishery outcomes: a bioeconomic approach based on brown shrimp (K. Craig, L. Crowder, M. Smith). Re-budget as subcontract to FSU: 8/1/07-7/31/09. (\$110,666, **Kevin Craig**).

NOAA/Center for Sponsored Coastal Ocean Research. 8/1/06-7/31/09. \$1,531,048. Reproductive and population effects of moderate hypoxia (P. Thomas, E. Buskey, P. Montagna, University of Texas). Re-budget as subcontract to FSU: 8/1/07-7/31/09. (\$60,147, **Kevin Craig**).

2008 FSUCML Lecture Series Second Thursday of the Month (usually)

- 14 Feb. 2008 **Bruce Menge**, Oregon St. Univ., “Coastal ecosystems: windows into ecological consequences of global warming?”
- 21 Mar. 2008 **Brian Helmuth**, University of South Carolina, “Ecological forecasting of intertidal eco systems: triaging the train wreck of climate change” This is one of the Elsie B. Newell Seminars sponsored by Sea Grant Florida.
- 10 Apr. 2008 **Stephanie Simek**, Florida Fish and Wildlife Conservation Commission, “The Florida Black Bear; Achieving Successful Co-Existence”
- 8 May 2008 **Kevin M Porter**, Florida Bureau of Archaeological Research, “A Historic Dugout from the Apalachicola River”
- 12 June 2008 **Dean Grubbs**, FSUCML, “Sharks and rays of Florida: an introduction to their diversity, identification, biology, and ecology”
- 10 July 2008 **Tim Larow**, FSU Center for Ocean-Atmospheric Prediction Studies, “Hurricanes: past, present, and future”
- 14 Aug. 2008 **Kevin Craig**, FSUCML, “Dead zones in the ocean”
- 11 Sept. 2008 **Chris Stallings**, FSUCML, “Predators, prey, and people: Indirect effects of fishing on marine communities”
- 8 Oct. 2008 **Bruce Means**, Coastal Plains Institute, “U.S. biodiversity hotspot”

Check our website for dates of these speakers at: <http://www.marinelab.fsu.edu/outreach.html#lecture>

Academic Courses, Non-credit Workshops, and Short Courses

BSC 4933-2, ST. Biology of Fishes (4 hrs); Chris Koenig

BSC 4933-2, ST. Special Topics in Marine Invertebrate Biology (3 hrs) Bill Herrnkind, Don Levitan, Janie Wulff, Laura Petes, Marcus Huettel, and Dave Ferrell.

OCC5419 c-1 (graduate), OCE4930-2 (Undergraduate). Biogeochemical Field Methods. Joel Kostka.

ISC 5535 Research for Teachers—Inquiry in Marine Ecology (6 hrs). Bill Herrnkind.

BSC 4934/BSC 5936 AAUS Scientific Diving: Methods for Scientists; Mike Lavender.

GIS short course— (3 days); Xiaojun Yang, FSU Department of Geography.



Mission: To solve ecological problems through innovative, interdisciplinary research in coastal and marine ecosystems of the northeastern Gulf of Mexico and provide scientific information as the basis for sound policy decisions.

Become a Friend of the FSU Coastal and Marine Laboratory!

Join a group of dedicated people who support our mission. You can help us by making a private tax deductible gift. Gifts of any amount are important, whether it's for our general operations or to an endowment dedicated to providing scholarships to undergraduate and graduate students for research.

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Please indicate if you would like to apply your donation to **General Operations** or to the **Scholarship Fund**

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Would you like for your gift to be anonymous? Yes No

Other ways to help the Lab:

Are you interested in becoming a volunteer? Yes No

Would you be interested in organizing volunteers? Yes No