


Fall 1995

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NSU Oceanographic Center

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Currents

Fall 1995 • Volume IX, Number 4



Dr. Gary Kleppel Assumes New Leadership Role

Dr. Gary Kleppel has been asked to serve as Director of the COBIA (Coastal Ocean Boundaries, Interactions and Assessments) Program for the next five years. "COBIA is a large network of marine scientists, managers, and academicians located throughout the southeastern U.S.," explains Dr. Kleppel. "Our area of interest is the South Atlantic Bight, which runs from Cape Hatteras to

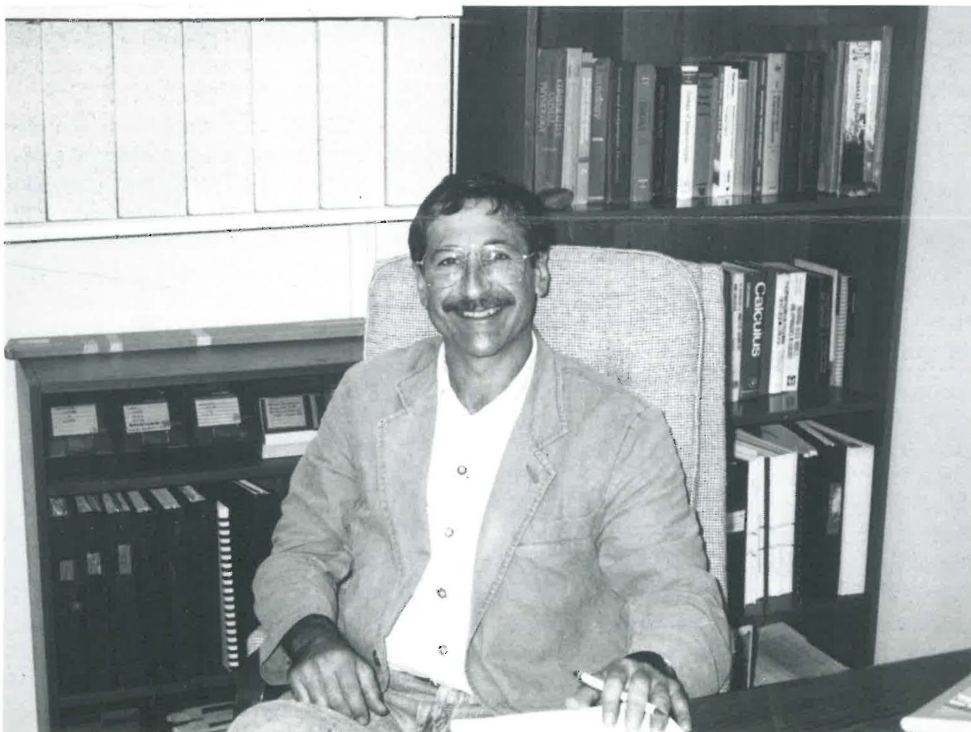
Cape Canaveral.

"Our interest is to increase the research experience, to affect academic outreach, and to improve the acquisition, archiving, and availability of information about this region," he continues. "We are doing this by developing communication networks, setting up multi-institution and multi-disciplinary research programs, sharing facilities, and reduc-

ing redundancy in research."

Several projects are underway at present. They involve the physics and biology of inlets, studies of the contamination and toxicology of Charleston Harbor, and sediment transport and geomorphology along the Carolina and Georgia coasts.

According to Dr. Kleppel, "A new project called the Land Use Coastal Ecosystem Study (LUCES), funded by NOAA's Coastal Ocean Program, will fall under the COBIA umbrella. LUCES will represent an effort to develop scientifically based resource management models during a period of enormous population growth in the Carolinas and Georgia over the next ten years." Directing LUCES with Dr. Kleppel is **Mr. Richard DeVoe**, of South Carolina Sea Grant. Besides NSU, several other major institutions are involved in LUCES. They include the University of Georgia and its Marine Laboratory on Sapelo Island, the Skidaway Institute of Oceanography, the University of South Carolina, Belle Baruch Institute of the University of South Carolina, Clemson University, the University of Charleston, and the South Carolina Sea Grant consortium located in Charleston. Dr. Kleppel is looking ahead to a series of workshops that will be held to discuss various aspects of the program.



Dr. Kleppel, in his laboratory.



Dr. McCreary with President Ovid Lewis.

Julian McCreary Wins Prestigious Award

Dr. Julian McCreary, Dean of the Oceanographic Center, has been awarded the prestigious Sverdrup Gold Medal by the American Meteorological Society (AMS). The award will be presented at the Awards Banquet of the 76th Annual Meeting of the AMS on January 31, in Atlanta.

In the words of the Society, "The Sverdrup Gold Medal is granted to researchers who make outstanding contributions to the scientific knowledge of interactions between the oceans and the atmosphere. Friends of the late Harald Ulrik Sverdrup have established a Sverdrup Memorial Fund. As the fund grows, its activities will be expanded to honor Professor Sverdrup's name in other ways. The medal will be awarded at suitable intervals. Unlike other awards, the Sverdrup Gold Medal is awarded by the President of the Society on the advice of an international committee appointed in consultation with representatives of the Scripps Institution of Oceanography, La Jolla, California, and the University of Bergen, Bergen, Norway."

This particular citation will read that it is presented "for fundamental contribution to the physical understanding of upper-layer dynamics including El Niño, the Equatorial Undercurrent, the ocean mixed layer, and eastern boundary currents."

On October 10, Center faculty, staff, and students threw a surprise party in the Richardson Library for Dr. McCreary, in celebration of the honor that he has brought to us all. President **Ovid Lewis** and his wife **Clare** joined us in the festivities.

People on the Move

Dr. Mahmood Shivji attended the 125th Annual Meeting of the American Fisheries Society in Tampa, Florida, August 27-31. The theme of the meeting was "Fisheries: A Vision for the Future - Science, Application, Communication."

Dee Bristol, **David Gilliam**, and **Robin Sherman**, all graduate students of **Dr. Richard Spieler**, also attended the American Fisheries Society meeting in Tampa.

On July 25, Ph.D. candidate **David Gilliam** was Guest Speaker at the Miami Museum of Science and Planetarium, where he received a plaque for his efforts. He spoke on "Nova Southeastern's Artificial Reef Program." He had presented a similar talk as Luncheon Speaker for the Rotary Club of Fort Lauderdale in March. Mr. Gilliam also traveled to Tokyo to attend "ECOSSET '95," the Sixth International Conference on Aquatic Habitat Enhancement, October 29 - November 2. He presented a talk entitled "Evaluation of a Novel Material for Artificial Reef Construction." The theme of the conference was ecological system enhancement technology for aquatic environments. While in Japan, Mr. Gilliam spent several days in Sapporo visiting **Dr. Yasushi Fukamachi**, a former student of **Dr. Julian McCreary** who received his Ph.D. degree from Nova in 1992.

Dr. Richard Spieler attended the World Conference on Chronobiology and Chronotherapeutics at the University of Ferrara, Ferrara, Italy, September 6-10. Soon thereafter, during September 28-29, Dr. Spieler attended a conference sponsored jointly by the Scientists Center for Animal Care and by The Canadian Council on Animal Care, held at the Royal York Hotel in Toronto, Canada. He presented a talk entitled "The Care and Use of Fish, Amphibians and Reptiles in Research." Then, on September 30, Dr. Spieler attended a symposium in honor of **A.H. Meier**, which was held at Dr. Spieler's alma mater, Louisiana State University in Baton Rouge.

Several Center faculty members and students were involved in the October 17-18 Florida Bay Science Conference, which was held at the University Centre Hotel in Gainesville, Florida. The conference was sponsored jointly by the University of Florida Institute of

Food and Agricultural Sciences and by Florida Sea Grant; its purpose was the presentation of reports by the program's many principal investigators. **Dr. Richard Dodge** attended and was co-author of a paper presented by **Dr. Peter Swart**, of the University of Miami, entitled "A History of Salinity and Eutrophication in Florida Bay, Using Stable Oxygen and Carbon Isotopes from Scleractinian Corals."

Dr. Gary Kleppel and M.S. student **Erin Kerby** also attended the conference and presented a poster, which was co-authored by Ph.D. student **Carol Burkart** and M.S. student **Lee Houchin**. The poster was entitled "Zooplankton Grazing and Production in Florida Bay." Ms. Kerby's M.S. thesis work is closely tied to this project. She attended the conference as part of the Department of Environmental Protection (DEP) group, which has been working in Florida Bay for about two years. The group is headed by **Dr. Karen Steidinger** and **Dr. Carmelo Tomas** (Center adjunct), both from the DEP's Florida Marine Research Institute in St. Petersburg. According to Dr. Kleppel, "The focus of our particular project is nuisance algal blooms and their impact on the food web of Florida Bay."

On October 25, **Dr. Andrew Moore** presented a seminar at the Rosenstiel School of Marine and Atmospheric Research, University of Miami. The title of the talk was "Some Ideas Related to the Predictability of El Niño."

Dr. Charles Messing attended the Annual Meeting of the Geological Society of American in New Orleans, November 6-9. He presented a paper, co-authored by M.S. student **Dana Rankin**, entitled "Local Variations in Skeletal Contribution to Sediment by a Modern Stalked Crinoid (*Chladocrinus decorus*) (Echinodermata) Relative to Distribution of a Living Population." This work was part of an NSF-sponsored project in the Bahamas, and was the basis for Ms. Rankin's undergraduate senior research thesis.

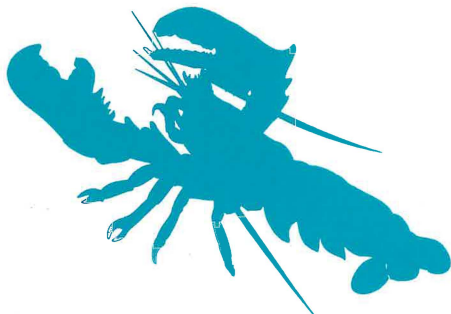
Melissa Dore, a graduate student employee, attended the Second Meeting of the Florida Biotic Information Consortium, held at the University of Florida in Gainesville, November 8-9. The Consortium is made up of scientists and librarians who are committed to identifying and making available to researchers information dealing with Florida's biota.

(Continued on Page 3)

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Dr. Julian McCreary, Dean, is an Invited Speaker at the International Symposium on Ocean Sciences, to be held November 19-21 in Matsue, Japan. The theme of the symposium is "Dynamics of Strong Western Boundary Currents and Data Assimilation," and is sponsored by the Japan Marine Science Foundation. Dr. McCreary's talk is entitled "A Numerical Investigation of the Source Waters of the Pacific Equatorial Undercurrent," co-authored by the Center's **Dr. Peng Lu** and **Dr. Barry Klinger**.

Carrie Nelson and **Robin Sherman**, both M.S. students of Dr. Spieler, will attend the American Society of Zoologists Annual Meeting, to be held December 26-30 at the Sheraton Hotel in Washington, DC. They will present a poster entitled "Preliminary Examination of Gill Surface Area in Two Batoid Elasmobranchs."



Center Seminar

On October 20, Ph.D. student **David Gilliam** presented a seminar to faculty, staff, and students in the Richardson Library. The title of the talk was "Evaluation of a Novel Material for Artificial Reef Construction." Mr. Gilliam presented the same talk in Tokyo in November.



David Gilliam presents a "practice" seminar.



Dr. Moore enjoys a seminar on modeling.

Andrew Moore Begins Gulf Stream Study

Dr. Andrew Moore has been funded by the National Science Foundation to begin a three-year project to study the physics of the Gulf Stream. The title of the project is "A Study of the Dynamics of Error Growth and Predictability in Models of the Gulf Stream."

According to Dr. Moore, "The idea is to try to understand the dynamical factors that influence the predictability of the Gulf Stream, as evidenced in various numerical models currently used by different groups of scientists in the U.S. This is an extension of some work that I did three years ago at Harvard and at the Australian CSIRO." In particular, he will look at the dynamics of Gulf Stream meanders, eddies, and filaments. "I will use existing quasi-geostrophic and primitive-equation models that were developed at Harvard and techniques that I have developed," he explains. "The Harvard group and others have used these models for several years to make predictions of the Gulf Stream downstream of Cape Hatteras, and these forecasts have been verified using satellite and ship data."

Dr. Moore will analyze the forecasts and sort them into "good forecasts and bad forecasts." Using linear stability analysis, he will try to ascertain the dynamical factors that influence the predictability of different kinds of events in models.



Dr. Klinger at a center seminar.

Barry Klinger Undertakes Modeling Project

Dr. Barry Klinger has been awarded a three-year National Science Foundation grant for a project entitled "Dynamics of Three Dimensional Thermohaline Circulations." Funding for the first year of the study arrived in August.

Dr. Klinger will investigate the dynamics and parameter sensitivity of the steady state thermohaline circulation and meridional heat transport in rotating basins. He stated in his proposal that "Understanding steady state circulation is a prerequisite for predicting future ocean-atmosphere equilibrium states that result from changes in parameters such as atmospheric carbon dioxide concentration; it also provides insight into oscillating departures from equilibrium. Within a single-hemisphere basin, it is not known how wind and buoyancy-driven flows interact in transporting heat across lines of latitude."

Dr. Klinger will use a three-dimensional model to diagnose the geographical distribution of this heat transport and relate it to the wind- and buoyancy-driven components of the flow. The numerical experiments will be guided by barotropic models of wind-driven heat transport that he has developed. "One aspect of ocean-atmosphere interaction will be examined by studying the feedback between sea surface temperature and the strength of mid-latitude winds," he explains. "The buoyancy-driven overturning cell in the Atlantic, and in other oceans, contains substantial inter-hemispheric flow. The laws governing the strength of such flows are not clear." He will conduct numerical model experiments to clarify these laws within a single ocean basin.



Dr. Lee and Dr. McCreary, at work.

Dr. Hyong Lee Returns as a Visiting Scientist

Five years ago, **Dr. Hyong Lee** received the Ph.D. degree in Oceanography from Nova's Oceanographic Center. He worked under the tutelage of **Dr. Julian McCreary** and became an accomplished ocean modeler in the few short years that he was here. He then returned to Korea, his homeland, where he has served as an Associate Professor of Oceanography at the Korean Naval Academy and holds the rank of Captain. In September he came back to the Center for a six-month visit, so that he and Dr. McCreary could work together on a new model.

The modeling project now underway has to do with the coastal ocean response to strong offshore winds in the Gulfs of Tehuantepec and Papagayo, on the Pacific side of Mexico and Costa Rica. Lee pre-

viously had investigated this response using a 1½-layer model, but now he has moved to a more complex 2½-layer model. He is looking in particular at the regions's large sea-level drop and the fast westward speed of an anticyclonic gyre. "In the previous study in 1989," he explains, "the model was capable of revealing all of the physical processes in a simple way and the solutions compared favorably with observations; however, the values for sea-level drop and propagation speed of the gyres were not good enough. We hope to get more accurate values with the 2½-layer model. The results from the new model are already in good agreement with observed values for both the sea-level drop and the speed of the gyre."

Lee feels that the new model's improved values are primarily due to the addition of the second baroclinic mode, horizontal mixing, and real coastal geometry. He and Dr. McCreary already have begun writing a paper on their results. "The model works well, but for some parameters, such as entrainment (upwelling), we are still looking for more realistic values," he adds.

Lee states that he is very happy to rejoin the Nova "family" and is pleased to see so much progress, both at the Oceanographic Center and at the University as a whole. His two children are back in school (high school now) in Hollywood, and his wife has settled into their temporary quarters. We are very happy to have Lee and his family back, if only on loan for a few months.

Board of Governors Meets

The Board of Governors met on October 19 at the Oceanographic Center. Present were Board members **Bud Brown, Patricia Carr, Will Connelly, Richard Donato, Chris Jacoby, Kenneth Kent, Denise Liebmann, John Peet, John Penn, and Tom Plachter**. University personnel present were **Dr. Ovid Lewis**, NSU President; **Leslie Brown**, NSU Vice President for Development; and the Center's **Dr. Richard Dodge, Dr. Gary Kleppel, Dr. Julian McCreary, and Helene Taylor**.

President Lewis reported on the great strides that NSU has made in recent years, and the fact that it is now the largest private university in Florida. He also discussed future opportunities for marine biology and aquaculture at the Center, as well as the expansion of our master's program. Dr. Dodge provided an update on recent progress at the Center in both research and coastal studies.

Various development ideas were discussed, including plans to revive the Friends of Oceanography and to more actively pursue fund-raising activities. It was proposed to better educate the public as to the Center's specific needs and accomplishments. Plans were announced for a spring "Cruise '96", which would be the second educational cruise to the Gulf Stream for people interested in learning about the inner workings of sampling experiments at sea.



New Board members Kenneth Kent (above), Tom Plachter, and John Penn (below).

Faculty Appointments

Dr. Andrew Moore has been appointed Associate Editor of the *Journal of Physical Oceanography*, published by the American Meteorological Society. **Dr. Julian McCreary**, Dean, is an editor of *JPO*.

Dr. Charles Messing and **Dr. Andrew Moore** will represent the Oceanographic Center on Nova Southeastern's Faculty Advisory Committee. The Committee is headed by **Dr. Elizabeth McDaniel**, Vice President for Academic Affairs.

Ph.D. Degree Offered

The Oceanographic Center offers the Ph.D. degree in Oceanography. The program requires a minimum of 60 credits beyond the baccalaureate, 30 of which may be applied from the master's program. The remaining credits are made up of at least 24 dissertation research credits and 6 credits from upper-level course work, usually taught in the tutorial mode. Tuition is \$2,225 per quarter.

UNDERCURRENTS

INSTITUTE OF MARINE AND COASTAL STUDIES

WINTER TERM SCHEDULE

M.S. degree specialties are **Marine Biology** and **Coastal Zone Management**. Each course carries three credit hours or may be audited. Tuition is \$333 per credit hour (50 percent less for audit). Classes meet once a week from 6:30 to 9:30 P.M. at the Oceanographic Center. The winter term runs from January 2 to June 28, 1996. For further information, call **Helene Taylor** at (954) 920-1909.

Descriptive Marine Physics (OCOR-5601): This is a CORE course. Discusses the physical properties of seawater, the temperature and salinity structure of the oceans, T-S diagrams, water masses and their circulation, wind waves and swell, tides and other long waves, geostrophic and frictional currents, and ice formation and movements. Algebra required. Instructor: **Dr. Barry Klinger** (Center faculty). Starts Monday, January 8.

Principles of Coastal Zone Management (CZMT-0609): Covers management of coastal resources, based on the principles and techniques of a diverse array of disciplines, discussed in terms of a balanced coastal strategy. Presents practical solutions to conflicts of use, especially those of coastal zone protection versus land, mineral, and water development practices in relation to their impact on the coastal resource base. Instructor: **Mr. Stacy Myers** (Center adjunct). Starts Tuesday, January 2.

Marine Phytoplankton (OCMB-6060): Presents the major groups of phototrophic marine eukaryotic plankton, stressing current concepts of their activities, ecological role, importance, dynamics, and interrelationships. Instructor: **Dr. Gary Kleppel** (Center faculty). Starts Wednesday, January 3.

Fish and Wildlife Management (CZMT-0805): Covers management principles based upon the conservation of aquatic and terrestrial free-living species. Consideration is given to their habitat, behavior, physiology, anatomy, and interaction with humans. Examines the history, utilization, and economic return from various species. Special attention is given to endangered species worldwide; specific local examples are used as models. Instructor: **Dr. Keith Ronald** (Center adjunct). Begins Thursday, January 11.

Beyond 5000 Days (CZMT-0633): This is a distance education course that presents, through debates and case studies, issues that relate to mankind and how we live in, perceive, and relate to our environment. Instructor: **Dr. Keith Ronald** (Center adjunct). Starts Friday, January 12.

Spring Term Schedule

The spring term extends from April 8 to June 28, 1996. Course descriptions will appear in the next issue of *Currents*.

Marine Geology (OCOR-5604). Instructor: **Dr. Pat Blackwelder** (Center faculty).

Dynamic Biological Oceanography (OCMB-6195). Instructor: **Dr. Gary Kleppel** (Center faculty).

Marine Microbiology (OCMB-6055). Instructor: **Dr. Curtis Burney** (Center faculty).

Dry Coastal Ecosystems (CZMT-0610). Instructor: **Dr. Bart Baca** (Center adjunct).

Biological Effects and Risks of Chemistry in an Aquatic Environment (OCMB-6196). Instructor: **Dr. Gary Rand** (Center adjunct).

New Students for 1995

The following M.S. students have registered for the summer and fall terms in the Institute of Marine and Coastal Studies. Welcome aboard!

Lianne Bishop, SP: Stetson University
Drew Brown, CZM: Mercer University
Lisa Csuzdi, SP: Nova Southeastern University

Susan Finkle, MB: University of Maryland

Paul Fitzgerald, SP: Texas A&M University

Christopher Gervasi, SP: Stockton College

Brenda Hilkemann, MB: University of Nebraska

Carin Klein, MB: Hillsdale College

Achim Kretschmer, MB: Queens College

Juan Levesque, MB: University of South Florida

Michael McCabe, CZM: State University, New York

Steve Moen, SP: University of Arkansas

Sean O'Brien, SP: University of South Florida

Jennifer Parris, MB: University of Louisville

Suzanne Piccini, MB: James Madison University

Tom Quinney, MB: American International College

Dominique Schuchardt, SP: Shippensburg University

Rosalie Taborsky, SP: Barry University

Susan Thornton, MB: State University, New York

Sarah Troutman, SP: Western Kentucky University

Christopher White, MB: Bowling Green University

CZM: Coastal Zone Management
MB: Marine Biology
SP: Special Student

Student Party Termed a Success!

On Friday the 13th of October, the annual Student party was held in the Richardson Library. It was, as usual, proclaimed a success. We have several people to thank for that, namely **Melissa Dore, Kathy Maxson, and Helene Taylor**, who planned and executed the event. Perhaps we should also thank Publix, who whipped up some excellent food trays for us. Thanks also go to **Laszlo Nemeth**, who fixed the keg.



Melissa Dore, at the student party.



Jennifer Parris, Rosalie Taborsky, and Kathy Maxson.



Michele Biringer, Brenda Hilkemann, and Michelle Tatlock.



Dominique Schuchardt and Susan Finkle.



Rance Shomaker, Kevin Kohler, and Drs. Richard Dodge, Keith Ronald, and Donald McCorquodale.



Brian Hicks, Helene Taylor, and Christopher and Beth White.



Kevin Helmle, Matthew Heilman, Christopher Gervasi, and Paul Fitzgerald.



Carrie Nelson, Pamela Bachman, Michelle Zurawski, and Jennifer Parris.



John Braker at his defense.

John Braker Defends M.S. Thesis

On October 13, Marine Biology student **John Braker** defended his thesis, entitled "The Impact of Variability in Coastal Circulation on Plankton Distributions along the Continental Shelf of Southeast Florida." His thesis committee consisted of **Dr. Gary Kleppel** (Chairman) and **Dr. Barry Klinger**, Center faculty members, and **Dr. William Venezia**, of the Naval Surface Warfare Center.

Braker's study examined the relationship between high-frequency variability in the Gulf Stream circulation and the spatial distribution of zooplankton along the continental shelf off Fort Lauderdale. "Over the past three decades," he states, "it has become increasingly clear that hydrodynamic variability is an important force determining the structure of marine ecosystems. A growing emphasis is being placed on understanding how physical and biological processes combine to govern the recruitment of marine organisms. Understanding the nature of hydrodynamic variability and its relation to the biological environment is vital to resolving patterns in population dynamics. Mesoscale oceanographic phenomena, such as eddies and upwelling events, have been linked to the transport and redistribution of zooplankton as well as to the exchange of nutrients in the water column."

Christine Orthmann Defends Thesis

On September 15, M.S. student **Christine Orthmann** defended her thesis in Coastal Zone Management. The title of her thesis was "An Assessment of the Extent and Types of Environmental Crime in Florida, with a Focus on Dade, Broward, and Palm Beach Counties, as Measured by Local Prosecutors' Records." Her thesis committee was composed of **Dr. Richard Dodge** (Chairman) and **Dr. Curtis Burney**, Center faculty, and **Joel Mintz, Esq.**, of Nova Southeastern Law School.

According to Ms. Orthmann's research, records showing the arrests, citations, and warnings issued by the Florida Game and Fresh Water Fish Commission document a rise in the number of environmental violations in Florida from 1988 through 1992. "Arrest records from the state law enforcement agency, FDLE, indicate 1,936 environmental crime arrests were made throughout Florida during 1993, in-

cluding 618 in Dade, 103 in Broward, and 79 in Palm Beach. A four-year incident total combining the records of FDLE and the Game Commission reveals 7,894 documented cases of environmental violations."

Braker emphasizes that imagery from satellite-flown instruments has shown a strong association between the distributions of chlorophyll in the upper ocean and sea surface temperature. He worked to adapt the acoustic Doppler current profiler (ADCP), a tool designed to measure the physical environment, to describe biological properties. "This study provides the first synoptic measurements of both high-frequency variability in current velocity and zooplankton abundance along the continental shelf off southeast Florida from a single instrument."

It seems clear to Braker that zooplankton assemblages are affected by variability in the Gulf Stream front that results in periodic excursions of Gulf Stream water into the coastal environment. "The rapid transport of Gulf Stream water across the continental shelf may take fish larvae and other planktonic organisms from the nutrient-poor waters of the Gulf Stream and Sargasso Sea to nutrient-rich inland and coastal ecosystems." He concludes that "this method of transport may be key to the successful recruitment of estuarine-dependent fishes."



Christine Orthmann defends her thesis.

All three counties of interest "have designated professionals to respond to and investigate environmental crimes," according to Ms. Orthmann; "however, none were able to estimate environmental crime within their respective jurisdictions." Data provided by the State Attorney's Offices in the three counties indicate varying levels of environmental criminal activity, but little historical information is available.

On the plus side, Ms. Orthmann found that attempts have been made to facilitate networking among the counties and the agencies. Even so, "separate agendas still prevail and hamper the overall effectiveness of efforts to handle environmental crime. The true extent of environmental crime across the state and within the three local counties remains unknown. The results of this study... indicate levels of environmental criminal activity which should raise concern. It must also be realized that the cumulative effects of such violations pose a great threat to the welfare of the environment."

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Cruise News

During the week of September 17, **Daniel Anderegg**, an M.S. student of **Dr. Richard Dodge**, participated in a cruise through the Florida Keys. The cruise was sponsored by the National Undersea Research Program, Harbor Branch Oceanographic Institution, and the Florida Institute of Oceanography.

Billed as a "survey of the state of health" of the Keys, the project focused on some of the most serious problems facing the reef tract, namely coral diseases and the predominance of alga coverage. Dodge and Anderegg were invited to drill coral cores from seven stations under study, ranging from Key Biscayne National Park to the Dry Tortugas. A total of 73 cores were collected, mostly from *M. annularis* colonies. The cores have been slabbed and X-rayed and are awaiting further analysis.



Daniel Anderegg, Genny Healy (RSMAS, U. of Miami), and John Halas (Key Largo National Marine Center), aboard R/V Seward Johnson, from Harbor Branch. (Photograph by John Ogden, of FIO).



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**Recycled
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