Spring 1993

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NSU Oceanographic Center

Nova University Oceanographic Center

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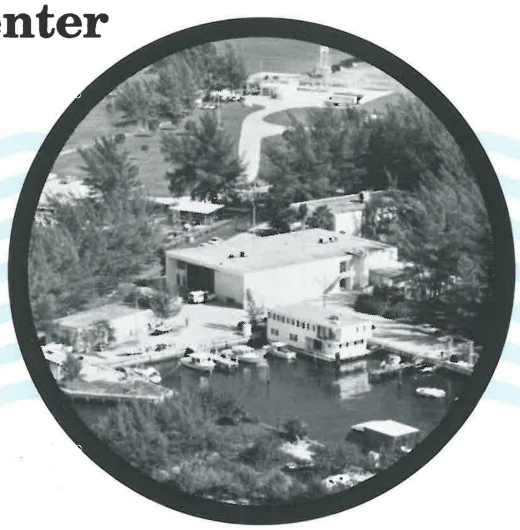

Trash Tires Making Themselves Useful

Richard Spieler explains new artificial reef technique.

Dr. Richard Spieler has begun work on a research project established to evaluate the effectiveness of a new type of material for use in creating artificial reefs. The University recently was awarded funds by The Broward County Office of Natural Resource Protection for a three-year project, which will keep Spieler and Ph.D. student **David Gilliam** busy and underwater a lot.

Designed by a Miami inventor, a new, patented, artificial reef material composed of shredded trash tires and concrete was formed into 3- and 4-foot tetrahedrons (4-sided, pyramid-shaped blocks). On March 29, 200 such blocks were dumped from a barge into the ocean in 20 feet of water off Fort Lauderdale beach. They were arranged into four 6-foot-tall piles: 2 concrete/tire reefs and 2 concrete/gravel reefs that serve as control groups.

Spieler's task is to monitor the response of sea life, such as algae, microbes, and fish, to the new reefs. Using SCUBA gear and video cameras, as well as audio equipment for voice recording, divers will compare the two types of reefs over the 3-year period to see which is more successful. During an April 30 seminar Spieler presented slides showing an encouraging number of small fish, lobsters, and other marine organisms that already have been attracted to the new hybrid reefs. "Should the tire and concrete material be as effective as a gravel and concrete composite," Spieler said, "it may well become the construction material of choice for many artificial reef projects."

There are several advantages to using the tire-and-concrete mixture: it is resistant to salt water breakdown, it is light and easy to handle compared with other materials, and there is an abundance of low-cost used tires. Spieler will be looking for any problems caused by the tire component as well. For example, he will check for potentially hazardous materials that may leach out of the tires and into the fish habitats. He will also determine whether the new reef materials hold together as well as the control materials do.

Junked tires have created environmental hazards in this area for years. Other experimenters have tried with little success to create artificial reefs by banding old tires together and dumping them offshore. Not only have many organisms refused to grow on the tires, but currents have scattered them over the ocean floor and created an underwater junk yard. Apart from mosquitoes, so far no one has come up with a really workable solution for reusing old tires. "This is a real win-win proposition," said Spieler. "We're examining ways to turn an environmental problem into something that will help the environment."

David Gilliam displays underwater audio and video equipment.

(Continued on page 8)

PEOPLE ON THE MOVE

Dr. Richard Spieler and Ph.D. student **David Gilliam** attended the Florida Artificial Reef Summit '93, which was held May 4-6 in Tallahassee. Dr. Spieler was invited to present a paper, co-authored by Gilliam, **K. Banks**, and **B. Mostkoff**, entitled "Evaluation of a Tire-Concrete Aggregate for Artificial Reef Construction: Work in Progress." The conference was hosted by the Florida Department of Natural Resources and the Organization for Artificial Reefs.

Dr. Jeffrey Proehl traveled to San Antonio, Texas, May 10-14 to attend the Ninth Conference on Atmospheric and Ocean Waves and Stability. The conference was sponsored by the American Meteorological Society.

During May 30 - June 3, **Dr. Andrew Cole** attended the annual meeting of The Society of Wetlands Scientists and the American Society of Limnology and Oceans (ASLO), held at the University of Alberta in Edmonton, Canada.

Dr. Julian McCreary will attend the Gordon Research Conference on Coastal Ocean Circulation at Plymouth State College, New Hampshire, June 13-18. He will present an invited talk entitled "Dynamics of the Circulations along the East and West Coasts of India." Gordon Conferences are unique in that "participants must live on site and stay the entire week," according to a published announcement. "Scheduled sessions occur in the morning and in the evening after dinner. Afternoons are 'free' for recreational activities or lively ad hoc debates among small groups of participants. Attendance at the GRC will include participants from academia, industry, and government."

Cruise News

Carol Burkart and **Kevin Carter**, both graduate students of **Dr. Gary Kleppel**, participated in a research cruise in the Gulf of Mexico April 12-22. They pursued their research on productivity on the West Florida continental shelf. It was the fifth in a series of such cruises in the Gulf. **Dr. Carmelo Tomas**, of the Department of Natural Resources, was Chief Scientist on the cruise, aboard R/V *Suncoaster* from Florida Institute of Oceanography in St. Petersburg.

Dr. Charles Messing and students **Pat Bellew, Chuck Featherstone**, and **Dana Rankin** returned to the Bahamas May 15-18 aboard Harbor Branch's R/V *Seward Johnson*. There they went down in the Johnson Sea Link deep-diving submersible to revisit crinoid life in the ocean.

From May 25 to June 1, Messing, Bellew, and Featherstone will visit Lee Stocking Island in the Exumas. On this trip they will participate in more submersible dives, sponsored by NOAA.

Recent Seminars

On February 19, **Cathy Mattison** presented a seminar to staff and students in the Richardson Library. Her talk was entitled "Trends in the Spatial Distribution of Sea Turtle Activity on an Urban Beach."

The Center had a guest speaker on February 23: **Dr. Robert Trench**, of the University of California at Santa Barbara. His seminar was entitled "Marine Microalgal Invertebrate Symbiosis."

On April 30, **Dr. Richard Spieler** gave a talk in the Richardson Library entitled "Evaluation of a Tire-Concrete Aggregate for Artificial Reef Construction: Work in Progress."

Cathy Mattison presents sea turtle nesting data during seminar.

CONTRACTS AND GRANTS: UPDATE

Since the publication of the Spring 1992 issue of *Currents*, Center investigators have been awarded a number of contracts and grants, which are the life blood of our research activities. Some are new, and some are extensions of existing awards.

C. Burney/C. Mattison: "Sea Turtle Monitoring F.Y. 93," Broward County Commissioners (4/4/93-4/3/94). $56,758.

R. Dodge: "The Physiology of Sclerochronology: Mechanism and Variation in Formation of High Density Bands in the Massive Coral Montastrea Annularis," National Science Foundation (NSF) (1/1/93-6/30/96). $101,299.

R. Dodge: "Materials and Services to Provide Data for Corrosion Testing and Provide Technical Support at the Fort Lauderdale Marine Corrosion Test Site," Naval Surface Warfare Center (10/1/92-9/30/93). $17,900.

R. Dodge: "Assessment of Climate through Coral Growth Band Analysis," U.S. Geological Survey (8/1/89-7/31/94, extension). $12,992.

R. Dodge/G. Webb: "Renovation of Research and Research Training Facilities at the Nova University Oceanographic Center," NSF (9/15/92-3/31/94). $130,000.

G. Kleppel: "Copepod Feeding Research," Dept. of Natural Resources (DNR) (5/1/92-open). $10,000.

G. Kleppel: "SEFcar Program," University of Miami (4/1/93-5/31/93). $11,109.

G. Kleppel: "U.S.-U.K. Joint Workshop: Environmental Regulation of Biological Production in the Irish Sea," NSF (8/1/92-7/31/93). $9,750.

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Dr. Kleppel Has Busy Springtime

Kevin Carter at the microscope in the biology laboratory.

Dr. Gary Kleppel continues to be on the move this spring. To start things off, he was one of the organizers of a 3-day workshop on the Irish Sea held at the School of Oceanography at Menai Bridge, Wales, March 29 to April 1. "The reason that Americans are working in the Irish Sea," Kleppel said, "is that it appears to be an area which, because of its geography, is susceptible to research in many ways."

Besides Kleppel, the U.S. delegation consisted of graduate student **Carol Burkart**; **Dr. Elizabeth Clarke**, of the University of Miami; **Dr. Van Holliday**, of Tracor Applied Science; **Dr. Richard Pieper**, of the University of Southern California; and **Dr. Gabe Vargo**, of the University of South Florida. The British delegation included co-convenor **Dr. Keith Brander**, of the English Ministry of Agriculture, Fisheries, and Food (MAFF) and several of his colleagues from MAFF; **Dr. Richard Gowen** and others from the Department of Agriculture of Northern Ireland; many researchers from the Plymouth Laboratory in England; and **Dr. Boelens**, of the Republic of Ireland.

"The meeting was a resounding success," said Kleppel. "We synthesized our collective data from several different projects. We also initiated several steps toward collaborative research, including student exchanges and continued U.S. involvement in Irish Sea research."

While he was in the area, Kleppel went on to Copenhagen to visit the Institute for Fisheries and Marine Research at Charlottenlund Castle, April 2-3. He gave a lecture entitled "On the Diets of Copepods." He later had a meeting with **Dr. Thomas Kioboe** from the Institute. He also met with **Dr. Richard Nash**, from the Port Erin Marine Laboratory on the Isle of Man, to discuss the role of the Port Erin Laboratory in collaborative Irish Sea research.

After returning to the U.S., on April 5 Kleppel traveled on to Rutgers University in New Brunswick, New Jersey, where he again gave a talk on the diets of copepods.

On May 10, Kleppel took off for the University of Charleston in Charleston, South Carolina. There he attended a meeting of the Steering Committee for the South Atlantic Bight Conference, sponsored by NOAA/Sea Grant and the NOAA Coastal Ocean Program. The Committee is organizing a regional meeting that will allow scientists from the South Atlantic Bight (Cape Canaveral to Cape Hatteras) and adjacent regions to share data and explore avenues of collaboration.

After a brief respite, Kleppel will travel to the University of Alberta, in Edmonton, Canada, May 30 to June 3 to attend a meeting of the American Society of Limnology and Oceanography (ASLO). He will chair a session on biological applications of pigments. He will also present a paper co-authored by **C. Burkart, P. Blackwelder**, and **E.J. Lessard**, entitled "Pigments in Zooplankton: Implications to Feeding and Photoprotection." M.S. student **Gayle Stone** will present a talk co-authored by **G. Kleppel, M.E. Clarke**, and **P.B. Ortner**, entitled "Phytoplankton Pigment Distributions in Relation to the Gulf Stream Front of Southeast Florida."

Leadership Hollywood Has Environmental Day Tour

On April 1, The Greater Hollywood Chamber of Commerce assembled a group of about 20 interested community leaders in order to expose them to "sensitive environmental issues of today and to provide a level of understanding which will be useful for future involvement." So Leadership Hollywood members boarded a bus at 8:00 AM and visited 4 different facilities in Broward County that are deeply involved with the environment. The Oceanographic Center was one of the chosen facilities.

Coordinated by **Dr. Richard Dodge**, Associate Director, a tight tour schedule was set up that took in the ichthyology and outside seawater system, biology lab, electron microscopy lab, invertebrate lab, coral growth and reef facility, physical oceanography and computing facility, Coastal Studies, the Richardson Library, and the Schure Building Conference Room (for a look at our relandscaping plans, thanks to Andrew). Prior to the tours, which were led by **Jan Witte** and **Dennis Dannacher**, the visitors watched a short video about the Center and what it is that we do here. We hope that more groups like this one will take a serious interest in our research activities.

Board of Governors Meets

The Oceanographic Center's Board of Governors met on January 21 in the Schure Building. Board members present were **Chris Jacoby**, Chairman, **Scott Boyd, Bud Brown, Arne Carlson, Patricia Carr, William Darby, Richard Donato, John Gerbino, Michael Greep, Marshall Lytle, Stan Smoker**, and **Ron Stroud**. Attending from the Center were **Dr. Richard Dodge, Dr. Gary Kleppel, Dr. Julian McCreary, Dr. Charles Messing, Ruth Lazarus**, and **Jan Witte**; Nova's **Dennis Dannacher** and **George Webb** also were present.

Dr. Kleppel described the visit from 34 Japanese scientists and technologists to the Center in November, and passed along Nova President **Stephen Feldman's** willingness to collaborate with the Japanese in future scientific ventures.

General discussion of Center fund-raising needs followed. A major need is the renovation of the Schure Building, particularly the rebuilding of labs and furnishing of lab equipment. Other needs include starting up the seawater system, refurbishing the *Lucy Forman*, and assisting with costs of student research activities and travel expenses for national scientific meetings. Several Board members supported a suggestion that a student research activities fund be considered a priority need as part of our fund-raising plans this year, and that a goal of $50,000 be set for the fund.

Nova's landscaping proposal for the Oceanographic Center was presented to the Board by Mr. Webb. He reported that the Nova Associates are interested in working with the Board to help out with the total relandscaping necessitated by the extensive damage done by Hurricane Andrew last August. The grounds have been completely cleared, and plans for coastal plantings and a critical wind-block are going forward. The project will proceed incrementally, in step with fund-raising activities.

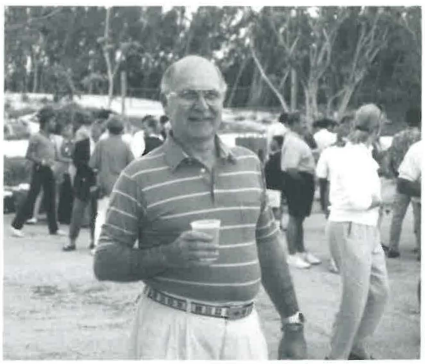
An abbreviated meeting was scheduled for March 11, at which time a committee will discuss plans for the April 8 MIASF barbeque to be held at the Center. The meeting was then adjourned.

MIASF Annual BBQ Held at Center

The Marine Industries Association of South Florida (MIASF) held its third annual barbeque cookout at the Oceanographic Center on April 8. The theme of the joint get-together was 50s and 60s music, which was richly provided by the Low Tides. (And yes, some partygoers actually danced!)

The highlight of the evening was an auction, and some major giveaways took place. Among them were framed **Guy Harvey** prints and tee-shirts, vacation trips, marine-type videotapes, and assorted Nova memorabilia. Self-directed tours of the Center's facilities were available to the 200 or so guests who attended. At sunset, the MIASF announced its annual donation of $1,000 to the Bud Huch Scholarship Fund, which was gratefully accepted by **Dr. Julian McCreary**, Center Dean, and **Dennis Dannacher**, Nova Development officer. We are already looking forward to next year's gathering.

Students Chuck Featherstone and Eric Hull hawk raffle tickets and other wares.



James Guerdon, Nova Vice-President for Financial Affairs, enjoys gathering.

Dr. Charles Messing and Dr. Tiffany Field admire vintage Chevy on display.

MIASF members prepare for the feast.

UNDERCURRENTS
INSTITUTE OF MARINE AND COASTAL STUDIES

Dennis Dannacher receives check for $1,000, as Frank Herhold, MIASF Executive Director, and Julian McCreary, Center Diector, look on.

Tracie Bath, Nova Publications Director, and Richard Miller, Vice President for Development, in the swing of the 50s.

Dancers also get into the 50s swing.

SUMMER 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 $300 per credit hour (50 percent less for audit). Classes meet once a week from 6:30 to 9:30 P.M. at the Center. The summer term extends from July 6 to September 17, 1993. For further information, call Bonnie at (305) 920-1909.

Marine Chemistry (OCOR-5605): A CORE course, required for both specialties. Reviews properties and composition of seawater; the importance, distribution, relationships, and cycling of major nutrients; dissolved gases; trace metals; and organic compounds. Offers a self-paced laboratory. Problem-solving is supplemented by interactive microcomputer work. Prerequisite: undergraduate-level introductory chemistry. Instructor: **Dr. Curtis Burney** (Center faculty). Begins Friday, July 9 (normally held on Mondays).

Law and the Coastal Zone (CZMT-0603): Topics of discussion include researching the laws that affect coastal zone areas, general and special federal laws that protect the shorelines, and state activities and legislation dealing with the protection of coastal areas. Content should be of interest to planners, engineers, and government agency employees who deal with the environmental impact of development in coastal areas. Instructor: **Stephen King, Esq.** (Center adjunct). Begins Tuesday, July 6, 7:00-10:00 P.M.

Marine Zooplankton (OCMB-6065): Examines aspects of zooplankton composition, large- and small-scale distribution, and ecology. Classical theory and literature provide the background for emphasis on modern concepts and techniques in zooplankton biology. Instructor: **Dr. Gary Kleppel** (Center faculty). Begins Wednesday, July 7.

Aquaculture (OCMB-6200): This survey course provides direct, practical, hands-on training in the culture of a number of marine species. Topics under study include farm design and management, larval culture techniques, stocking and growout, disease, reproduction, and marketing and finance. Species worked with include catfish, tilapia, shrimp, and clams. Several fields trips to local aquaculture operations are scheduled. Instructor: **Dr. Bart Baca** (Center adjunct). Begins Thursday, July 8.

Fall Term Schedule

The fall term will last twelve weeks, from September 27 to December 17, 1993. Course descriptions will appear in the next issue of *Currents*.

Marine Ecosystems (OCOR-5602). A CORE course. Instructor: **Dr. Curtis Burney** (Center faculty).

Policy in Coastal Zone Systems (CZMT-0800). Instructor: **Ms. Laura Geselbracht** (Center adjunct).

Functional Morphology and Physiology of Fish (OCMB-6220). Instructor: **Dr. Richard Spieler** (Center faculty).

Biological Indicator Organisms (OCMB-6190). Instructor: **Dr. Gary Kleppel** (Center faculty).

Carol Burkart describes her Irish Sea research.

Carol Burkart Defends M.S. Thesis

On February 22, **Carol Burkart** successfully defended her thesis for the M.S. degree in Marine Biology. The title of her thesis is "Microzooplankton Distributions in the Irish Sea." Her major advisor was **Dr. Gary Kleppel**; the Center's **Dr. Charles Messing** and **Dr. Van Holliday**, of Tracor Applied Science in San Diego, also served on her thesis committee.

In her research, Burkart looked at microzooplankton distributions across two fronts in the Irish Sea: the seasonal front in the western sector and the salinity front to the east. "My hypothesis was that biology determined the distributions," she explained. "However, I found that it was mostly hydrodynamic forcing that affected the distributions. The Liverpool Bay front to the east acted as a boundary between coastal and offshore water, and you also could see that in the biology. In the west, the thermocline had mixed water on one side and stratified water on the other. The surface water on the stratified side appeared to be water from the coast of Ireland. The relationships among the microzooplankton taxa actually identified 3 different water masses: Welsh coastal water, offshore water, and Irish coastal water west of the front."

Map of Great Britain and the Irish Sea, showing approximate locations of the Liverpool Bay front and the Western Irish Sea front.

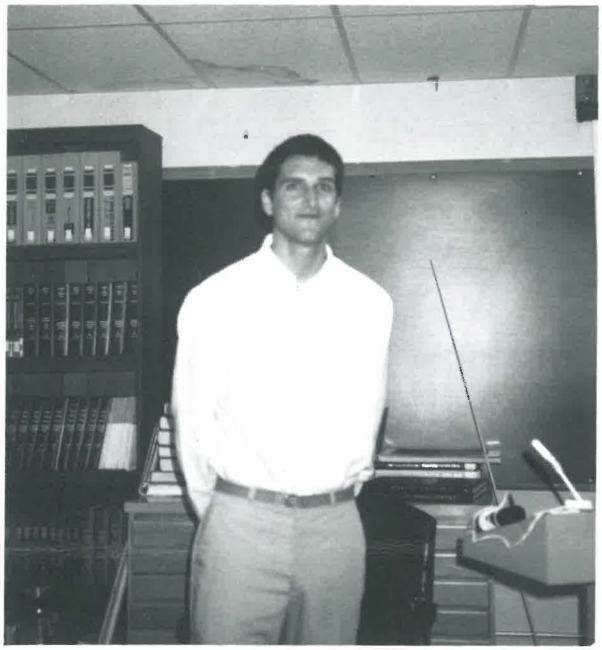
Burkart started the project to look at the fisheries in the area. For some reason recruitment is much lower in the Irish Sea than in the North Sea, although the same number of eggs are produced in both seas, according to the British Royal Ministry of Agriculture, Fisheries, and Food. A joint U.S.-British team of investigators set out to determine why. They looked at both the physical environment and the larval fish food to see whether distributions and abundances affected recruitment.

As part of the study, water samples were collected at 5 stations in the Irish Sea—2 coastal and 3 offshore—to show vertical distributions of the microzooplankton as well as distributions across the transects. In this way Burkart was able to identify the different water masses.

Burkart had the opportunity to present her data at a workshop in Bangor, Wales, March 30 to April 1. She also presented findings analyzed from Isle of Man samples collected by Dr. Kleppel, who served as one of the workshop organizers.

As for future plans, Burkart intends to go on for the Ph.D. degree under Dr. Kleppel. She will pursue copepod studies in all ocean regions. To kick things off, she will participate in a 3-week cruise to the Antarctic next January, aboard the R/V *Polar Duke*, where she will collect water samples in open water at the ice edge, as well as under the ice. She will be looking at zooplankton egg production and grazing in these waters. Later on she will return to sampling in more temperate waters. "My main interest is egg viability," she said. "Most egg production studies look at just the quantity of eggs produced. I want to look at how many of the eggs actually hatch." Happy hunting.

John Hocevar Defends M.S. Thesis



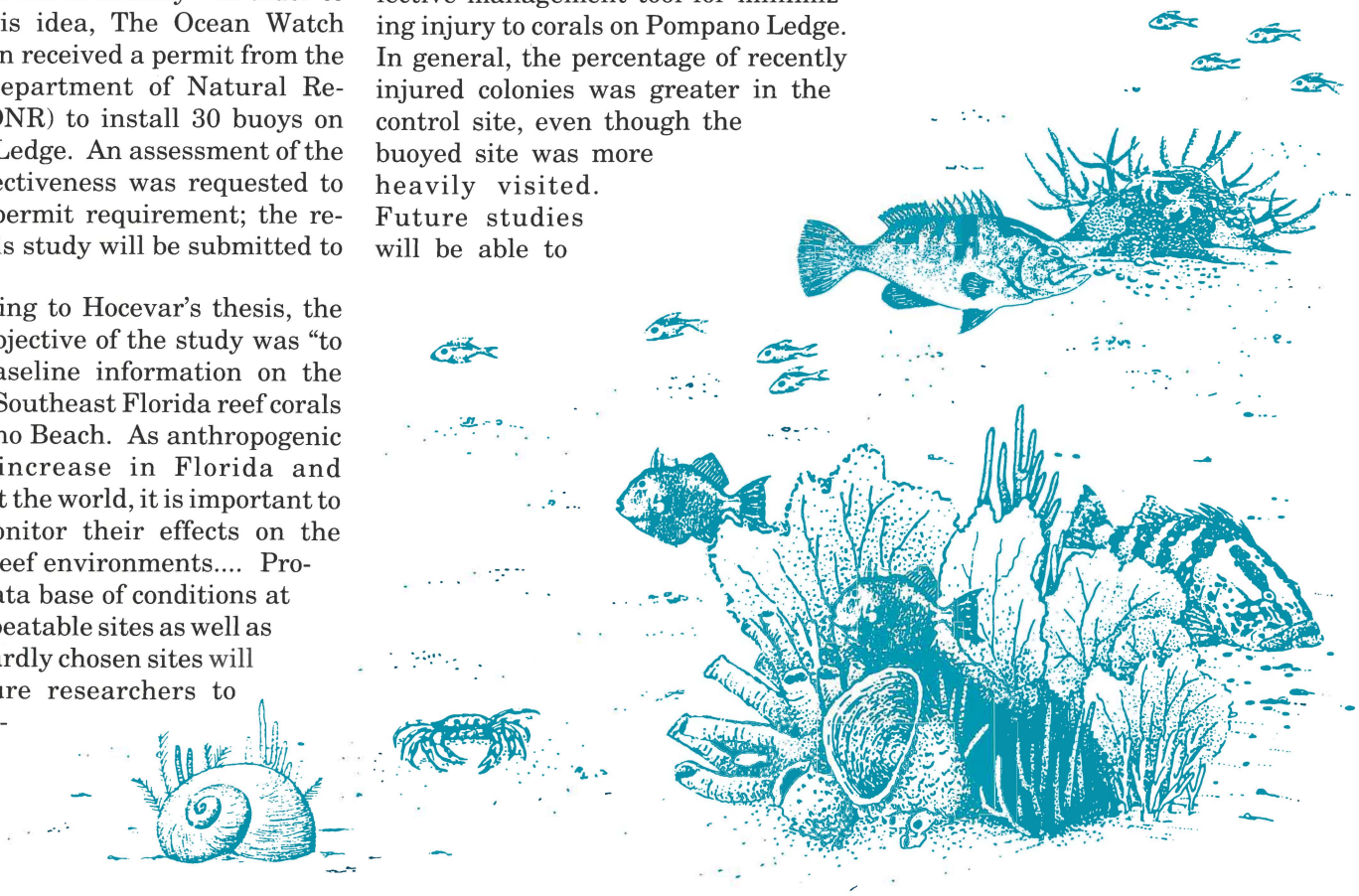
John Hocevar explains coral reef project during thesis defense.

On March 26, **John Hocevar** successfully defended his M.S. thesis, entitled "A Survey of the Stony Coral Community Composition of Pompano Ledge, Broward County, Florida, with a Preliminary Evaluation of the Effectiveness of Mooring Buoys in Reducing Coral Damage." His thesis committee consisted of **Dr. Richard Dodge**, Chairman, **Dr. Curtis Burney**, and **Mr. John Halas**, of the Florida Keys National Marine Sanctuary. The study examined the hypothesis that mooring buoys are an effective tool for reducing overall physical damage to coral reefs.

The reef areas off the coast of Southeast Florida attract large numbers of divers and fishermen throughout the year. Unfortunately, their boat anchors inflict great damage on the fragile sea life below - the sponges, coral colonies, and other delicate reef organisms. An alternative to dropping anchors is tying up to moorings placed in strategic areas of activity. In order to pursue this idea, The Ocean Watch Foundation received a permit from the Florida Department of Natural Resources (DNR) to install 30 buoys on Pompano Ledge. An assessment of the buoys' effectiveness was requested to satisfy a permit requirement; the results of this study will be submitted to DNR.

According to Hocevar's thesis, the primary objective of the study was "to provide baseline information on the ecology of Southeast Florida reef corals off Pompano Beach. As anthropogenic stresses increase in Florida and throughout the world, it is important to closely monitor their effects on the health of reef environments.... Providing a data base of conditions at specific repeatable sites as well as at haphazardly chosen sites will allow future researchers to make comparisons, identify changes, and investigate their causes. Additionally, observations were made of corals that had been recently injured in both buoyed and control sites to assess current impacts."

Hocevar concluded that "Mooring buoys were demonstrated to be an effective management tool for minimizing injury to corals on Pompano Ledge. In general, the percentage of recently injured colonies was greater in the control site, even though the buoyed site was more heavily visited. Future studies will be able to further assess buoy impacts by comparing any changes in coral population parameters. The buoys have been in place for only two years, so it will be interesting to see if the coral communities of the two sites begin to diverge in the future."



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Trash Tires Making Themselves Useful

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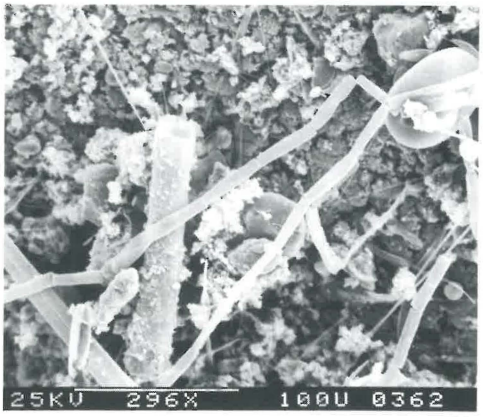


Scanning electron micrograph of initial colonizing on the artificial reef modules. (Photograph by Dr. Pat Blackwelder.)

CONTRACTS AND GRANTS: UPDATE

(Continued from page 2)

G. Kleppel: "The Antarctic Ice Edge Bloom: Its Importance to Intermediate Trophic Levels," NSF (6/1/93-11/30/94, year 1). $79,865.

G. Kleppel: "Conservation of Carotenoid Pigments during Passage through the Guts of Calenoid Copepods; Specificity and Physiological Induction," NSF (7/1/93-12/31/94, year 1). $93,763.

P. Kundu: "A Study of Coastal Richardson Numbers, and How They Are Affected by Wind-generated Waves," NSF (5/1/93-10/31/94, year 3). $75,000.

J.McCreary/J. Proehl: "Dynamics of Equatorial Coastal and Subtropical Ocean Circulation," NSF (7/1/92-12/31/93, year 1). $300,000.

J. McCreary/J. Proehl: "Dynamics of Ocean Circulation: Coastal Instabilities and Mid-latitude Subduction," Office of Naval Research (4/15/93-4/14/94; year 4). $95,000.

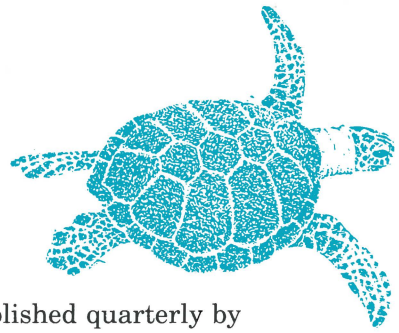
J. McCreary/J. Witte: "Publication of TOGA Quarterly Bulletin (*TOGA Notes*)," National Oceanic and Atmospheric Administration (NOAA) (3/1/93-2/28/94, year 4). $48,984.

J. McCreary/J. Witte: "Journal of Geophysical Research Editorial Office," American Geophysical Union (10/1/92-9/30/93, year 4). $37,329.

C. Messing: "Growth, Distributional Controls and Taphonomy of Recent Isocrindae (Echinodermata: Crinoidea)," NSF (1/15/93-6/30/95). $63,166.

J. Proehl: "Modelling the Tropical Instability Waves," NSF (6/15/92-11/30/93, year 2). $60,000.

R. Spieler: "The Establishment and Monitoring of an Artificial Reef Constructed of Waste Tire Material and Concrete," DNR (3/9/93-8/15/93). $42,708.



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