


Spring 1989

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Currents

Spring 1989 Volume III Number 2



WAVES REVISITED

When we last left **Dr. Russell Snyder** in the summer of '88 (Currents, Vol. II, No. 3), he was vacationing in the Bahamas with his family aboard his 36-foot ketch *Catspaw*, and he mailed his story to us in time for publication. His ketch, you may recall, doubles as a research vessel during his gravity wave field studies in the Abacos.

At this writing he is again aboard *Catspaw*, at Basin Harbour Cay in the northeast corner of the Bight of Abaco, this time setting up a pilot experiment for a major field study that will take place next spring. It is the initial phase of a 3-year project recently funded by NSF. He and his associates are busy checking out modifications to some of the myriad of electronic gear that will be used in this follow-on study.

Something new has been added this year - a 50-foot radio tower located ashore that is used to "solidify telemetry," according to Dr. Snyder. He is also installing for the first time, in addition to a wave array and a dummy array, "a weather station that will involve a mast in the water, on which will be mounted some wind stress instrumentation. So we are checking out the design of that weather station. The main objective is to find out how the bay station logistics work out."

By "the bay station" he means an array of five tents on shore: a data center, mess tent, cooking area, and two sleeping tents. This is not your ordinary research cruise. To begin with, the cruise was conducted in conjunction with R/V *Calanus*, of the University of Miami, for the first two weeks of the cruise, beginning May 8.

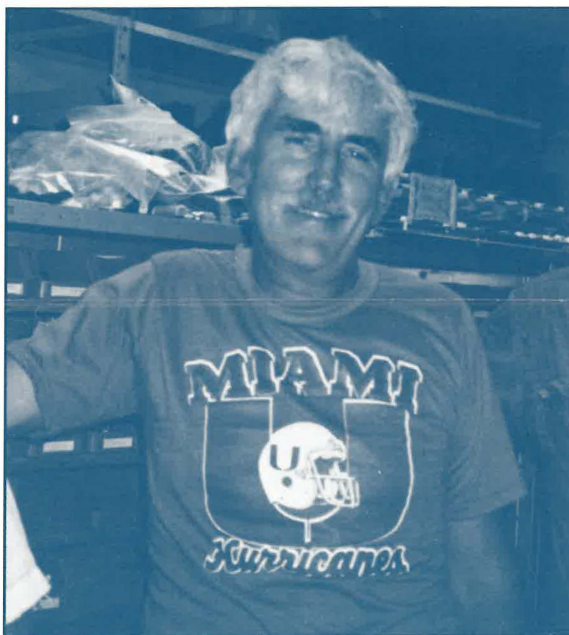
The cruise, in its entirety, will last two months. A base camp definitely is needed to accommodate the large number of people involved in the study. They include a group from Virginia Polytechnic Institute and State University, headed by co-investigator **Dr. Wayne Neu**; a group from Delft Hydrological Lab in The Netherlands, headed by **Dr. Willem deVoogt**, plus **Dr. and Mrs. Hermann Gerritsen**; a

group from NOAA/AOML in Miami, headed by **Dr. Robert Long**, along with his wife **Barbara**; and a large contingent from our Center, headed by **Dr. Snyder** and including electronics technician **Terry Thompson**, technician **Ted Tankard**, computing expert **John O'Brien**, and M.S. students **Kevin Kuta** and **Dennis Seymore**.

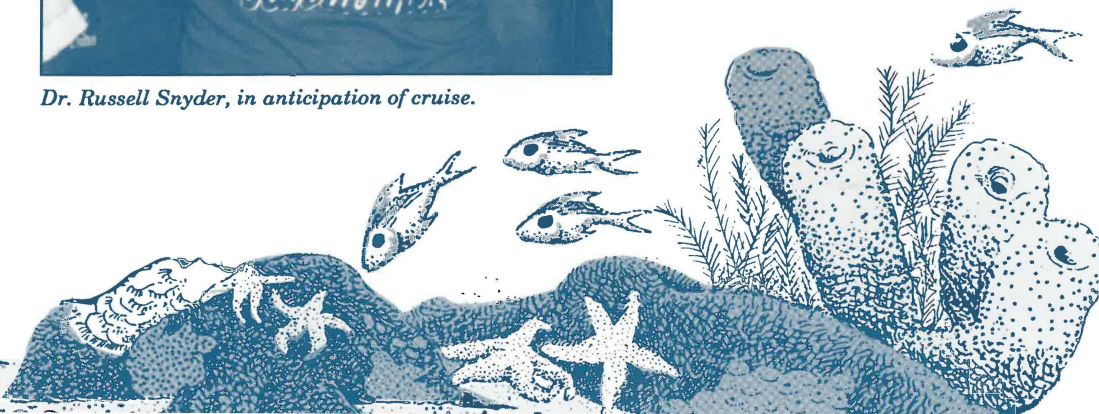
Dr. Snyder also is looking at "modifications in the design of the wave array, and the limits of telemetry to the radio tower. We are working with a new telemetry software package, which has been put together over the past few months by John O'Brien, working with Terry Thompson.

"The main accomplishment would be to obtain some data from the wave array, plus the current meter that we are installing. The current meter will allow us to determine the relationship between the orientation of the array and the current and wind."

Godspeed, *Catspaw*.



Dr. Russell Snyder, in anticipation of cruise.



U.S. AND BRITISH BIOLOGISTS COLLABORATE IN IRISH SEA

Dr. Gary Kleppel joined six other marine scientists from the U.S. and Great Britain on a research cruise in the Irish Sea from April 30 to May 11. The cruise was a collaborative effort to study some of the biological constraints on fish recruitment (the survival of young fish to adulthood) in the Irish Sea (between Ireland and England). Two British research vessels were used: one from the Ministry of Agriculture, Fisheries and Food in Lowestoft, England, and the other from the Port Erin Marine Laboratory on the Isle of Man.

The major American effort was a survey of zooplankton distributions using a Multi-frequency Acoustic Profiling System, which is capable of measuring the abundance and biomass of zooplankton in 40 different size categories. Simultaneously, the instrument collects continuous data on the vertical distributions of several physical and biological properties. Another research objective was to determine the diets and egg production rates of the dominant zooplankton (food organisms for small fish), in an attempt to find out whether food production limits fish production.

Dr. Kleppel was responsible for measuring diet and egg production of the zooplankton, as well as for deploying the drogues. He also set up a ship link for satellite thermal infrared imagery, which provided the scientists with sea surface temperature data.

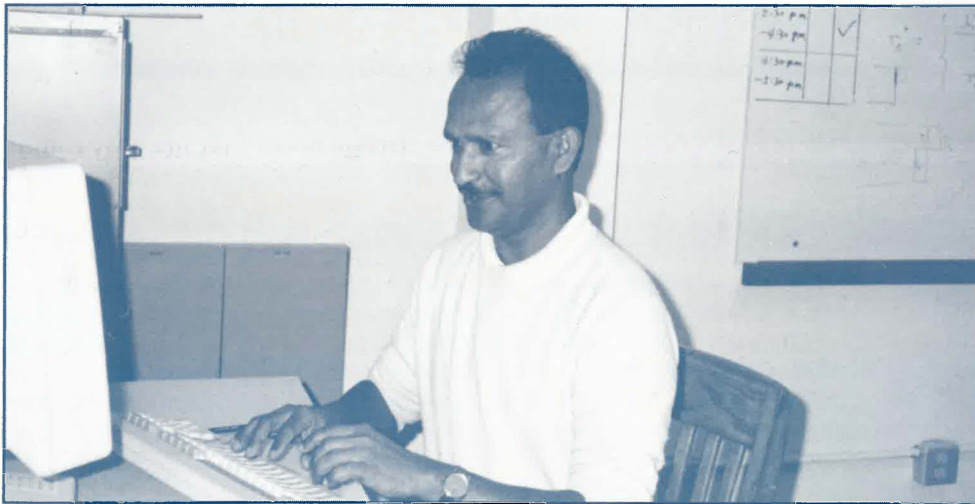
The American participants were invited to present seminars and lectures prior to the cruise. Dr. Kleppel presented seminars on zooplankton feeding at the Plymouth Marine Biological Laboratory, at Liverpool University, and at the Ministry of Agriculture, Fisheries and Food. During the same period he presented a workshop on HPLC (High Performance Liquid Chromatography) at the Port Erin Marine Laboratory.

Dr. Kleppel also co-authored a poster on acoustics that was presented at the Fisheries Acoustics Science and Technology (FAST) meeting in Dublin prior to the cruise. He was accompanied in

his travels by his wife **Pam** and his 5-year-old son **Jarret**, who was "the youngest member of the U.S. delegation to attend the FAST meeting," according to informed sources.

cont. on page 3

On Fast and Slow Flows



Dr. Pijush Kundu, busy at the PC keys.

Dr. Pijush Kundu, who has been a theoretical physical oceanographer with our lab for over 10 years, concentrates his current research on mixing in the ocean. He has the following assessment of his findings.

"I am analyzing some data taken off the coasts of Peru and California, focusing on the interaction of fast (high frequency) and slow (low frequency) flows in the ocean. Most flows in the ocean are turbulent, which means that the mixing is done by the exchange of chunks of matter from place to place. Some of this mixing can also be done by internal waves (the invisible waves below the ocean surface) carrying momentum from place to place.

"The hypothesis is that the internal waves behave much like molecules in a gas and interact with the lower frequency waves in such a way as to extract energy from these slow flows. My earlier work showed that the hypothesis is indeed borne out by one data set, although the evidence was weak. My present work shows that two other data sets support the same idea.

"I am also finishing up a book on Fluid Mechanics. It recently was accepted for publication by Academic Press. The book is somewhat general and deals with fluid flows in both geophysical and engineering systems. My background in engineering education and my geophysical experience have come in handy in writing a general book. The wide coverage has made the manuscript rather large: it may be nearly 650 pages when printed!"

[News on the volume's publication date will be carried in a later issue of *Currents*.]



BEACH RENOURISHMENT BEING CLOSELY MONITORED

Drs. Richard Dodge and **Charles Messing**, of our Center, along with **Dr. Steven Hess** of ERM-South, Inc., have thrown themselves into performing the biological monitoring activities for Broward County, in response to the John U. Lloyd Beach Renourishment Program. Sand dredging in coral reef areas off Hollywood beach began on May 16 and will continue for 67 days. This activity is both near and dear to us, primarily because our Center is located within Lloyd Beach State Park. It is "our" beach.

Renourishment entails pumping sand from sand bars located between two coral reefs not far offshore. A giant barge then moves the sand into the Intracoastal Waterway, where it is pumped through huge pipes across a narrow section of the park and onto the beach. Bulldozers then take over. Lloyd Beach State Park covers a pristine area 2.5 miles long, just south of Fort Lauderdale beach. Erosion has taken a heavy toll, in spite of the renourishment that took place just 13 years ago, extending the beach an additional 40 feet.

According to Dr. Dodge, there are two overriding reasons for the severe erosion that has occurred not only here, but globally: global sea level rise and the activities of man. "Our beaches are very important for recreational use,

for tourist use, and for protection from severe storms," he explains. "In order to renourish the beach, we must add sand in great quantities. The most convenient and economically accessible sand supplies lie offshore, between living coral communities. There is a perception that beach renourishment activities [dredging] will harm the coral reef communities. So that's why the study is being conducted - to evaluate the degree of impact that the dredging activities will actually have."

Dr. Dodge notes that not only could the turbidity in the water column caused by



Dr. Charles Messing explains monitoring procedure.



Dr. Richard Dodge discusses monitoring project.

the dredging be harmful to the coral environment, but "mechanical damage" could occur as well--the dredging equipment could run aground on a reef, as has occurred elsewhere.

According to Dr. Messing, the monitoring is divided into 3 stages. One suite of samples was taken prior to the start of dredging, one stage will occur when the dredging stops in mid-August, and the final sweep will be made 12 months after the conclusion of the dredging.

Dr. Messing describes the three environmental aspects to be monitored as being the hard coral cover and diversity along 20-meter transect lines; the diversity in numbers of benthic macro-invertebrates, chiefly sponges, gorgonians and stony corals in 2 m² quadrants; and the diversity and abundance of small macrofauna found basically in sediment cores. The latter are organisms larger than .5 mm and consist primarily of small crustaceans and worms.

Some monitoring will be done via SCUBA diving to the reef area, where "we will just count and identify, and try to determine any changes in growth patterns," Messing concludes. A large part of the work involves laboratory identification with the aid of microscopes. M.S. student **Glenda Kelley** is assisting in this effort.

Let us hope that our reefs and marine animals are more resilient than we give them credit for being and that something beneficial to our beach area and our economy will emerge from all of this.

cont. from page. 2



Dr. Gary Kleppel (far right) aboard R/V Cuma, From Port Erin Marine Laboratory.

SPOTLIGHT

NEW SEA TURTLE PROJECT UNDERWAY

Watching a giant sea turtle lay her eggs on a sandy beach is an incredibly moving experience. This editor has witnessed such an occurrence, as have many native and visiting beach walkers in South Florida. To help describe the egg-laying/hatching cycle, the following material has been lifted from a little brochure that our Center recently distributed locally to announce the start of another "turtle season."

"If undisturbed by human activities, female turtles crawl out of the water and up the beach, normally to a point well above the high tide line. There she digs a hole about 8 inches in diameter and 18 inches deep with her rear flippers. After a brief rest she fills the hole with about 100 (sometimes more) ping-pong ball sized eggs. She then carefully covers the egg chamber with sand. Before returning to the sea she spreads sand over a wide area with her front flippers to hide the exact location of the nest. A female turtle will often nest several times during a given season. Then several years may pass before that female returns to nest again...."

"About 50 days after the eggs have been laid, the nests virtually erupt with baby sea turtles. Stragglers may continue to emerge from the nest up to 48 hours after the initial eruption. Unless they are confused by artificial lights, they scamper for the ocean.... Those that make it to the water instinctively begin swimming directly out to sea."

"Where they go during the first year of life remains a mystery. After one year they show up in coastal waters as football-sized juveniles. No one knows how long it takes a turtle to mature. Estimates range from 12 to 50 years. Their maximum age is also unknown."

Obviously, a lot remains to be learned about these wondrous sea creatures.



Dr. Curtis Burney and Cathy Mattison head the 1989 sea turtle conservation program for Broward County.

"It is amazing how little is known conclusively about sea turtles," says **Dr. Curtis Burney**, who is the faculty sponsor of the Center's 1989 sea turtle project. The Beach Erosion Prevention District of the Broward County Environmental Quality Control Board once again has provided funding for this research. The goals of the study are twofold: (1) to save sea turtle nests that would otherwise be lost and (2) to continue sea turtle research based on strictly monitored data-gathering.

"There are many contradictory studies," Dr. Burney continues. "For example, take the effect of light on nesting. Some say that [artificial lighting] bothers the nesting process; others say just the opposite, especially for loggerheads. Maybe the turtles just don't care about the lights, or maybe by now they are used to humans."

"Other environmental factors are not known well. The idea of some research is to understand better what makes Mama Turtle nest where she does. In future projects, we should look at other factors leading to nesting and what

actions on our part would lead to more efficiency and thus better management of our conservation efforts."

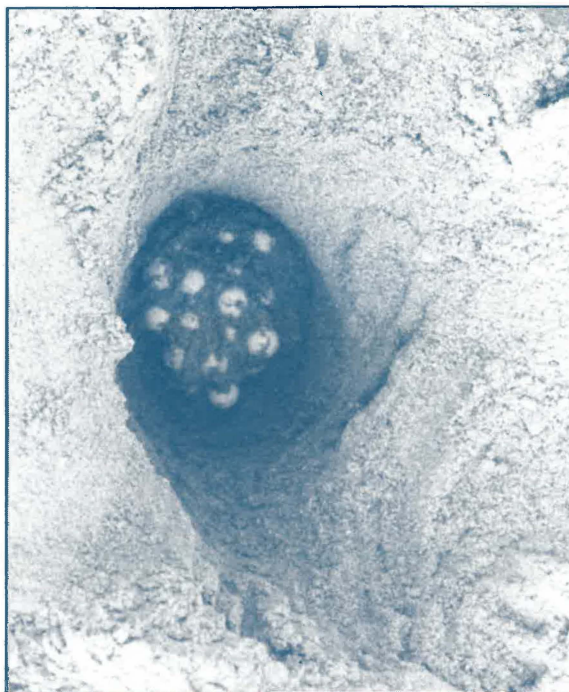
Could the weather be one of the factors affecting a sea turtle's egg-laying schedule? Traditionally, the "season" starts around May 1, but this year it began much earlier, in mid-April, after an unusually warm South Florida winter. Is this change in the weather pattern important to a sea turtle? The frequency of nesting also seems to be relatively high this season. One morning early in May, as many as six nests were found on one stretch of beach. Usually the onset is more gradual. Are there more turtles out there this year?

Much remains to be learned about hatching success as well. How many eggs are laid per nest, how many actually hatch, and of those, how many hatchlings survive to reach the sea? By maximizing the hatching success, we are not only learning to manage the whole process better, but we are also substantially adding to the general store of knowledge that is science.

BACK TO THE BEACH!

M.S. student **Cathy Mattison** has a new title: Project Manager of the 1989 Broward County sea turtle project. Last year [see *Currents*, Vol. II No. 4] she worked under Project Manager **John Fletemeyer**, but now she is in charge. Her territory has expanded to include Pompano Beach and Fort Lauderdale, and she retains responsibility for Hillsboro Beach to the north and John Lloyd Beach State Park to the south.

Cathy still hits the beach by 6:00 A.M. every day, searching for endangered sea turtle nests that may need to be relocated to one of several hatchery sites. Problem nests could be those that are affected by artificial lighting, are not high enough beyond the high tide line, or are in the path of beach-cleaning equipment.



A sea turtle nest, ready for relocation.



Cathy Mattison removes eggs for relocation.

This year Cathy's routine has changed somewhat. For one thing, she has 25 people working for her, usually providing 5 assistants per day. Some have come from Ocean World in Fort Lauderdale, from Metrozoo in Miami, and from Nova's Coastal Studies program. Others are just people who have an interest in sea turtle conservation and don't mind getting up be-

fore dawn and returning home grubby and exhausted.

Cathy would love to recruit volunteers to help out, but there are many restrictions that must be adhered to. For example, only a certain number of her assistants are allowed to touch the eggs or hatchlings. All of the workers must be off the beaches at a certain hour of the morning, so there are time

restrictions as well. She could use help with the data entry end of the research, however, or even with the digging of the holes for nest relocation. Of course public relations is an ever-present, but vital fact of life. If Cathy is probing for a nest, say, and an interested bystander starts asking questions, she cannot stop her work to explain what she is doing. A volunteer spokesperson would be a valuable asset in this situation. Often she is criticized by onlookers for relocating nests. Cathy's response to that is "The only alternative to relocation is letting them get squashed in the road." Her most amusing anecdote is about an onlooker who approached Cathy during relocation and asked what she was doing. When Cathy

responded that she was digging a hole for turtle eggs, the woman then asked, "But how will the turtle find the hole?"

Perhaps the most intriguing pests that Cathy has encountered are the Hillsboro Beach foxes. "They are so clever," she laughs. "They know that stakes in the ground can be the markers for sea turtle nests, and they dig by those stakes, even if the markers belong to surveyors and not to us."

As before, a "Turtle Hotline" has been set up to deal with the multitude of problems that could arise during the laying and hatching season. Cathy requests that the public refrain from calling the hotline unless there is a real emergency, such as evidence that a sea turtle is being harrassed, or that an animal of either the 2-legged or the 4-legged variety is bothering a nest. Dead or injured sea turtles also may be reported on the hotline. The hotline should NOT be used to report a normal nesting or hatching. However, if it is determined that a nest has been missed during the daily morning rounds, then its exact location should be reported. The hotline is hooked up to a recorder, which is checked regularly. The number to call is 925-7496.

Still in use are the 4-wheel drive ATV's that negotiate the sandy beach terrain so well. "We are in desperate need of another one," Cathy remarks. [Are you listening, potential ATV donors?]

UNDERCURRENTS

INSTITUTE OF MARINE AND COASTAL STUDIES

Summer Classes Announced

Master's degree specialties are Marine Biology and Coastal Zone Management. Some of the courses may be of interest for teaching recertification as well as for credit. All courses are worth 3 credit hours and are open to audit. Tuition is \$180/credit hour (50% less for audit). Classes meet once a week in the evening. The summer program lasts from July 5 through September 18, 1989. Call Dr. Dodge, Dr. Burney, or Cathy Mattison for further information at (305) 920-1909.

AQUACULTURE (OC-6200).

A survey course providing hands-on training in the latest methods of commercial aquaculture, using live animals in each life history stage. Instruction covers hatchery design and management, culture of larval foods, larval culture techniques, stocking and growout, diseases, sourcing of breeders, maturation, and marketing and finances. Modern and classical methodologies are discussed. Emphasis is on species from the U.S. and abroad that include catfish, tilapia, shrimp, and clams. Several Saturday field trips (with lecture) to local aquaculture operations are planned. Instructor: **Dr. Bart Baca** (Center Adjunct). Starts Tuesday, July 18.

LAW AND THE COASTAL ZONE (CZM-603)

Emphasis is on laws affecting coastal zone areas, including general and special Federal laws and state activities and legislation that protect the coastal areas. Of interest to planners, engineers, and government agency employees who must deal with the legal aspects of the impact of development on the coastal environment. Instructor: **Robert Riggio** (General Counsel for Broward County Environmental Quality Control Board). Starts Wednesday, July 5.

MARINE CHEMISTRY (OC-5603).

One of 4 required "core" courses in either specialty. Reviews the properties and composition of seawater; the importance, distribution, relationships, and cycling of, major nutrients; dissolved gases; trace metals; and organic compounds. A self-paced laboratory is included. Problem-solving is supplemented by interactive microcomputer work. Instructor: **Dr. Curtis Burney** (Center Faculty). Starts Thursday, July 6.



Summer "Short Course" in Aquaculture Offered

From July 24 to 28, a "short course" will be conducted at the Center. The subject will be the fish *Tilapia aurea* and hybrids. Course topics will include life history stages, hatchery design and management, culture of larval foods, culture techniques, stocking and growout, marketing and finance, and several other aspects of aquaculture.

The course is expressly designed to provide direct, hands-on training in the latest methods of commercial aquaculture, and students will work with live fish in each stage. The course will be conducted daily from 9:00 A.M. to 5:00 P.M., with reading and laboratory work during some evenings. The instructor will be **Dr. Bart Baca**. Call (305) 920-1909 for further information.

Thesis on Sea Turtles Defended

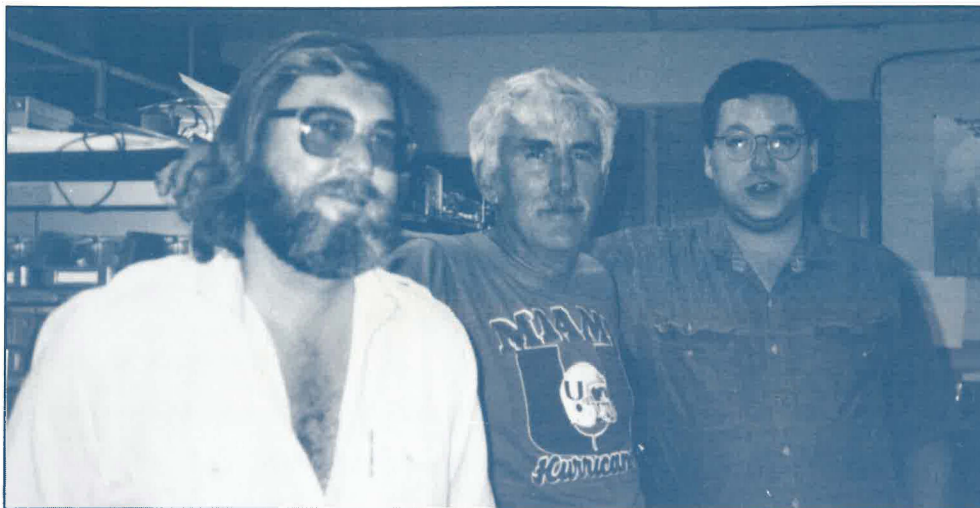
Ph.D. candidate **Lyle Kochinsky** successfully defended his thesis on April 27. His thesis topic was "The Effect of an Iodophor Compound on Skin Lesion Disease in Sea Turtles." The main objective of his study was to determine the effectiveness of a particular compound in the prevention and treatment of skin lesion diseases, as they are observed in sea turtle aquaculture. His findings indicate that the compound tested is effective and that the hatchling survival rate can be enhanced as a result.

Recent Graduate Heads Conference

Karen Blyler, a 1988 M.S. graduate in Coastal Studies, is Co-Chair for a National Marine Educators Association (NMEA) conference, to be held July 24-28 at the University of Miami, Coral Gables. The conference will be hosted by the Florida Marine Science Education Association, located in Fort Lauderdale.

The theme of the conference is "Florida's Fragile Paradise," and focus will be on the environmental problems that our coastlines face today and will continue to face around the corner and into the future. Many diverse exhibits will be presented, and a number of social events have been planned.

For more information on the conference, phone Karen at (305) 360-9953, or **Jim Carswell** at (305) 786-7800.



Dr. Snyder, flanked by technician Terry Thompson and programmer John O'Brien.

Recent Donations Gratefully Accepted

A large effort is underway at the Center to set up a viable program in Marine Archaeology, under the supervision of **Capt. Peter Throckmorton**, of whom you have read several times in *Currents*. To that end, we have received some extremely welcome donations, the largest of which have come from two sources: **The Sumner Gerard Foundation** (\$11,000) and the **Henry Penn Wenger Foundation** (\$20,000). We are most appreciative. Our progress with this fledgling program will be reported in future issues of *Currents*.

Special thanks also go to the **Ray Weiss** family, of Plantation, Florida, for donating an electric golf cart to the Center. Although this addition to our stable may seem a bit incongruous, the cart sees use every day. Just ask our maintenance person, **Diego Rodriguez**, who travels to about every corner of our 10-acre plot daily to make sure that all of the wheels are properly greased.



Technician Laszlo Nemeth prepares wave array (above) and solar panels (left) for wave study field experiment.

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People on the Move

In mid-February, **Cathy Mattison** attended the 9th Annual Sea Turtle Workshop in Jekyll Island, Georgia. In attendance were about 400 researchers and interested conservationists, ranging from Audobon Society to Greenpeace to Nature Conservancy members. Several foreign nations were represented as well. Cathy presented a poster on the work that she did during the 1988 Broward County sea turtle monitoring project.

Dr. Julian McCreary, Director, traveled to Noumea, New Caledonia (mid-

way between Fiji and Australia's Great Barrier Reef), to attend a TOGA (Tropical Ocean - Global Atmosphere) meeting May 23-26. The gathering was international in scope. He presented a paper entitled "An overview of models of El Niño and the Southern Oscillation."

Jan Witte will attend the inaugural meeting of the newly formed Oceanography Society, August 27-30 in Monterey, California. The 3 themes under

discussion will be the thermohaline and chemical stratification of the ocean, productivity limitations in the oceans, and the prognosis for observing and describing the ocean. An "active schedule" of social events is promised.

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