Sounding Line

News of the Florida Keys National Marine Sanctuary

Winter 2001

Eye to Eye with a Crawfish in the Great Blue

Cathy Sakas, Education Coordinator for Gray's Reef National Marine Sanctuary

If a travel brochure had read "fall asleep to the soothing sound of snapping shrimp crackling in your ears, enjoy fine dining while fish watching, thrill to the underwater vistas of a beautiful coral reef, bask in the warmth of clear blue ocean water, and stretch the muscles of your mind and body while diving for seven plus hours each day", wouldn't you sign up immediately? Well, I did! Only it wasn't a travel brochure that hooked me. It was a call from Dr. Steve Gittings, National Oceanic and Atmospheric Administration's National Marine Sanctuary Science Coordinator, asking if I wanted to become an Aquanaut. I leaped at the chance. Think of it, me living with the fish and lobsters and five very buff guys for ten days in the great blue under. I was definitely in!

Of course this was not a vacation, far from it as a matter of fact. This mission was our National Marine Sanctuary (NMS) Aquarius Mission. Officially numbered Aquarius 2001-06, to us it was "Sanctuary Saturation". The four Aquanauts were your very own Billy Causey, Superintendent of Florida Keys NMS, Dr. James Lindholm, Research Coordinator for Stellwagen Bank NMS near Boston, MA, Laddie Akins, Executive Director of Reef Environmental Education Foundation (REEF) in Key Largo, FL and yours truly Cathy Sakas, Education Coordinator for Gray's Reef NMS near Savannah, GA.

Aquanaut Cathy Sakas found herself eye to eye with spiny lobsters during the Sanctuary Saturation Mission.

Prior to the mission the four of us were put through a rigorous training program expertly led by National Undersea Research Center staffers Mark Hulsbeck, known to us as Otter, and Paul Masaki, an incredible free diver. Both men were tough yet always encouraging. "The surface is not an option" was drilled into our heads and referred to the fact that our surface was 47' down at our underwater habitat called Aquarius. With our bodies saturated at 2.5 atmospheres, our routine was to dive for four hours in the morning, rest for four hours and do an afternoon dive for three and a half hours. Midway between our dives we checked in and refilled our double tanks at one of the fill-up stations. While filling up we talked to each other and to our ever vigilant and amiably attentive technicians and fellow Aquanauts Jay Styron and Mike Smith. These guys had the hardest task of all. They had to keep track of us, work on the habitat and tag fish, one at a time (one always inside Aquarius) venturing only as far as their hookah line would allow.

During our dives James and Laddie were a team, and I was lucky enough to have Billy as my partner. Our projects' compatibilities determined the teams. James observed the social foraging behavior of fish while Laddie censused fish populations. Their

***see* Aquarius Experience, p.5**

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Billy D. Causey
Superintendent

Anna Marie Hartman
State Co-trustee

Nancy G. Diersing
Sounding Line Editor

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Dear Readers,

In early September, I had the privilege of participating in a 10-day saturation mission in the world's only underwater laboratory, the Aquarius Habitat located at Conch Reef off the Upper Keys. Cathy Sakas, Education Coordinator for Gray's Reef National Marine Sanctuary, and my mission dive buddy, has written a delightful article in this issue that describes our adventure. Cathy and I, along with Aquanauts James Lindholm, Research Coordinator for Stellwagen Bank National Marine Sanctuary, and Laddie Akins, Executive Director of Reef Environmental Education Foundation (REEF), spent over a week in very intense training, preparing for the Aquarius experience. Although it was my second mission, it was still very exciting to have the opportunity to live and work underwater for an extended period.

On the first morning of the Sanctuary Saturation Mission, we were up early and ready to go. We posed for group photographs, took in the last sunrays we would feel for the next ten days and headed offshore. Once at Conch Reef, we donned our double 100 cubic foot scuba tanks, rigged for cave diving, and splashed in around 8:30 am. We completed a four-hour dive with a maximum depth of 80 feet and worked our way to the Aquarius Habitat located in 65 feet of water. Soon, the laboratory and living quarters would become our new "surface." We were all excited when we broke the surface inside the wet porch of the habitat and were met by Jay Styron and Mike Smith, our Aquanaut technicians. It was half past noon on September 11, 2001, and we were about to learn for the first time how much our topside world had changed during the morning dive.

After hearing the tragic news, we immediately used the cell phone to get a topside assessment of our families and colleagues. My fellow Aquanauts and I were fortunate to not have had any family members directly affected by the tragedy. After discussing the situation, the team unanimously voted to continue the mission. Later, we learned that Joe Ferguson and Ann Judge with the National Geographic Society and the teachers and students traveling with them to the Channel Islands National Marine Sanctuary were passengers on the airliner that crashed into the Pentagon. As they had done the year before, Joe and Ann were scheduled to bring students to the Florida Keys National Marine Sanctuary for an educational program, following their trip to California. They will be greatly missed by their loved ones and the many students and educators who were touched by their warmth and kindness. In honor of those who lost their lives in the tragedy, an American flag was flown over the Aquarius Habitat during the 10-day mission.

Later in the month on September 25, the first Congressional Ocean Day in Washington, D.C. was celebrated. I was honored to speak as a member of the Ocean and Climate Panel. Presentations were made on the House side and then on the Senate side. At times, the rooms were filled to capacity. Considering the events that had taken place earlier in the month, there was a tremendous amount of interest in ocean issues and our ocean environment. Several speakers emphasized that environmental issues remain a priority in Congress and with the Administration. Now, and in the days to come, an important part of continuing with our lives as normal will include a commitment to protecting, conserving and preserving our ocean and coastal environments. The oceans and coasts benefit all of us in this watery planet we call home.

Sincerely,

Sanctuary Collaborates with International Partners

Joanne Delaney, FKNMS Research Interpreter

The Florida Keys island chain may seem small to those of us that live here, but in the eyes of international visitors, a trip to the Florida Keys National Marine Sanctuary (FKNMS) is big business. As the second largest National Marine Sanctuary in the United States and one of the most complex marine protected areas (MPA) in the world, the Sanctuary regularly draws the attention of international marine managers and their staff who are seeking lessons and examples to apply to their own experiences back home. And as we've learned time and time again, the Sanctuary has much wisdom to gain from the experiences of these foreign guests.

After a day in the field, Pat Wells, Florida Park Service Manager (far right), with staff members from the Coralina Project of Colombia.

Since 1999, the Sanctuary has organized and hosted more than twelve groups of international visitors to the Keys. These groups have varied widely in their number, nationality, and responsibility in the marine affairs of their country. Representatives from the Mafia Island Marine Park in Tanzania, Galapagos Marine Reserve, Italian National Park System, KwaZulu Natal Nature Conservation Service in South Africa, Great Barrier Reef Marine Park Authority in Australia, Coralina Marine Protected Area Program in Colombia, Egyptian Environmental Affairs Agency, and Sanya Coral Reef Reserve in China have taken part in training programs at the Sanctuary. We have been fortunate enough to share our experiences with high ranking international officials such as Dr. Rokhmin Dahuri, Director General of the Indonesian Ministry of Marine Exploration and Fisheries, Mr. Jassim Al-Qaseer, Director of Fisheries in Bahrain, and Dr. Jennie Cary, Senior Marine Ecologist with the Western Australian Department of Conservation and Land Management.

Interest in the FKNMS from the international community can largely be attributed to the diversity of management strategies employed at our Sanctuary. Education and outreach, enforcement, mooring buoys, research and monitoring, volunteer programs, and marine zoning are all tangible tools that can be applied effectively in most marine settings. Hands-on observation and participation in these and other Sanctuary programs offer many marine conservation groups a valuable training experience. And highly skilled Sanctuary staff members are quick to offer their time and assistance to support these important visitors. Marion Wiles Howard, Coralina Project Coordinator for Marine Protected Areas in the San Andreas Archipelago of Colombia, recently visited the FKNMS with her staff. "The special program tailored to our needs balanced presentations, discussions, and practical field training, with plenty of time and opportunity to share information. The enthusiasm of the FKNMS staff was matched only by our team's excitement!" she explains.

In addition to experiences at the Sanctuary, the Florida Keys provide the opportunity for international guests to interact with the many other important agencies, programs, and environmental organizations that work in marine resource protection. The Sanctuary routinely collaborates with the Dry Tortugas, Everglades, and Biscayne National Parks, National Undersea Research Center, FWC/Florida Marine Research Institute, John Pennekamp Coral Reef State Park, Mote Marine Laboratory, The Nature Conservancy, The Ocean Conservancy, and World Wildlife Fund to share knowledge and information with foreign visitors.

Through their diverse experiences at the Sanctuary and in the Florida Keys, directors and staff of marine conservation programs worldwide have brought lessons from our corner of the globe to their activities at home. "Our experience at FKNMS was invaluable. We are in the process of developing a system of four large marine protected areas in our archipelago, but

see **Exchanges Benefit Sanctuary p.7**

Aquarius 2001: Exploring Inner Space

Steven L. Miller, PhD. Director of National Undersea Research Center

It isn't often that you can say you were the first at something, or that you are unique. However, the Aquarius program carries both these banners. Aquarius is an underwater laboratory funded by NOAA's National Undersea Research Program (NURC) and operated by the University of North Carolina at Wilmington. The underwater lab is located at Conch Reef in the Florida Keys National Marine Sanctuary.

What is an underwater laboratory? First, it's important to emphasize that Aquarius represents the only program of its kind on our planet – that's the unique part. Aquarius represents the culmination of over 35 years of experiments and developments in the field of underwater laboratories, including major projects conducted by the U.S. Navy, and several efforts in foreign countries. Aquarius is much like any university laboratory, except that it happens to be located at a depth of over 60 feet, 4 miles offshore, and 9 miles away from it's mission control facility in Key Largo.

The Aquarius on shore before being placed in the "Conch Reef Research-only Area" off Key Largo.

Aquarius gives scientists nearly unlimited time to work underwater to conduct their studies, along with sophisticated computer and electronic capabilities. You've probably heard of "the bends," a sickness that scuba divers get if they go too deep or stay underwater too long. There's a joke among divers that if you want to avoid getting the bends you either don't go down, or don't come up. The ***don't come up*** part is where Aquarius comes in. Aquanauts live and work from Aquarius for missions that last 10 days. At the end of the mission they undergo "decompression" inside Aquarius, where the scientists are slowly brought back up to surface pressure. Thus, avoiding the bends.

The value of the program is partly measured by the results of what scientists do with their time in Aquarius, and we have a world class science program. But Aquarius is much more than a science program. We have linked to classrooms, aquariums, and museums across the country – reaching hundreds of thousands of students using newly installed video conferencing equipment. You might be thinking, "How do you get connected to the Internet when you're out on a reef, underwater, inside a laboratory?" Good question! We have a wireless network between Aquarius computers and our shore-based mission control computers. The bandwidth is impressive, nearly 5 Mbs in each direction, which allows decent video, voice, and nearly unlimited data transmission. On shore, our computers are linked to the internet using a local internet service provider or ISDN lines for video conferencing. This gives students from anywhere in the world unique access to our oceans. In fact, in 1996 we hosted the world's first underwater web site as part of a Jason Foundation Expedition, with the web server deployed inside Aquarius.

Finally, we are not satisfied with being the first underwater web site, or the only underwater laboratory. Our vision is to build a program that uses our capabilities and technology to build student and educator skills and knowledge in multiple areas, and to make learning a truly exciting activity. We have the technology to share our discoveries with students from anywhere in the world – to show them the wonder of the oceans and the value of science (visit our website at: **www.uncwil.edu/nurc/aquarius**). The next generation of researchers and explorers, in space and in our oceans, will point, we hope, to programs like ours when they talk about what first got them interested in science. And today's teachers, we hope, will capture the excitement of exploration and discovery using materials provided by our program. We are excited about the future, our plans are ambitious - see you underwater!

Dr. Steven Miller is Director of NOAA's National Undersea Research Center at University of North Carolina at-Wilmington. He is currently involved in coral reef monitoring and assessment in the FKNMS to understand how coral reef communities are structured across multiple spatial scales, over time, and within marine protected areas.

Aquarius Experience Affords Research Opportunities

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The Aquanauts salute the American Flag that flew over the Aquarius during the mission in memory of those who lost their lives on September 11.

studies meshed well, and they could do their own research close by without getting in each other's way. They were never a breath's distance from each other, another safety tenet drilled home by our instructors. Our research had Billy and I working literally side by side, fin to fin. While I surveyed four 25 meter transect lines for benthic (bottom) cover, Billy assessed the size and condition of the hard corals on my first two transect lines. He also took time to video record the large schools of mutton snapper, gray angelfish and spotfin hogfish we were seeing after Tropical Storm Gabrielle passed by us. It was very impressive to see those fish in such large aggregations. Equally impressive was enduring Gabrielle while confined to Aquarius.

My work required that I keep my head down and my feet up. This offered me the opportunity to look at the bottom and touch it sparingly. While I was doing my work I had the advantage of seeing an amazing number of spiny lobsters. Again, after Gabrielle it seemed the lobsters came in by the droves. Under every nook and cranny, in every crack and crevice, the liquid black eyes of a wary lobster stared back.

On one occasion, I noticed one of these beautifully marked crustaceans meticulously using her legs and mouth parts, called mandibles, to move water over her swimmerets. There nestled against her abdomen were hundreds of bright red, peppercorn-sized eggs. She kept water flowing over them to keep them free of debris and bacteria. It was fascinating to watch her. Eye to eye like that with a creature makes you do funny things. I had a mental conversation with this magnificent creature. I made her a promise that no matter what was happening in my crazy terrestrial world, I would do my best to make her salt water world a healthier, safer place for her offspring and theirs for generations to come.

Of course some would say I was "narced", giddy from the high levels of nitrogen in my tissues from being saturated; however, I think I was just having one of those naturalist moments when you connect at some level with another life form. Ask Billy, Laddie, or James for other interesting stories from this truly incredible experience. Above all else, go and have a natural history moment all to yourself in the great blue of your own beautiful Florida Keys.

The Aquanauts pose for one last photo on land before the mission. From left to right: Cathy Sakas, Laddie Akins, James Lindholm, and Billy Causey.

Having lived her entire adult life on the Georgia coast, Cathy brings her experience in and knowledge of coastal natural history and her academic training in general biology (BS) and science education (MEd/S) to her work at Gray's Reef and to the National Marine Sanctuary Program. She is known to many in the southeast as the Coastal Naturalist through her two popular nature series of the same name that she wrote and hosted for Georgia Public Television.

The Florida Keys: Dramatically Different

Martin Moe, SAC Education/Outreach Representative

Changes due to Natural Causes

*Global warming (considered by some scientists to be enhanced by human activity)
*Increased water temperatures resulting in coral bleaching
*Rising sea level
*Increased incidence of tropical storms
*Loss of long-spined sea urchins due to disease in 1983
*Historic loss of commercial sponges due to periodic disease episodes
*Increased susceptibility of fishes and invertebrates to disease-causing organisms during periods of high water temperatures and other stresses

Changes due to Indirect Human Impacts

*Increased nutrient levels in near shore waters
*Increased organic and bacterial pollution due to high human populations
*Increased water turbidity from algal blooms
*Changes in biodiversity and ecology due to intense fishing pressures

Changes due to Direct Human Impacts

*Accumulation of chemical pollutants (petroleum and pesticides)
*Occasional spills of chemicals and nutrients affecting localized areas
*Habitat destruction from boat groundings on the coral reef and sea grass beds
*Dredging of channels and canals
*Filling of wetlands and creation of armored sea walls
*High human contact with reef organisms in many localized areas
*Increased and constant high turbidity in localized areas due to boating activity
*Disruptive noise and activity around bird and wildlife rookeries
*Intense fishing pressure on specific organisms (lobster, grouper, snapper, sharks, sponges), resulting in the widespread depletion of many species
*Physical impact on marine life due to the presence of discarded and lost fishing gear
*Physical and ecological changes over great areas of the seabed due to trawls and other devices

The flora and fauna of the Florida Keys, and that of the associated coral reef and Florida Bay, are dramatically different now than they were in the closing years of the nineteenth century. To those who lived here then, the natural resources of the Keys must have appeared boundless. During those times of low population and virgin natural resources, human activity did not greatly affect the aquatic life of the Keys. One hundred years ago there were no internal combustion engines, no synthetic materials, no bridges, little coastal alteration, and negligible organic pollution. There was no need for conservation law and, unfortunately, little understanding of the future effects of unbounded exploitation.

Our attitude toward our natural resources did not change much despite the limited technical advances and the increases in resource exploitation during the first 50 years of the twentieth century. Then suddenly, electronic navigation, motorized fishing boats of great capacity, huge net and trap fishing operations, accurate satellite positioning, an extensive sport fishery, and shoreline modifications built to support large human populations occurred in seemingly the blink of an eye. It took quite a while, but we have come to realize that our impact on the natural resources of this fragile area can result in environmental catastrophes.

Environmental changes in the Keys in the last 100 years have largely been negative. Coral reefs are in decline, our near shore waters are charged with nutrients, fishery resources are in danger, and human use of the Keys is increasing at an alarming rate. Much of the environmental degradation can be attributed to humans, and it is through a careful analysis of impacts and the resulting changes in natural areas that we can better understand what has happened to the Keys over the last century. Environmental change can be broadly categorized into three areas: changes due to natural causes, changes due to indirect human impacts, and changes due to direct human impacts (see text box, left).

It is necessary for the survival of the Keys environment and for the quality of life of Keys residents and visitors to do all that we can to stay and reverse negative changes, regardless of the

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Exchanges Benefit Sanctuary and its Partners

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our project team had never visited a functioning MPA. We were particularly eager for them to train at FKNMS because we are basing our multiple use MPAs on the FKNMS model," said Howard. Sanctuary staff gain tremendous insight and skills during these visits as well, as many foreign programs have challenges similar to those in the Keys and have developed innovative ways to address them. In some instances, collaboration with international partners continues beyond the initial FKNMS visit to offer reciprocal staff training. Such programs are currently ongoing in South China with the Sanya Coral Reef Reserve and the proposed Weizhou Island Coral Reef Reserve. Similar exchanges with Coralina in San Andreas, Colombia and the Red Sea Protectorates in Egypt are also being explored. Contributing the experiences of this small island community to the international marine conservation world is an exciting part of our work here at the Florida Keys National Marine Sanctuary.

Joanne Delaney is a Research Interpreter for the Florida Keys National Marine Sanctuary, where she explains scientific information related to current marine issues to a variety of audiences through articles, presentations, and papers. Joanne brought her background in marine science, management, and education to the Sanctuary in 1997.

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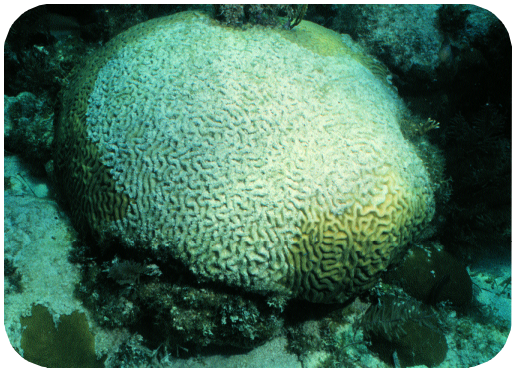

Coral bleaching is a generalized stress response to extremes of temperature, salinity, ultraviolet radiation, and other environmental conditions.

source of impact. Unfortunately, some of these are not within our ability as individuals to readily correct. This includes most of the the first category, ***Changes due to Natural Causes***. Reversing global warming trends will require national and international commitments, which we can each facilitate through political action on many scales. Our efforts can have some effect in the second category, ***Changes due to Indirect Human Impact***. Mediation generally requires long term, expensive, and far reaching programs that must be implemented over time and over large areas; therefore, it is here where our collective efforts must be expended. It is in the third category, however, ***Changes due to Direct Human Impact***, where we can have the most immediate corrective effect, both individually and collectively, and everyone must strive to do so.

It is difficult, looking at our environment today, to attain a realistic perspective on the past and to plan for the future. However, we must work together to prevent further abuses and protect our natural resources. Although we cannot reverse the course of history, our actions as individuals at home, as well as at the local, regional, and even national level, can effect positive change for the environment and ecology of our Florida Keys.

If no one cares, the Keys will die.
If you don't know, you can't care.
If you don't care, you can't help anyone else to care.
Information and education are the keys to caring.
The Florida Keys National Marine Sanctuary holds these keys to caring.
Together, we can teach the Keys to care.

Martin began his career in marine biology in 1962 working on offshore fishing boats and studying the life history of red grouper at the Florida Marine Laboratory in St. Petersburg. He was a pioneer in the early development of aquaculture of tropical marine food and ornamental fishes. Now an author and publisher, Martin and his wife ,Barbara, live on Lower Matecumbe and write books on marine natural history (lobsters) and marine aquarium topics. Martin currently serves as the Education/Outreach Representative on the Sanctuary Advisory Council.

SAC Approves Draft Management Plan

June Cradick, FKNMS Project Manager

During the past few months, the Sanctuary team has been busy working with the Sanctuary Advisory Council (SAC) working groups and with the public to review the existing Sanctuary management plan and to draft revised action plans for the following: ***Channel/Reef Marking; Education and Outreach; Enforcement; Mooring Buoy; Regulatory; Research and Monitoring; Submerged Cultural Resources; Volunteer, Water Quality and Zonin***g. New action plans for ***Damage Assessment and Restoration*** and for ***Sanctuary Administration, Operations, Policy and External Relations*** have also been developed.

The Sanctuary team is very grateful for the guidance given to them by the SAC and Keys residents during this first step in the management review process. The review process provides an opportunity to look at what has been accomplished in implementing the existing plan and to think about management issues to be addressed in the next five-year plan.

During its October meeting, the SAC approved the draft revised action plans submitted by the working groups. Presently, the plans are being prepared for review by NOAA headquarters before the public review period, which is scheduled to begin in early 2002.

The complete draft revised management plan will be available on CD Rom, on-line on our web page, (**http://www.fknms.nos.noaa.gov/**) and in old-fashioned printed copy in 2002. The public hearing schedule has not been determined at this time. If you have any questions, please contact Billy Causey or June Cradick at (305) 743-2437.

Sounding Line is issued on a quarterly basis by the Florida Keys National Marine Sanctuary. For more information or to be placed on the mailing list, email the editor Nancy.Diersing@noaa.gov

Florida Keys National Marine Sanctuary
P.O. Box 500368
Marathon, Florida 33050
http://www.fknms.nos.noaa.gov/