Florida’s New Frontier

The deep-water Lophelia reefs of the Florida coast

Jim Wharton, Public Programs Specialist

It was moving too fast to capture on film—a silver blur with a sword. Three days into the Florida Coast Deep Corals 2005 research cruise an eight-foot swordfish attacked the Johnson-Sea-Link submersible. Apparently spooked by the lights and noise, it ran headlong towards the sub, breaking its sword before retreating into the darkness. Think that’s exciting? Wait till you hear about the coral.

Stand on the beach in Fort Pierce, Florida and head east, into the surf. Hug the bottom and you’ll pass through nearshore limestone ridges dotted with sponges, algae and coral. Keep going, heading deeper. Twenty-five miles from shore you’ll encounter the only Oculina coral reefs in the world. They’re incredible—teeming with life, but keep going. Drop off the edge of the continental shelf and glide down the slope. Go deeper. Finally, at depths of more than 2,000 feet you’ve arrived at the Lophelia reefs. Discovered in the past twenty years, these reefs run parallel to the Florida coast and support a diverse community of animals with everything from large gamefishes and sharks to corals, crabs and delicate glass sponges.

With such a diverse and impressive animal community, even deep-sea reefs eventually attract the attention of the commercial fishing industry. It is therefore critical to explore and document these deep reef ecosystems and identify any potential for damage through fishing activities. The mission of the Florida Coast Deep Corals 2005 research cruise was to do exactly that: observe, document and characterize the deep Lophelia reefs of the Florida coast.

Five Smithsonian researchers participated in the Florida Coast Deep Corals 2005 cruise including Marine Station Director Valerie Paul. Dr. Paul, Research Assistant Raphael Ritson-Williams and Postdoctoral Fellow Melany Puglisi were interested in learning more about the role chemical defenses play in predation and competition on the reef, particularly among sessile animals (those permanently attached to the bottom). During sub dives to the reef, Dr. Paul collected various species of soft corals including large sea fans and bamboo corals. She and her colleagues have already uncovered one unexpected chemical phenomenon—a bright blue luminescence from one particular species of bamboo coral (visit the NOAA Ocean Explorer website to see video footage). Collected specimens are now back at the Marine Station where interesting chemical compounds will be extracted, identified and cataloged. Extracted compounds will be tested against potential predators (including marine fungi) to determine if these chemicals might be naturally used for defensive purposes.

Uncovering the diversity of these habitats was one of the main objectives of the cruise. Researchers observed, identified and collected fish, fungi, snaills, sponges, corals, crabs, even bacteria. Marine Station Postdoctoral Fellow Anja Schulze was collecting sipunculan worms (sometimes called peanut worms). Dr. Jerry Harasewych of the National Museum of Natural History and a frequent visitor to the Marine Station was collecting slit shell snails and other mollusks. Dr. Harasewych was interested in not only what species might be found, but also how their distribution might vary with depth and geography.

Though the expedition is now over, the learning has just begun. Researchers collected video and still photography, biological specimens, information on water parameters and physical data on the bottom topography. All this information now goes back to the lab where the discoveries from Florida Coast Deep Corals 2005 will continue for years to come.

For more on the Florida Coast Deep Corals 2005 research cruise, visit NOAA’s Ocean Explorer website at: http://oceanexplorer.noaa.gov/explorations/05deepcorals.

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Satisfy Your Natural Curiosity
Kathy Hill, Project Coordinator - IRL Species Inventory

The next time you find yourself wondering what species of fish you’ve hooked, or what kind of bird might be visiting your backyard, the answer may lie as close as your computer with the Field Guide to the Indian River Lagoon, an online resource for amateur naturalists. Developed by the Smithsonian Marine Station at Fort Pierce, in partnership with the Indian River Lagoon Program, the Field Guide was a natural extension of the already successful Indian River Lagoon Species Inventory, a website devoted exclusively to the more than 3,000 species of animals and plants that inhabit the Indian River Lagoon (IRL). Whereas the Inventory project was developed to provide biological and ecological information about local species to college students and researchers, the Field Guide was designed with the non-scientist in mind. Its objective is to reach Florida’s school children, teachers, year-round residents, seasonal visitors and tourists.

Designed to be both image-rich and user-friendly, the Field Guide to the Indian River Lagoon highlights the Lagoon’s diverse habitats and the unique features that make it one of the most species-rich estuaries in the United States. Visitors to the site can access information on more than 300 local species, with descriptive profiles that include range and habitat information, annotated photos, fun facts and links. New information is being developed and added continually, with the focus this year on commercially and recreationally important species of fishes and invertebrates.

With positive feedback from local educators and increased web traffic during both the school year and peak tourist season, there is little doubt that the Field Guide is reaching its target audience. See for yourself by accessing the Field Guide to the Indian River Lagoon from the Smithsonian Marine Station’s homepage at: http://www.sms.si.edu.

Inventory Recognized

The Indian River Lagoon Species Inventory website was added this year to Natural Selection—a catalog of hand-selected and evaluated websites compiled by the Natural History Museum in London and Biome (part of the Resource Discovery Network (RDN), a set of ‘hubs’ that provide gateways to web resources in a variety of subject areas). You can view Natural Selection at http://nature.ac.uk/

Toxic Algae Blooms in the Lagoon
Cliff Ross, Postdoctoral Fellow

The prevalence of toxic blooms of cyanobacteria (also known as blue-green algae) in the state of Florida have gained considerable attention in the past twenty years. An unprecedented bloom of the blue-green alga Microcystis aeruginosa occurred in the St. Lucie River Estuary in the summer of 2005. Microcystis aeruginosa contains a suite of toxic chemicals that can have detrimental impacts on environmental health. Variants of these toxins have been directly associated with the deaths of fish, domestic livestock, and even humans. Interestingly enough, not all Microcystis strains produce toxins. The purpose of this study was to determine if the St. Lucie River Estuary strain of M. aeruginosa was indeed toxic, and to determine if certain environmental conditions or potential remediation strategies could induce stress and lead to a significant release of toxins. Our results showed that secreted toxin levels were relatively low in dense natural assemblages. However, toxin levels increased by 90% when M. aeruginosa was stressed by an increase of salinity, physical injury, application of chemical herbicides, or UV irradiation. In collaboration with Dr. Lory Santiago (Florida Atlantic University) we have positively identified a gene that has previously been correlated with the biosynthesis of toxic microcystins. So while this bloom was not secreting high levels of toxins at this time, it most certainly could be stressed into releasing higher concentrations of stored toxins into the surrounding water column. In addition, it could be feasible that this local strain could genetically biosynthesize more toxins when stressed.
Flotsam and Jetsam

New “Wet” Lab for Marine Station Scientists
Construction is now complete on a new 1,000 square-foot “wet” laboratory building. The new 25’ x 40’ concrete building features a running seawater system. Water for the building will be pumped from the Fort Pierce Inlet to a 4,000-gallon storage tank then fed by gravity to water tables and tanks within the building. The addition of this much-needed space will increase the number and type of marine animals and plants that researchers will be able to maintain in captivity.

New Species Named
Long time SMSFP researcher Judy Winston of the Virginia Museum of Natural History recently named a new species of bryozoan, Celleporaria sherryae, after Research Assistant Sherry Reed in recognition of her 20 years of dedicated service to the Marine Station and its visiting scientists.

Environmental Award
Marine Station Research Assistants Woody Lee and Sherry Reed were recognized in 2005 by the Conservation Alliance of St. Lucie County as Researchers of the Year for their “dedication to the sea and its creatures, and to educating the public about the importance of both.”

Virtual Learning
Research Assistant Woody Lee recently visited a high school biology classroom in Peru, NY via telephone to discuss how influxes of freshwater in the Lagoon have affected the plants and animals that live there. “It’s like being there because the person telling you has been there.”

Make Your Contribution to Biodiversity
The Smithsonian Marine Station is actively seeking donations to support its research and fellowship programs at the Station and the educational and outreach programs at the Smithsonian Marine Ecosystems Exhibit. Any charitable contributions of money or gifts to support the mission of the Marine Station are completely tax-deductible. If you’re interested in the study and preservation of marine biodiversity, send your contribution to the Smithsonian Marine Station at 701 Seaway Dr., Fort Pierce, FL 34949 or contact Dr. Valerie Paul at 772-465-6630 ext. 140 or by email at paul@sms.si.edu.

Exhibit Wish List
By donating items from the Wish List, you will be directly contributing to our education and outreach efforts.

- Hand-held refractometer
- Underwater housing for digital camera
- Backup generator
- Color copier

Of course, our number one need is, as always, more volunteers! Contact us for details on individual items, needs or to volunteer at 772-465-3271.

New Staff
Laura Diederick has joined the Station as the (relatively) new Marine Biology Educator at the Marine Ecosystems Exhibit. Laura comes to us from the Columbus Zoo where she developed standards-based, hands-on educational materials for visiting student groups.

Scott Jones recently joined the Station as a Research Assistant working with Bjorn Tunberg in the Benthic Ecology Lab. Scott hails from Michigan where he studied aquatic ecology and entomology at Northern Michigan University.

New Grants
Head Scientist, Valerie Paul, received an award of $45,000 from the NOAA Ecology and Oceanography of Harmful Algal Blooms program (through the University of North Carolina) for the project, “LyngbyaHAB: Ecology of Toxic Marine Cyanobacteria Lyngbya spp. in Florida Estuarine and Coastal Waters.”

Dr. Paul also received an award of $614,400 from Florida Fish and Wildlife Conservation Commission for Research and Public Outreach Programs at the Smithsonian Marine Station. The award funds ongoing programs in research on the Indian River Lagoon and education and outreach activities at the Marine Ecosystems Exhibit.

Bjorn Tunberg received an award of $65,729 from St. Johns Water Management District for the project, “Assessment of Sebastian River Dredging on Benthic Infauna.”

Selected Publications


News from the Abyss and Beyond

Jim Wharton, Public Programs Specialist

While Marine Station researchers were exploring new worlds at the bottom of the sea, visitors to the Smithsonian Marine Ecosystems Exhibit (SMEE) could follow along via expedition dispatches posted to a new temporary exhibit on deep-water corals. Already home to the world’s only living Oculina coral display, SMEE recently participated in the outreach efforts associated with the Florida Coast Deep Corals 2005 research cruise (see cover).

The temporary, traveling display gives visitors insight on the mission and its objectives with information on the researchers, their studies and the tools they used during the two-week cruise. You can follow the discoveries as they happened through daily dispatches sent from the ship and learn more about the most common deep-water coral species encountered during their dives. Additional information and details, including essays, researcher bios and exclusive video and still photography are available on the National Oceanic and Atmospheric Administration’s Ocean Explorer website at:

http://oceanexplorer.noaa.gov/explorations/05deepcorals

More SMEE News:

- SMEE was featured on St. Lucie County TV’s Postcards from Home, a half-hour feature shown locally to introduce tourists and locals to what’s going on in the community. You can view the full episode on their website: http://www.stlucieco.gov/slctv/. Choose “Video On Demand” and scroll to the show’s link.

- The education staff recently participated in three workshops for Treasure Coast school teachers. In September the Exhibit staff hosted How to Cold-read a Fish—a workshop that helped teachers look at fish adaptations in a new way. In October, staff contributed to an Oculina coral reef workshop conducted off-site in cooperation with a 2005 research cruise to the Oculina Banks. And in November, Exhibit staff toured a group of teachers participating in a SEAPORT workshop that introduced teachers to data they can access via the SEACOOS ocean observing buoys.

- Exhibit Manager Bill Hoffman was the star of a “webcast” on seagrass ecosystems by Indian River Community College’s Living Science program. You can view the webcast on their website at http://www.living-science.org.