Odds are that most people have never even heard of foraminiferans – often referred to as forams – let alone know what they are. Yet these tiny marine organisms are found in every ocean, at every depth, and the accumulation of their skeletons over millions of years have formed sedimentary beds all over the world, including the bedrock that forms the Florida peninsula.

Foraminiferans are marine protozoans, most of them microscopic, that typically have shells of calcium carbonate. Most forams live on the sea floor, though a few species are planktonic. Regardless of where they spend their lives, they ultimately all end up on the bottom when they die, in such high numbers that they blanket the ocean floor. Understanding the distribution and abundance of the forams found in the fossil record has a number of practical applications. Forams can be used to determine the age of sediments, making them useful in the search for valuable oil reserves. But this line of study can also be helpful in monitoring, and perhaps even predicting, environmental conditions.

Smithsonian scientist Dr. Martin A. Buzas is the Curator of Foraminifera at the National Museum of Natural History and has been researching foram communities around the globe for over four decades. By taking sediment cores and looking at the species that are found in each layer, Dr. Buzas can see changes in the environment over time. "We know quite a bit about forams," Dr. Buzas says, "which makes them statistically reliable and easy to read."

Dr. Buzas is no stranger to the Treasure Coast. As one of the first Smithsonian scientists to study the benthic, or bottom, communities in the Indian River Lagoon, he and his research team established a baseline of information on the foram communities in the St. Lucie Estuary in 1975. When he compared the samples he collected from the same area in 2005, what he found was alarming. The 62 species of forams he had observed in 1975 had dwindled to a mere 13 species 30 years later. Dr. Buzas attributes this significant decline to a number of variables, including freshwater releases from Lake Okeechobee and agricultural and residential pollutants introduced to the estuary via canals and runoff.

This dramatic shift in the benthic community is not to be taken lightly, Buzas warns. Forams are normally found in high numbers and are food to millions of organisms. A decrease in diversity and density could spell disaster for organisms higher up the food chain, and eventually the estuarine ecosystem as a whole.

Recent samples from the estuary show that the diversity of the foram community has returned to the 1975 numbers, but with one significant difference. "We found approximately 60 species in 2009," notes Dr. Buzas, "however, except for the dominant species, they are different species from what we found previously."

What this shift in species composition means for the long-term health of the St. Lucie Estuary is still unknown, but Dr. Buzas assures regular monitoring of the benthic community is essential and will continue. "[It] may be used to indicate declining water quality, and possibly even predict how long ecosystem recovery may be."
Whether or not coral reef ecosystems are in trouble is no longer a question. They are. Increasing coastal populations have led to local strains on the environment (habitat destruction, erosion and sedimentation, nutrient input, and overfishing) that in concert with global stressors (increasing ocean temperatures, ocean acidification, increasing frequency of disease) threaten to destroy these biologically diverse underwater ecosystems. Two species of coral, \textit{Acropora palmata} (Elkhorn coral) and \textit{A. cervicornis} (Staghorn coral), are among the most important in the Caribbean because they are large, branching corals that create habitat for many organisms found on the reefs. In the late 1980s, the populations of both \textit{Acropora} species declined drastically due to disease, hurricanes, and multiple local stressors. As a result of this massive die-off, \textit{A. palmata} and \textit{A. cervicornis} were the first corals to be listed as "Endangered" under the Endangered Species Act. The critical question now is - how can we help these corals recover to their previous population levels?

In late February 2009, coral researchers and aquarists, NOAA managers, and endangered species experts from around the world came together for a workshop organized by Dr. Mary Hagedorn of the National Zoological Park (NZP) and hosted by the Smithsonian Marine Station. Funding for the workshop was provided by the Smithsonian Marine Science Network (www.si.edu/marinescience). Using scientific data as a foundation for their dialogue, attendees discussed strategies for the recovery of \textit{Acropora} corals in the field and for preserving both species' genetic diversity using captive populations in public aquariums - similar to a seed bank, but for corals. Scientists from the NZP gave examples of endangered species, such as the black-footed ferret and giant panda, that have returned from the brink of extinction and the specific goals and activities that saved them.

The recovery of coral species is uncharted territory, but a mission of utmost importance. While there is still much work to be done, this workshop developed specific goals and established the collaborations necessary to facilitate a recovery.
In 2008, Dr. Valerie Paul received a grant from the National Institute of Health to identify and isolate new compounds from marine cyanobacteria to screen for potential biomedical uses. The ambitious goals of the project required the addition of two Research Technicians to Dr. Paul’s lab. Chivas Owle (above left) is a student at Indian River State College and will transfer to the University of Florida College of Pharmacy for Fall 2009. Vicky Pittman (above right) recently graduated from Baylor University where she majored in Biology and minored in Chemistry. Both Chivas and Vicky interned with Dr. Paul last summer before joining the SMS staff.

Sarah Mallette is interning with the husbandry staff at the Smithsonian Marine Ecosystems Exhibit. Sarah recently graduated from George Mason University where she received a Bachelor of Science in Integrative Studies with a concentration in Conservation Biology.

Smithsonian Marine Station Welcomes Friends New and Old

The Friends of the Smithsonian Marine Station was initiated by a group of longtime supporters of SMS. This annual membership program encourages community members to become more familiar with the activities of the Marine Station, while providing critical support for research and educational programs. Members receive SMS News, invitations to lectures and other special events, as well as additional benefits. For information on how to become a “Friend”, call (772)462-6220.

SMS & Pelican Yacht Club Lectures - Another Successful Season

The Smithsonian Marine Station and the Pelican Yacht Club hosted a marine science lecture series in January and February featuring presentations by distinguished Smithsonian researchers. On January 29, Dr. Anson “Tuck” Hines delivered a presentation entitled, “Blue Crabs: New Science for an Old Fishery.” Dr. Hines, pictured below with Dr. Mary Rice (left) and Dr. Valerie Paul (right), is the Director of the Smithsonian Environmental Research Center in Edgewater, MD. On February 26, world-renowned coral reef ecologist and Smithsonian Sant Chair of Marine Science, Dr. Nancy Knowlton, discussed “Coral Reefs: Past, Present and Future.” Many thanks to all in attendance and to the Pelican Yacht Club for their continued support of the Marine Station.

New Grants

Valerie Paul received a Marine Science Network award for $11,000 for “Coral Algal Microbial Interactions on Reefs of Florida and Belize”

Bjorn Tunberg received an award for $75,512 from St. Johns River Water Management District for “Assessment of Sebastian River Dredging on Benthic Infauna.”

Bjorn Tunberg received an award for $137,449 (Year 1 of a Five-Year Project) from South Florida Water Management District for “Benthic Infaunal Monitoring of the St. Lucie Estuary and the Southern Indian River Lagoon”.

Valerie Paul received an award from The Link Foundation for $13,500 for “Graduate Student Training in Marine Sciences”.

Selected Publications


Volunteers are the Backbone of SMEE

Donations of time are invaluable to the Smithsonian mission

Cristin Ryan, Marine Biology Educator

Before the Smithsonian Marine Ecosystems Exhibit (SMEE) ever opened its doors to the public volunteers have generously given their time and enthusiasm to the Smithsonian Marine Station's mission of educating the public about marine environments. Since 2001 volunteers and unpaid interns have contributed more than 10,500 hours to SMEE – the equivalent to five years of full time employment! Clearly, volunteers play an integral role in every aspect of the facility, from designing and constructing aquaria to interacting with the public.

Behind-the-scenes husbandry volunteers are on-hand seven days a week to help maintain the model ecosystems and interact with visitors. In addition to performing daily feedings, maintaining tanks and monitoring water chemistry, volunteers also assist with field work and are responsible for collecting many of the specimens on display at SMEE. Indian River State College student Peter Chamberlain has volunteered his time at SMEE since June 2008 and feels the time he has given to SMEE is a win-win situation. “My internship here has helped me gain the experience I need to fortify my future as a marine biologist,” Pete says. “I enjoy collecting specimens, performing routine lab work and caring for our aquatic inhabitants.”

Public side volunteers actively engage visitors to the Exhibit and can often be found assisting eager children (and sometimes squeamish adults) with handling marine animals at the touch tank. SMEE volunteer interpreter Charlie Kennedy recently celebrated his two-year anniversary at SMEE. “The interest of the general public in what is beneath our planet’s waters is inspiring,” Charlie enthuses. “I am proud to serve as a volunteer member of the Smithsonian Marine Station and to assist in the expansion and hands-on learning of this beautiful and vital environmental resource.”

If you are interested in learning more about the marine environment and sharing your interest with others, consider volunteering at SMEE! The only requirements are a positive attitude and willingness to learn. All other training is provided. For more information, please contact Cristin Ryan at ryanc@si.edu or 772-465-3271.