Algae is an essential part of many ecosystems, and – when maintained in a balance – can provide food, shelter, oxygen and more to millions of organisms, including people. But some algae produce harmful toxins and, under certain conditions, can grow out of control. These so-called harmful algal blooms, or HABs, have been increasing in frequency and severity along the world’s coastlines. The conditions that cause these blooms and the resulting impacts on marine ecosystems are not clearly understood.

Many people are aware that the west coast of Florida regularly suffers from red tides. Although “red tide” is often used as a catch-all phrase for all HABs, in Florida it refers to a bloom of the toxic phytoplankton, *Karenia brevis*. Less familiar are the blooms of benthic cyanobacteria, or bottom-dwelling blue-green algae, that can also produce potent toxins and quickly smother seagrasses and other organisms on the bottom of the sea.

*Lyngbya* is a benthic bloom-forming cyanobacterium that grows in marine and estuarine environments. It is generally found growing on rocks and sediment, however, during a bloom it overgrows seagrass, macroalgae, corals, anchor chains – almost anything underwater. In some places, *Lyngbya* has been nicknamed “mermaid’s hair” because it looks like long, brown, flowing locks of hair. As the bloom grows rapidly, the oxygen produced by the *Lyngbya* through photosynthesis gets caught among the filaments, creating floating mats. These mats often wash up on beaches, leaving large piles of smelly cyanobacteria on the shoreline.

Ecology and Oceanography of Harmful Algal Blooms (ECOHAB) is a multi-agency partnership coordinated through the National Oceanographic and Atmospheric Administration (NOAA). The many projects currently funded by ECOHAB are attempting to understand the causes and impacts of HABs. SMS researchers Valerie Paul and Karen Arthur, together with their collaborators Hans Paerl (University of North Carolina) and Judy O’Neil (University of Maryland), have been studying cyanobacterial blooms throughout Florida as part of the ECOHAB project.

*Lyngbya* blooms generally occur in the summer in Florida. Recently, large blooms have been occurring in Tarpon Bay off the coast of Sanibel Island. Increased nutrients from land-based sources, such as the run-off of fertilizers from gardens and golf courses, and from effluent from farms and sewage treatment plants may provide these organisms with the nutrients that they need to grow and produce toxins. Dr. Paul and her research team conducted experiments at the Sanibel-Captiva Conservation Foundation to see whether *Lyngbya* in the area would respond to additions of nitrate, phosphate, and iron – common components of the aforementioned land based nutrient sources. The *Lyngbya* was grown in individual chambers where it had access to natural water temperature and light. The researchers found that elevated nutrients can affect growth rates and compound production in this cyanobacterium, and this means that it is vital to effectively manage the release of nutrients into the marine system to ensure that HABs do not dominate our marine waters.
Conducted at SMS.

Research being learned about the latest opportunities to tour participants have had an opportunity to see researchers at work, but will also learn of the history of the Smithsonian in Fort Pierce, only have a chance to see researchers at work, but will also learn of the history of the Smithsonian in Fort Pierce.

Friends of SMS.

Intern supported by Foltz was the first College senior Zach College senior Zach College senior Zach College senior Zach.

Dr. Valerie Paul, Director of SMS. “In walking down one quarter and have an opportunity to discuss their studies, also learn of the history of the Smithsonian in Fort Pierce, only have a chance to see researchers at work, but will also learn of the history of the Smithsonian in Fort Pierce.

“One advantage of being a smaller research facility. Tour participants will not only have a chance to see researchers at work, but will also learn of the history of the Smithsonian in Fort Pierce and the scope of research currently being conducted.

“One advantage of being a smaller research laboratory is that our scientists are in relatively close quarters and have an opportunity to discuss their studies, not only with one another, but with visitors, as well,” said Dr. Valerie Paul, Director of SMS. “In walking down one hallway, you can learn about everything from the tiny animals that live in the sediment of the IRL to the chemical defenses of corals. It’s a very unique opportunity.”

The lab tour is being offered on the third Thursday of the month at 2:00 PM, though there are some exceptions around holidays. And while there is no charge for the tour, anyone interested in participating is asked to register in advance.

“The work we’re doing here is for the benefit of the entire community,” Dr. Paul stressed. “We want people to be aware of what’s going on behind our doors, because the health of our marine environment affects everyone.”

Reservations for tours are being taken on an ongoing basis. Please call Laura Diederick at 772.465.3271 to register.
**Flotsam and Jetsam**

**Movers and Shakers**
The staff of the Smithsonian Marine Station bid a fond farewell to three of its own this summer as Postdoctoral Fellows Fred Gurgel (above left) and Cliff Ross (center), and Marine Ecosystems Technician Holly Sweat (right) moved on. Fred accepted a position in Australia at the University of Adelaide, where he will continue his molecular study of red algae. Cliff also accepted a faculty position, but a little closer to home. He is an Assistant Professor in the Biology Department at the University of North Florida in Jacksonville. Holly’s new address is also at a university, however she is there as a student. After nearly five years at the Marine Ecosystems Exhibit, Holly left SMS to pursue her Masters in Marine Biology at Florida Tech, where she is studying invasive species.

**New Grants**
Valerie Paul received three awards from Mote Marine Laboratory “Protect our Reefs” program as follows:
1) “Impacts of Red Tides and Associated Toxins on Scleractinian Coral Health and Settlement” - $18,950 – with Cliff Ross (SMS) and Richard Pierce (Mote);
2) “Investigation of Microbes Associated with Early Life Stages of Acropora palmata in the Florida Keys” - $18,224 – with Koty Sharp (SMS) and Kim Ritchie (Mote);

Bjorn Tunberg received an award of $40,000 from South Florida Water Management District for the project “Benthic Infaunal Monitoring of the St. Lucie Estuary and the Southern Indian River Lagoon”.

Valerie Paul received an award of $32,000 from the St. Lucie County School Board for “Developing a Collaborative Education Program with the School Board of St. Lucie County: School Year 2007-8”.

Valerie Paul received an award of $13,500 from the Link Foundation for three Marine Science Graduate Student Fellowships.

Melanie McField received an award of $190,648 from The Summit Foundation for “Healthy Reefs for Healthy People: A Proposal to Advance the Healthy Mesoamerican Reef Ecosystem Initiative (Year 2)”.

**Selected Publications**


**SMS Welcomes New Friends**
The staff of SMS extends a warm welcome and a big “thank you” to the newest members of *Friends of the Smithsonian Marine Station*. 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 special events, as well as additional benefits. For information on how to become a Friend, call 772.462.0977.

**Leonard & Peggy Berg**
David & Ursula Blackburn
Will Jaeckle
Lilly King Manning
David & Sally Richeson
Peter & Jeanne Tyson
Lace & Walter Vitunac
Jann Widmayer

**Antonio Baeza** is a Postdoctoral Fellow splitting his time between the Smithsonian Marine Station at Fort Pierce and the Smithsonian Tropical Research Institute in Panama. Antonio received his PhD from the University of Louisiana at Lafayette and is studying the reproductive behaviors of marine crustaceans.

**Liliana Lettieri** is a recipient of an SMS/Link Foundation Fellowship and is currently pursuing her PhD in Evolutionary Ecology at the Georgia Institute of Technology in Atlanta, Georgia. During her stay at SMS, Liliana is studying the evolution of color patterns of cleaner fish of the genus *Elaeinus*.

**SMS/Link Fellow Justin Bagley**, (left) a graduate student at the University of Alabama, and SMS intern **Zach Foltz**, (right) a senior at James Madison University, spent the summer collecting and analyzing fish samples from local waters as part of Dr. Carole Baldwin’s DNA barcoding project.

**Antonio Baeza** is a Postdoctoral Fellow splitting his time between the Smithsonian Marine Station at Fort Pierce and the Smithsonian Tropical Research Institute in Panama. Antonio received his PhD from the University of Louisiana at Lafayette and is studying the reproductive behaviors of marine crustaceans.
Splish, Splash! Another Summer of Fun at SMEE

Cristin Ryan, Marine Biology Educator

Florida’s heat and humidity may persist into fall, but summer has come to a close at the Smithsonian Marine Ecosystems Exhibit (SMEE). And with over 5,500 visitors in June, July and August, it was the busiest yet! A celebration of World Ocean Day on June 8th kicked off the season and despite the rainy weather, nearly 200 visitors enjoyed giveaway bags, face painting and tours of the Exhibit. Be sure to look for this annual event next year.

After a successful introduction last summer, SMEE Camp expanded to three weeks in 2007 and campers still couldn’t get enough! The most common responses on Camper Evaluation forms were music to the Education staff’s ears: “Make [camp] at least two weeks!” and “I can’t wait to do it again next year!” Campers ages 6-8 took part in Ocean Discovery Camp, literally getting their feet wet in the seagrasses and mangroves of the Indian River Lagoon (IRL). Ocean Adventures Camp for ages 9-12 hit the water for a kayak trip on the IRL and snorkeling at Bathtub Beach, while 13-15 year olds in Ocean Explorers Camp experienced the underwater world along the Treasure Coast by snorkeling at Sebastian Inlet, visiting sea turtles at the Loggerhead Marinelife Center in Juno Beach and dredging for sand dollars aboard the Smithsonian Marine Station’s research vessel, the R/V Sunburst. With such successful programs and many happy (but tired!) campers, camp has cemented a spot as a summer tradition at SMEE.

Kids weren’t the only ones having fun in the sun. SMEE staff offered kayak tours of the IRL in conjunction with Tropical Kayak Tours of Vero Beach. After a brief introduction to seagrass and mangrove ecosystems inside SMEE, paddlers hopped into their boats and took off on a two and a half hour trip around spoil islands and through mangrove trails. Be sure to check out the online events calendar on the web (www.sms.si.edu/smee/calendar.htm) for upcoming paddles, as well as the many other programs for kids young and old.

Discovery was the name of the game for SMEE’s youngest campers and there is plenty to discover on the beach!