Nursery-grown Staghorn Coral Transplanted to Molasses Reef

About five years ago, marine life collector and sanctuary volunteer Ken Nedimyer noticed new staghorn coral colonies growing on cement blocks in his open-water "live rock" nursery permitted by the sanctuary. Since each of these colonies grew from a coral larvae (called a planula), each was a genetically unique individual. Nedimyer and his daughter Kelly cultivated several of these volunteer staghorn colonies and when they were large enough, transplanted them under the sanctuary manager's permit to the *Wellwood* grounding site on Molasses Reef. This site was selected as the location for the new colonies to replace the many corals lost during the *Wellwood* tanker grounding incident.

This past summer, again with the help of his daughter Kelly and student volunteers from University of Central Florida, Nedimyer coordinated the transplanting of another collection of nursery grown staghorn colonies. This time though the corals were cemented onto an area near Molasses Reef that had not been damaged by a boat grounding. Instead, the site selected under the manager's permit was a site where staghorn colonies were known to exist in the recent past, but were no longer present. Scientists plan to monitor the health and growth of these transplants over the next several years.

Nedimyer carefully removes colonies for transplanting from his permitted "liverock" nursery. Photo: Jennifer Nedimyer

Staghorn coral, *Acropora cervicornis*, is a branching species that was commonly found growing in thickets along the reef tract in the not-too-distant past. Due to population declines, staghorn coral and a closely related species, elkhorn coral (*Acropora palmata),* were placed on the federal threatened species list in 2006.

This coral restoration transplant project is different from previous efforts because a non-injured site was chosen and because the genetic fingerprint, or DNA, of each genetically unique colony was analyzed prior to the relocation. Knowing how well each genetically unique colony survives in its new habitat during the next few years may help managers better protect corals in the future.

The Sanctuary Friends Foundation of the Florida Keys provided funds for this project. To view a coral restoration video or find out more about the Coral Restoration Project, please visit **www.sanctuaryfriends.org.**

This module at the *Wellwood* site received six small staghorn transplants in 2003. Today, there are more than 45 colonies on the module. The increase has been taking place over time as coral fragments, broken by divers, turtles and sharks, were reattached by Nedimyer. Nedimyer has learned to take epoxy with him each time he visits the site. Photo: Ken Nedimyer

Nedimyer *(right)* oversees the transplant work of two volunteer students from University of Central Florida in July 2007. The process involves cleaning the attachment site and then using epoxy to glue the base of the coral fragment in place. Photo: Jennifer Nedimyer

SEAKEYS C-MAN Stations Record Real-Time Sea Conditions

Jon Fajans, SEAKEYS Program Manager

The SEAKEYS C-MAN (Coastal Marine Automated Network) stations provide a wealth of oceanographic and weather data used by marine ecosystem managers and scientists conducting research in the Keys. Scientists studying phenomena like coral bleaching and algae blooms depend upon the real-time data collected by the oceanographic stations. Marine managers use the sea surface temperature readings to help predict coral bleaching events. But they are not the only ones who use SEAKEYS data. Boaters, anglers, and divers, including commercial operators, also take advantage of being able to check sea conditions on the internet, especially the wind speed and direction, before they leave the dock for an outing on the water.

Fowey Rocks Lighthouse, located on the reefline off Miami, is one of the reef lighthouses that houses SEAKEYS oceanographic and meteorological instruments. The reef lighthouses, built along the reef tract in the 1800s, are navigational aids maintained by the U.S. Coast Guard. Photo: SEAKEYS

SEAKEYS, which stands for Sustained Ecological Research Related to the Management of the Florida Keys Seascape, is a research framework for scientists organized by the Florida Institute of Oceanography (FIO) in 1989 with funding from the John D. and Catherine T. MacArthur Foundation. FIO, in cooperation with the National Data Buoy Center, established six enhanced C-MAN environmental monitoring stations as part of the SEAKEYS framework. The program is now sustained annually through grants from NOAA and the EPA.

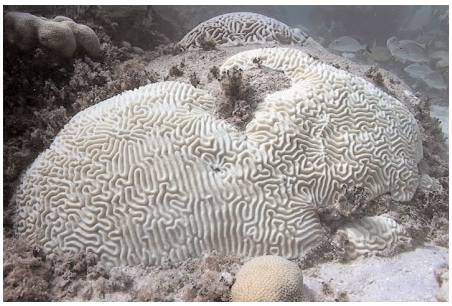
The SEAKEYS network encompasses the geographic scale of the Florida Keys and the Dry Tortugas. Data are transmitted hourly via a geostationary orbiting environmental satellite (GOES) providing near real-time environmental baseline data for researchers, resource managers, and the public. Stations record hourly wind speed, wind direction, air temperature, barometric pressure, sea temperature, salinity, and terrestrial solar irradiance, and will soon record wave height and tidal height. This information is available at **www.ndbc.noaa.gov/maps/Florida.shtml** or **www.coral.noaa.gov/seakeys/real_data.shtml**.

A seventh monitoring station, a cooperative effort between FIO and the University of South Florida's Coastal Oceanographic Monitoring Program, is located in Northwest Florida Bay. This site has been down since hurricanes Katrina and Wilma destroyed the monitoring equipment and is currently being rebuilt. An eighth station, in partnership with the Coastal Oceanographic Monitoring Program, will be established at Carysfort Reef Light.

For more information about this program visit **www.keysmarinelab.org/seakeys.htm** or contact the program manager at jsfajans@keysmarinelab.org.

Florida Reef Resilience Program Conducts Coral Bleaching Surveys

(continued from p. 1)



A colony of brain coral shows signs of bleaching. Photo: Erich Bartels, Mote Marine Lab

Another aspect of the program is improvement of the information base concerning how people use and value the coral reef ecosystem. Surveys of over 4,000 divers and fishers were conducted in the Florida Keys and a “human dimensions group” is working on combining these results with socioeconomic and behavioral surveys. User survey results will be combined with the biological and physical information to provide managers and decision makers with an integrated product that will be rolled out in 2008 so that different management alternatives can be more thoroughly evaluated.

For more information visit **www.nature.org.**. To find out how you can get involved, contact The Nature Conservancy’s Florida Keys Program at (305) 745-8402.

Changing Conditions in Biscayne and Florida Bays--Estuarine or Marine?

Nancy Diersing, Sanctuary Education Specialist

Some of Florida's earliest human inhabitants lived along the coast of Biscayne Bay and on the banks of the Miami River, where they sustained themselves by fishing in bay waters and hunting in the Everglades. Later, Europeans and eventually Americans settled on high ground in much of the same area, where they also drew sustenance from the coastal waters and the Everglades.

Today, nearly 2.5 million people live in Miami-Dade County, with many residents living only a few miles from the shoreline of Biscayne Bay. Most people live on land that was drained in the early 1900s by a system of canals to allow for human development. This canal system changed the quantity, quality and timing of fresh water flowing through the Everglades and entering the coastal waters, changing the natural ecosystem.

The city of Miami overlooks part of central Biscayne Bay. The bay is 434 square miles in size and drains a land area of 938 square miles. Over one-third of the land that drains into Biscayne Bay is freshwater and coastal wetlands in Monroe, Miami-Dade and Broward counties.

Without the gradual input of freshwater from the Everglades, the coastal waters of Biscayne Bay would become saltier and less brackish over time, creating a marine and sometimes even a hypersaline (very salty) environment where an estuary once existed.

Why is this change from estuarine to marine conditions detrimental to the health of south Florida's ecosystem? Estuarine habitats support a host of animals that do not survive in higher salinities. Spotted seatrout, silver perch, pink shrimp, eastern oysters, and the endangered American crocodile require either a brackish environment or estuarine salinities at certain stages during their life cycles. Estuarine conditions also keep some marine predators out, protecting marine animals like young pink shrimp from predation during their early stages of life.

Many estuarine animals eventually become part of the marine food chain when they mature and move out to deeper waters. Pink shrimp (which used to be abundant in these waters) and other marine life might spend time in Biscayne Bay while young, but live in Keys waters as adults. Surface currents move the larvae of fish, conch, crabs, shrimp, lobsters and other marine animals throughout the Caribbean, including the Florida Keys, Florida Bay, Biscayne Bay and the adjacent bodies of water. Tidal flows also help to disperse marine larvae.

In today's system, some fresh water does reach Biscayne Bay, but these are often large amounts of poor-quality water released in pulses through the canal entrances during times of heavy rains to avoid flooding communities on the mainland, instead of flowing in a sheet more gradually across the open Everglades as in the past. The widely fluctuating conditions caused by these pulses of water have negative impacts on many organisms that are not adapted to abrupt salinity and temperature changes associated with the inflowing water.

The water flowing across the open freshwater prairies in the pre-drainage Everglades soaked into the ground, helping to recharge the Biscayne Aquifer, an underground formation of porous limestone that holds water in tiny pores. The restoration of sheet flows in wetlands recharges the Biscayne Aquifer, which prevents saltwater from intruding on the freshwater wetlands along the coastline and helps to maintain both freshwater wetlands and the estuarine zone along the coast. The recharging of the aquifer is also important for residents of south Florida and the Keys since the aquifer is the source of drinking water for these areas.

Florida Bay's Story

Over the years, Florida Bay has also experienced this general trend toward increasing salinity, especially in its upper basins that typically received fresh surface waters from the adjacent mainland to the north. In the late 1980s and early 1990s, salinities in the northern basins in Florida Bay were, at times, nearly double that of ocean water, creating extremely harsh conditions for most animals and plants. Around the same time, extensive algae blooms, seagrass die-off and sponge mortality were observed in many basins in the bay. These changes helped bring attention to the need to restore freshwater flows to Florida Bay, the Everglades and other coastal areas that had lost their estuarine character.

(continued on p. 10)