



Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR)

~ RESEARCH UPDATE ~

STORMY WEATHER AND WATER QUALITY

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In anticipation of future hurricanes, University of Florida researchers Nicole Dix and Dr. Edward Philips, with Dr. Richard Gleeson of the Guana Tolomato Matanzas National Estuarine Research Reserve, recently used high and low tech sampling and measuring systems to determine how the four larger 2004 storms, Charley, Frances, Ivan and Jeanne, have affected water quality in a tidal creek. Even five years later this is important because changes in water quality, which can be determined by comparing before and after tropical storm conditions, could have an adverse effect on native plants and animals dependent upon estuaries for their survival.

The scientists documented their study in a research paper titled “Water Quality Changes in the Guana Tolomato Matanzas National Estuarine Research Reserve, Florida, Associated with Four Tropical Storms.” Their objective was to determine the effects of extreme wind and rainfall conditions associated with tropical storms on physical and chemical variations in a tidal creek, in this case Pellicer Creek in northeast Florida.

The GTMNERR had already established a continuous water monitoring program in 2002 at Pellicer Creek, between St. Johns and Flagler counties, which was designed to measure short term variability and long term trends for selected water quality parameters. This allowed the research team to compare normal conditions throughout the entire year of 2003 to what happened when the four storms went through in 2004. Pellicer Creek provided a convenient opportunity for studying storm events because the reserve’s weather station was situated at the mouth of the creek near the water quality monitoring station located just upstream.

Among other instruments used was a sophisticated automatic sampler with a pump and hose that sucked up water every 2.5 hours over a 25 hour period and deposited it in a container with rotating bottles, “A little like a soft drink bottling system,” according to Dr. Gleeson. They also used a “torpedo like” mechanism that measured and stored data every 30 minutes, and a “grab sampler,” which is essentially a simple PVC device that was plunged into the water by hand. Among other parameters, the researchers measured salinity (salt content), nutrient loads, and meteorological data at time scales ranging from 15-minute to monthly intervals.

Ultimately the researchers reported that the four storms did indeed upset the normal balance in Pellicer Creek, altering tidal cycles and watershed inputs significantly over those occurring during non-storm periods. For instance, they found that the storms initially prompted spikes in salinity from wind-driven seawater, but heavy rainfall later reversed the situation, causing a decline in salinity over extended time periods. They also found a notable elevation in nitrogen concentrations, likely generated from both natural and manmade runoff (e.g., fertilizer) in the watershed, thus increasing the potential for enhanced algal blooms that in turn could adversely alter water quality.

“Given the major changes in watershed characteristics and global climate patterns expected in future years, the ability to predict the influences of these changes on the estuarine environment will be an essential part of designing, implementing, and justifying management efforts,” the scientists concluded. Their paper was published by the *Journal of Coastal Research*, SI(55), 26-37, 2008.

For more information on the effects of tropical storms on water quality, contact Dr. Richard Gleeson at the GTM Research Reserve, Marineland, (904)-461-4054. To learn about other research projects in the watershed, contact the GTM Research Reserve Environmental Education Center (904) 823-4500.

The GTM Education Center, located off A1A in Ponte Vedra Beach across from the Atlantic Ocean, is open to the public and offers interpretive exhibits, nature movies, aquariums, a Nature Store, nature trails, and a variety of educational programs and outdoor activities. “River to Sea” guided trail walks are also available periodically at the GTM Research Reserve station at Marineland.

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The GTM Research Reserve was established as a partnership between the state of Florida and the National Oceanic and Atmospheric Administration. The reserve is one of 27 research reserves operating across the nation and one of three in the state. Coastal and Aquatic Managed Areas (CAMA) manages the (GTM Research Reserve) along with aquatic preserves, the Florida Keys National Marine Sanctuary and the Coral Reef Conservation Program. CAMA’s programs and activities are designed to help Floridians better understand and conserve the state’s resources through research, education and preservation. For more information on the GTM Research Reserve visit www.dep.state.fl.us/coastal/sites/gtm/guana_river.htm or www.gtmnerr.org.

Photos are of Katie Petrinec, Research Assistant, GTM Research Reserve

