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FAU Harbor Branch Study Examines Troubled Waters in St. Lucie Estuary

Stormwater, Land Use, Water Management Cited as Polluting Factors

FORT PIERCE, Fla. (January 2, 2013) – Discharges from Lake Okeechobee are primary among several factors producing a “perfect storm” of environmental degradation in the St. Lucie Estuary (SLE), suggest the results of study published in the November 2012 *Journal of Coastal Research* by FAU Harbor Branch Oceanographic Institute research professor Brian Lapointe, Ph.D. The research, which analyzes land-use patterns and water samples from 25 SLE locations collected in the wake of the 2004 and 2005 hurricane seasons, respectively, and during a period of relatively fewer discharges, is the most comprehensive examination yet of the challenges facing the SLE.

The City of Stuart and Martin County Board of County Commissioners were sponsors of this study.

“The public has been hearing more and more about Lake Okeechobee water discharges and negative consequences in St. Lucie Estuary,” said Lapointe. “This study describes what’s causing those consequences. Human alteration of watersheds magnifies the effects of significant rain events such as hurricanes, causing more severe effects on estuarine ecosystems.”

Estuaries contain a mixture of freshwater from the land and seawater, and the mix varies with the amount of rainfall. The SLE also is fed by drainage canals; especially the C-44 canal, which connects the estuary to Lake Okeechobee and is used to manage lake water levels through controlled discharges. Periods of heavy rainfall lead to increased freshwater runoff, high lake levels and lake discharges, which greatly reduces saltwater concentrations (i.e., salinity) in the SLE. Persistent low salinity is the primary stressor affecting the SLE.

Persistent low salinity in an estuary can be fatal to saltwater species such as oysters and seagrasses, and fish become vulnerable to infectious agents that are unable to survive normal estuary salinity. Similarly, low salinity conditions allow bacteria from septic systems, a known source of SLE pollutants, to survive and multiply. In this study, salinity was less than one part-per-thousand in June and November 2005 – versus the norm that typically exceeds 12 parts-per-thousand – and there were significantly more violations of bacteria regulatory standards during these periods compared with the March 2006 sampling.

The bacteria problem is made worse by elevated nutrient concentrations, which is a second factor affecting SLE health. Common sources of nutrients, such as fertilizers, in waterways include agricultural

and residential runoff, both of which were evident in this study. Nutrient concentrations were two- to threefold higher than proposed SLE targets during 2005 samplings, and could be linked to C-44 discharges in the SLE South Fork and to C-23 and C-24 flows and golf course runoff in the North Fork.

Higher nutrient concentrations also foster explosive growth of algae, a third challenge facing the SLE. Extensive surface blooms that occurred shortly after the June 2005 sampling were traced to favorable environmental conditions caused by the C-44 discharges and the transport of cyanobacteria, also known as blue-green algae, from Lake Okeechobee, which hosts frequent blooms. Part of what makes cyanobacteria blooms harmful is the toxins they produce, and in the case of the 2005 SLE blooms, the concentrations were high enough to affect human health.

“Martin County has long been proactive in addressing these issues,” said Sarah Heard, Martin County Commission Chair and District 4 commissioner. “The County has adopted a fertilizer ordinance that prohibits fertilizer application during the wet season, invested more than \$50 million in stormwater retrofit projects, and is spearheading the ‘Speak Up for the St. Lucie’ campaign on Facebook to make the community’s voice heard on stopping harmful freshwater discharges to the St. Lucie.”

The study suggests that increased stormwater retention, minimization of freshwater releases from Lake Okeechobee, and enhanced treatment of both stormwater and sewage are needed to minimize future stormwater-driven water quality variations in the SLE. Beyond effects on SLE animal and plant life, the authors note that the harmful impact of freshwater releases extends to the coral reefs just outside the St. Lucie Inlet, which marks the northern boundary of tropical reef corals in south Florida.

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About Harbor Branch Oceanographic Institute:

Founded in 1971, Harbor Branch Oceanographic Institute at Florida Atlantic University is a research community of marine scientists, engineers, educators and other professionals focused on Ocean Science for a Better World. The institute drives innovation in ocean engineering, at-sea operations, drug discovery and biotechnology from the oceans, coastal ecology and conservation, marine mammal research and conservation, aquaculture, ocean observing systems and marine education. For more information, visit www.hboi.fau.edu.

About Florida Atlantic University:

Florida Atlantic University, established in 1961, officially opened its doors in 1964 as the fifth public university in Florida. Today, the University, with an annual economic impact of \$6.3 billion, serves more than 30,000 undergraduate and graduate students at sites throughout its six-county service region in southeast Florida. FAU’s world-class teaching and research faculty serves students through 10 colleges: the Dorothy F. Schmidt College of Arts and Letters, the College of Business, the College for Design and Social Inquiry, the College of Education, the College of Engineering and Computer Science, the Graduate College, the Harriet L. Wilkes Honors College, the Charles E. Schmidt College of Medicine, the Christine E. Lynn College of Nursing and the Charles E. Schmidt College of Science. FAU is ranked as a High Research Activity institution by the Carnegie Foundation for the Advancement of Teaching. The University is placing special focus on the rapid development of three signature themes – marine and coastal issues, biotechnology and contemporary societal challenges – which provide opportunities for faculty and students to build upon FAU’s existing strengths in research and scholarship. For more information, visit www.fau.edu.