Indian River Lagoon Observations

June 29, 2016: St. Lucie Estuary Algal Blooms

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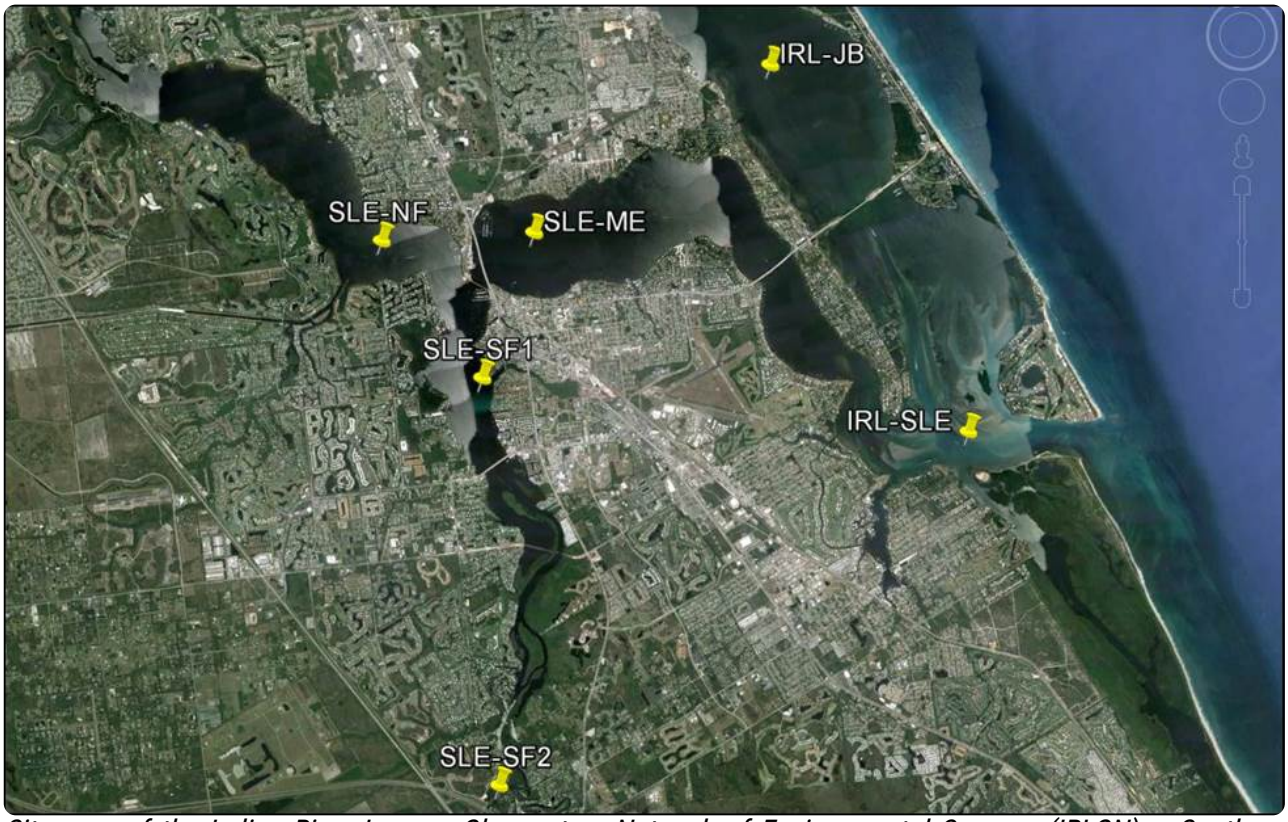
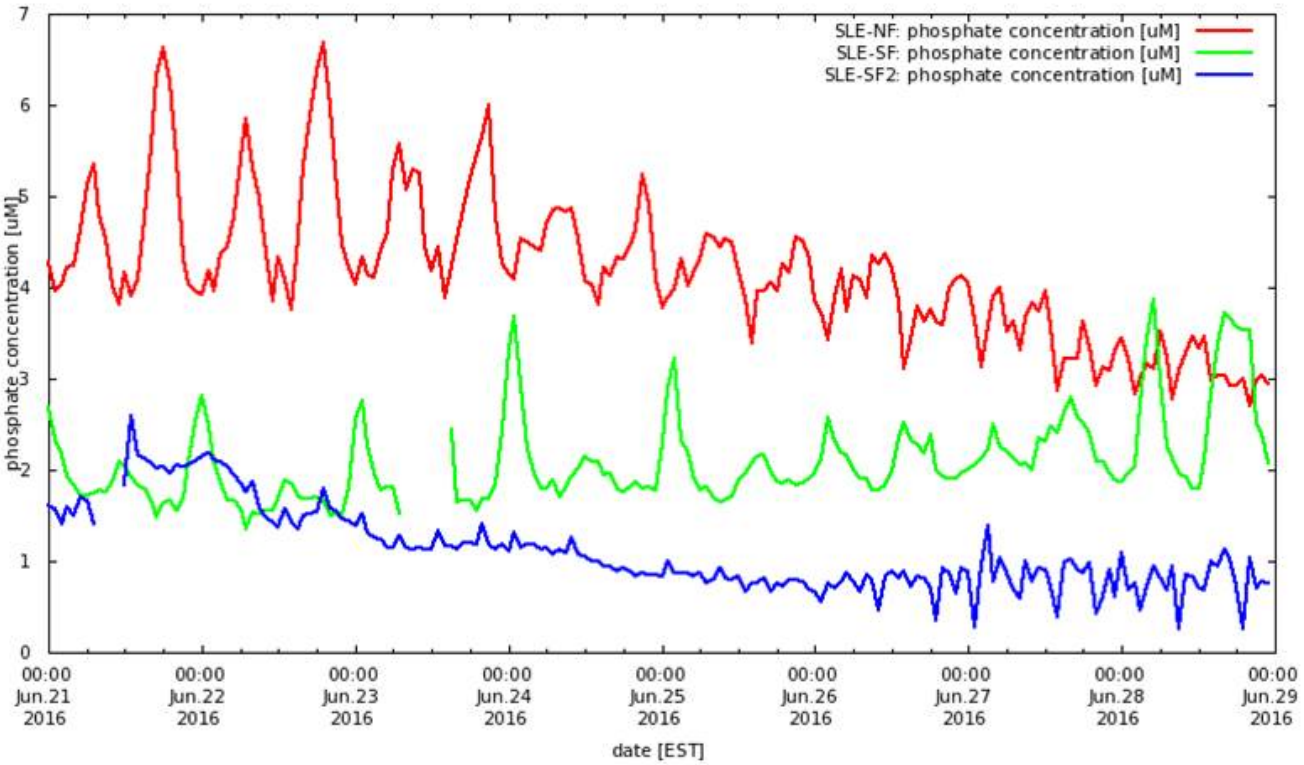


Site map of the Indian River Lagoon Observatory Network of Environmental Sensors (IRLON) – Southern Network (SLE and nearby IRL) (Image credit: M. Dennis Hanisak, Google Earth)

During the past week, the blooms in the St. Lucie Estuary (SLE) of cyanobacteria, also called blue-green algae, have increased to the point that today Governor Rick Scott declared a state of emergency in St. Lucie and Martin County.

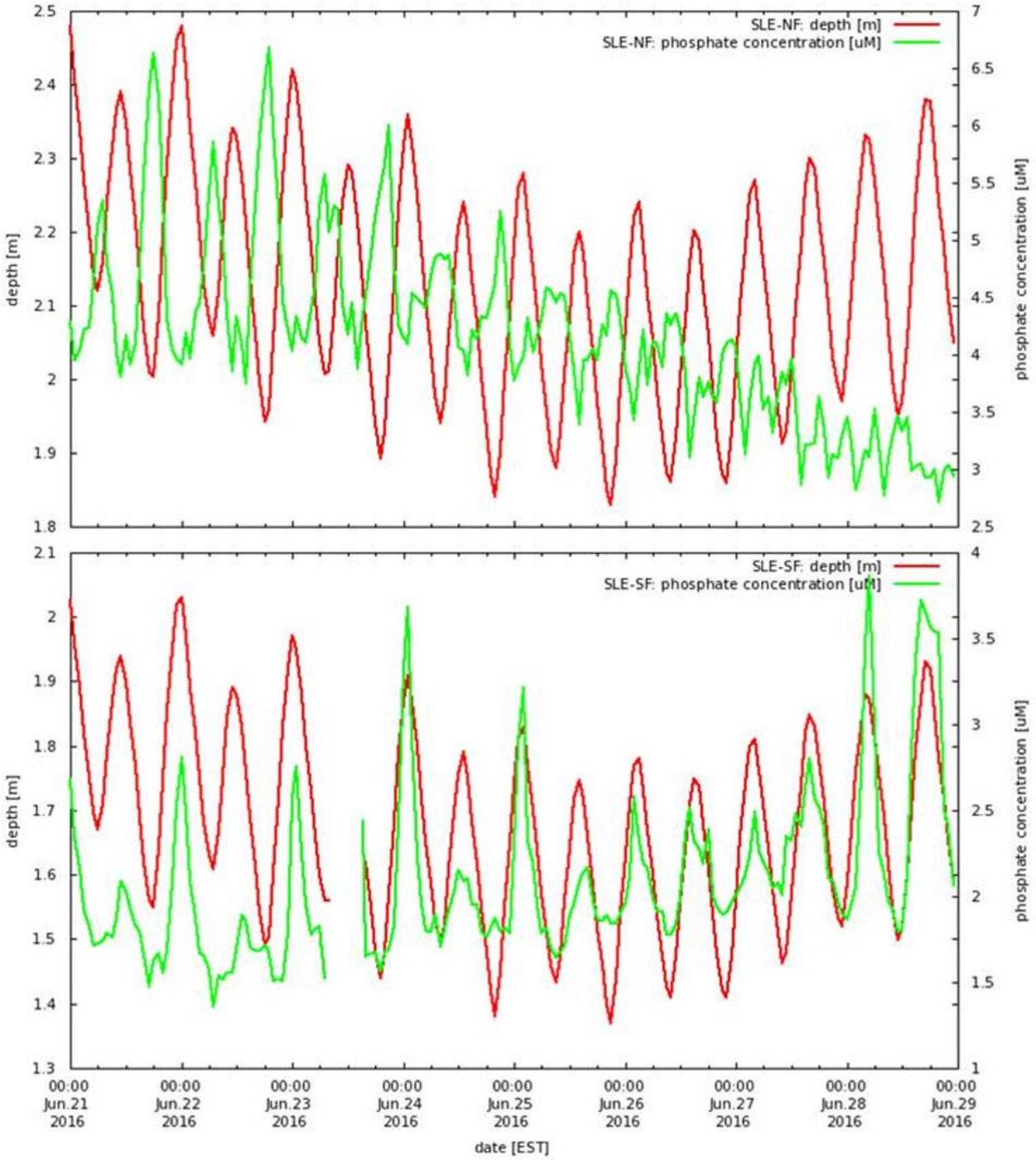
All algal blooms require favorable light, temperature, and nutrient conditions. Cyanobacteria particularly grow well at warmer temperatures and higher light levels, such as what we have in the summer. As to nutrients, the most important ones for algal growth are nitrogen and phosphorus. Unfortunately our aquatic environments are increasing becoming too rich in nitrogen and phosphorus due to a number of our human activities.



Hourly measurements of phosphate concentrations are higher in the North Fork (SLE-NF) than at South Fork (SLE-SF) and water coming into the South Fork from the C-44 Canal (SLE-SF2). (Screen shot of IRLON Data, June 21-28, 2016, http://fau.loboviz.com/loboviz/). (http://fau.loboviz.com/loboviz/)

The origin of these blooms is Lake Okeechobee. This year the center of the state, which drains into Lake O, experienced quite high rainfall – the "dry season" this past winter was abnormally wet. So, along with the water that flowed into the lake, there also were large amounts of nitrogen and phosphorus. As favorable light and temperature conditions arrived, cyanobacteria, primarily *Microcystis aeruginosa*, bloomed in the lake. That same abnormally high rain pattern led to the large amounts of water released from the lake by the U.S. Army Corps of Engineers via the C-44 Canal into the South Fork of the St. Lucie Estuary. These releases are made to lower lake levels in preparation for hurricane season. This bloom is adding to the tremendous impact of the freshwater on the SLE.

We know that these cyanobacteria may contain toxic compounds, which can adversely affect aquatic organisms and even humans that are exposed to them. But much is unknown about the fate of these algae and their toxins once they are in the estuary. While we understand what triggers these blooms, we don't really know how they are sustained in the estuary. This year the cyanobacteria are surviving longer than expected throughout the estuary, in part because of the greatly reduced salinity due to the high discharges of freshwater. But as the algae use up the available nutrients, where do they get more to sustain their



Hourly measurements of phosphate concentrations and height (tide level) show that phosphate levels are related to tide. Phosphate is highest at low tide in the North Fork (SLE-NF) and highest at high tide in the South Fork (SLE-SF). (Screen shot of IRLON Data, June 21-28, 2016, http://fau.loboviz.com/loboviz/). (http://fau.loboviz.com/loboviz/)

growth?

Our IRLON phosphate data strongly indicate that the bloom may be sustaining itself in the SLE with nutrients from the rest of the watershed that drains into the estuary. This evidence can be seen by looking at the phosphate data. Phosphate concentration is much higher in the North Fork (SLE-NF) than in the South Fork (SLE-SF), which is higher than in the water coming from the C-44 Canal (SLE-SF2). Phosphate levels are clearly related to circulation and tide. Phosphate is highest at low tide in the North Fork (SLE-

NF) and highest at high tide at South Fork (SLE-SF). At low tide, water from the phosphate-rich North Fork flows into the South Fork and Middle Estuary near Stuart, maintaining the bloom far beyond what would be expected.

We will continue to gather supporting data for this hypothesis which will be used to better model the SLE and for water managers to most effectively address the current need to discharge Lake O water into the estuary. What, for example, would happen, if these large discharges were not done on a continuous basis, but in pluses (e.g., two weeks on, two weeks off)? Would that better flush the cyanobacteria out of the system quicker, and without enhancing the bloom in the estuary?

Observations Archive

- April 6, 2016:You can observe a lot by just watching (/hboi/irlo/april06_2016.php)
- April 27, 2016: Our Tenth IRLON Site (/hboi/irlo/april27_2016.php)
- May 12, 2016: Barnacle Busting (/hboi/irlo/may12_2016.php)
- May 26, 2016: Future of Water Quality Research in Florida Workshop (/hboi/irlo/may26_2016.php)
- June 29, 2016: St. Lucie Estuary Algal Blooms (/hboi/irlo/june_29_2016.php)
- July 08, 2016: Connecting Users to IRL Data (/hboi/irlo/july08_2016.php)
- October 11, 2016: A Brush with Hurricane Matthew (/hboi/irlo/oct11_2016.php)
- January 17, 2017: Martin County Youth Leadership Environmental Day (/hboi/irlo/jan17_2017.php)
- March 3, 2017: St. Lucie Estuary – What A Difference A Year Makes! (/hboi/irlo/mar03_2017.php)
- June 12, 2017: Here Comes the Rain – 2017's First Flush (/hboi/irlo/june12_2017.php)
- August 24, 2017: An Estuary at your Fingertips: Connecting the Community to Environmental Data (/hboi/irlo/aug24_2017.php)

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