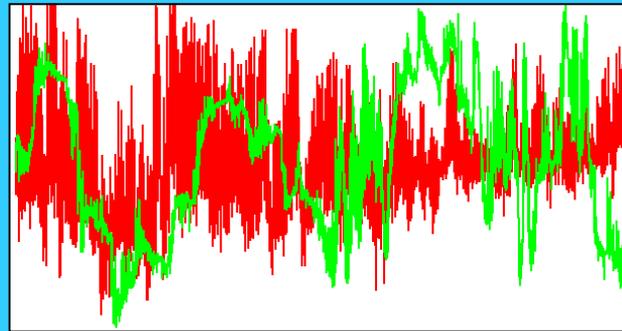


Influence of Flow from the C-44 Canal on the Water Quality of the South Fork of the St. Lucie Estuary, Florida



M. Dennis Hanisak, Kristen Davis, Bryan Botson
GEER 2019, April 25, 2019

HARBOR BRANCH

FLORIDA ATLANTIC UNIVERSITY*

The Indian River Lagoon Observatory Network of Environmental Sensors (IRLON)



IRLON Overview

An estuarine observation and prediction network in the IRL providing real-time, high-accuracy and high-resolution water quality and weather data through a dedicated interactive website

High-resolution measurements for:

- Temperature
- Salinity
- Depth
- Current speed and direction
- Dissolved oxygen
- pH
- Turbidity
- CDOM (water color)
- Chlorophyll *a*
- Nitrate
- Phosphate

Weather station for:

- Air humidity
- Air temperature
- Barometric pressure
- PAR
- Pressure
- Rain
- Wind direction
- Wind gust
- Wind speed

Data Access

<http://fau.loboviz.com/>

Continuous real-time, high-accuracy and high-resolution observational data available to all through a dedicated interactive website to better quantify and model relationships between environmental factors and biological processes in the IRL

HARBOR BRANCH **LOBO** Land/Ocean Biogeochemical Observatory
FLORIDA ATLANTIC UNIVERSITY
Clean Science for a Better World™

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Latest. *Click site name for data.*

Weather
IRL-LP Indian River Lagoon - Link Port
2016-07-06 16:00:00 EST [Q](#)

IRL-JB Indian River Lagoon-Jensen Beach
2016-07-06 16:00:00 EST [Q](#)

IRL-SLE Indian River Lagoon-St. Lucie Estuary
2016-07-06 16:00:00 EST [Q](#)

SLE-ME St. Lucie Estuary-Middle Estuary
2016-07-06 16:00:00 EST [Q](#)

SLE-NF St. Lucie Estuary-North Fork
2016-07-06 16:00:00 EST [Q](#)

SLE-SF St. Lucie Estuary-South Fork
2016-07-06 16:00:00 EST [Q](#)

SLE-SF2 St. Lucie Estuary-South Fork 2
2016-07-06 16:00:00 EST [Q](#)

Water Quality
IRL-LP Indian River Lagoon - Link Port
2016-07-06 16:00:00 EST [Q](#)

IRL-FP Indian River Lagoon - Fort Pierce
2016-07-06 16:00:00 EST [Q](#)

IRL-VB Indian River Lagoon - Vero Beach
2016-07-06 16:00:00 EST [Q](#)

IRL-SB Indian River Lagoon - Sebastian
2016-07-06 16:00:00 EST [Q](#)

IRL-JB Indian River Lagoon-Jensen Beach
2016-07-06 16:00:00 EST [Q](#)

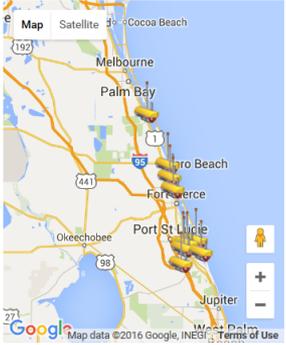
FAU Harbor Branch Indian River Lagoon Observatory



The Indian River Lagoon Observatory Network of Environmental Sensors

The Indian River Lagoon (IRL) is situated along 156 miles of Florida's east coast. Urbanization, excessive freshwater releases, degradation of water quality, contaminant loading, loss of habitat (e.g., seagrasses, mangroves), harmful algal blooms, decline of fisheries, and emerging diseases in marine mammals and other biota are increasingly important issues in the IRL, as they are throughout the world's estuaries and coastal waters. The Indian River Lagoon Observatory (IRLO), based at Florida Atlantic University's Harbor Branch Oceanographic Institute, is conducting long-term, multi-disciplinary, ecosystem-based research on this nationally significant estuary.

IRLO research and education activities are being enhanced by the deployment of an estuarine observation network of land/ocean biogeochemical observatory (LOBO) units and weather sensors to provide real-time, high-accuracy and high-resolution water quality/weather data through this dedicated interactive website. The LOBO network enables researchers to follow environmental changes in



Archived Data
Use **LOBOVIZ** to graph and download archived data from this LOBO node.

Configuration

Manufacturer	Instrument	Measurements
Satlantic	LOBO	Power distribution Sensor control Wireless communication Data management
Satlantic	SeaFET pH	pH

Benefits to IRL & SLE

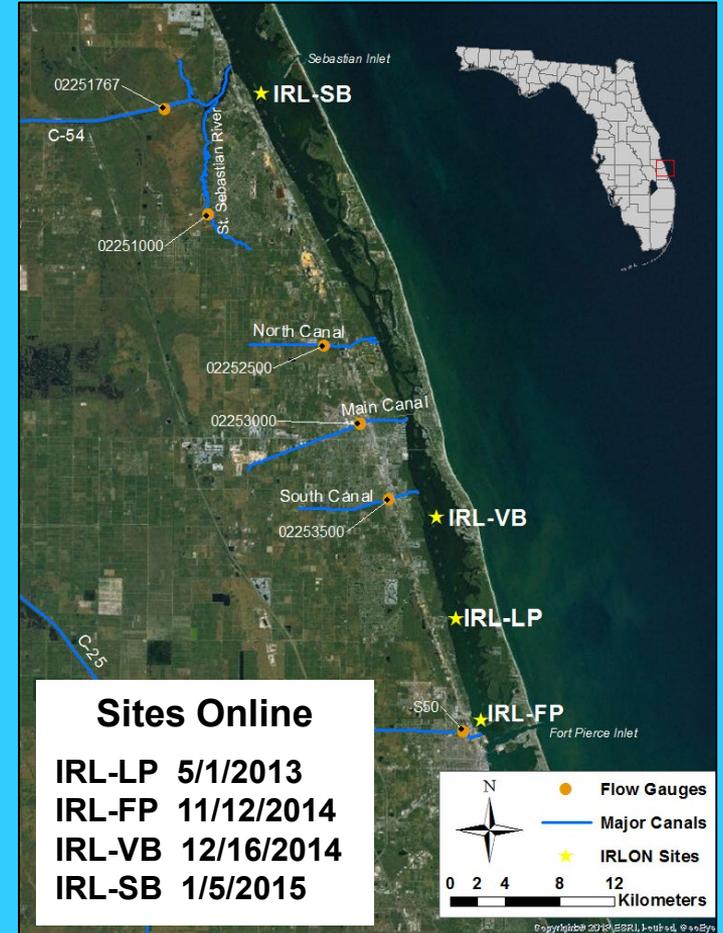
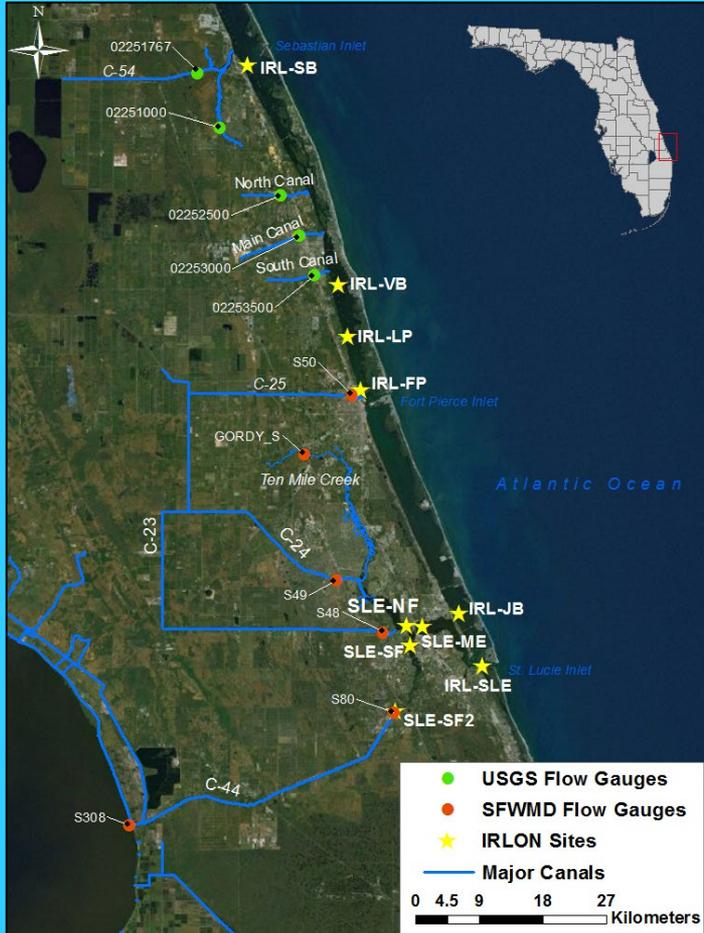
IRLON technology will provide researchers, governmental agencies, students, and the public unprecedented IRL & SLE environmental data

- Provide real-time environmental data via a publicly accessible website**
- Enable researchers to follow environmental changes in these estuaries and create the ability to do comparative studies on the east and west coasts of Florida**
- Assist resource and planning managers to make informed decisions for the good of the IRL & SLE**
- Model and correlate environmental data to biological, chemical, and physical phenomena of the IRL & SLE**
- Create a platform for education and outreach activities**

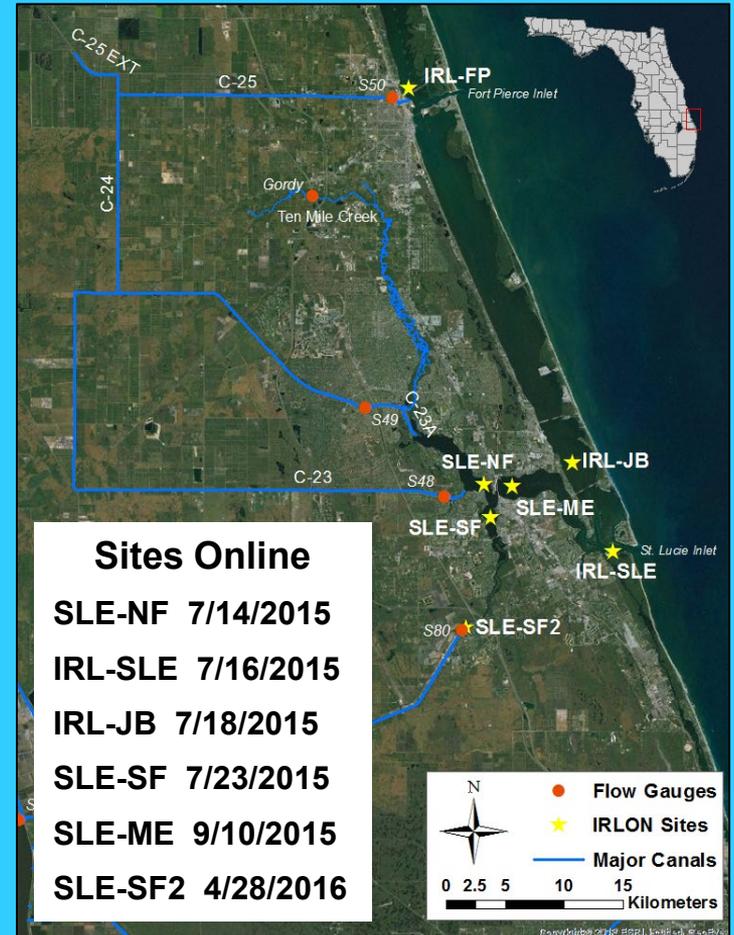
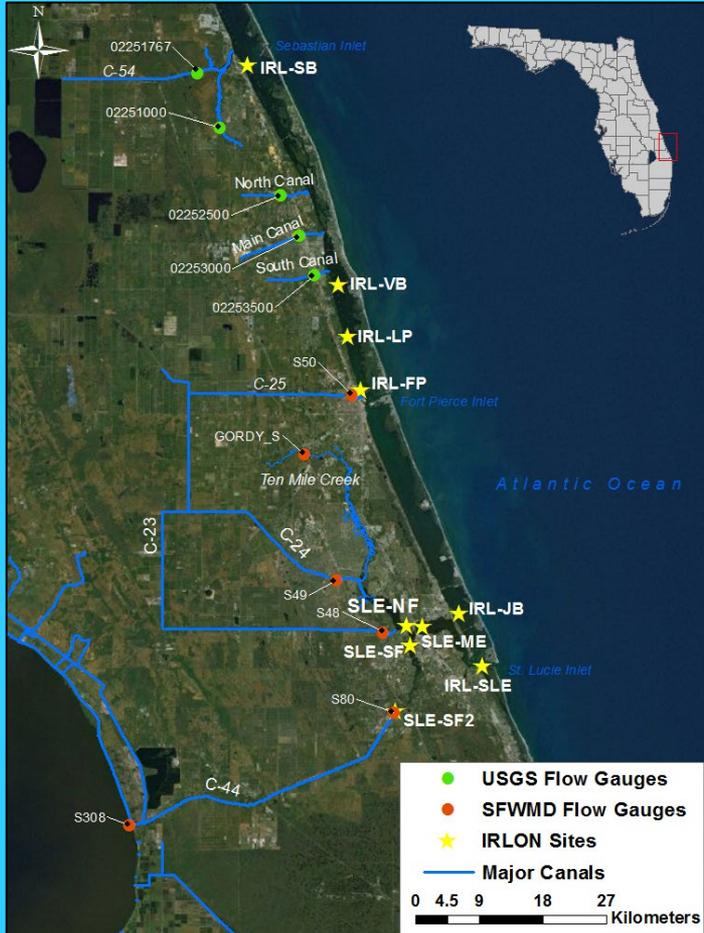
Questions to Address with IRLO Network

- **How do freshwater discharges and watershed runoff impact water quality in the Indian River Lagoon and St. Lucie Estuary?**
 - **What is the nutrient (nitrate, phosphate) load?**
 - **What is the impact on light attenuators (impact on seagrass)?**
 - **What is the relationship to algal blooms?**
- **How does water from these freshwater discharges interact with oceanic water flowing through the inlets?**

IRLON Sites



IRLON Sites



Sites Online

SLE-NF 7/14/2015

IRL-SLE 7/16/2015

IRL-JB 7/18/2015

SLE-SF 7/23/2015

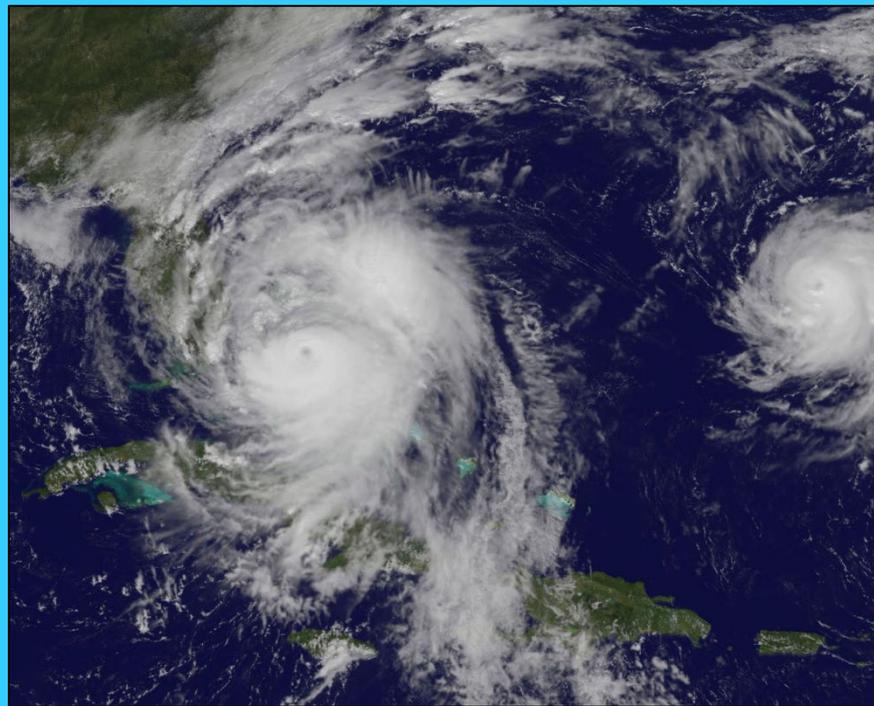
SLE-ME 9/10/2015

SLE-SF2 4/28/2016

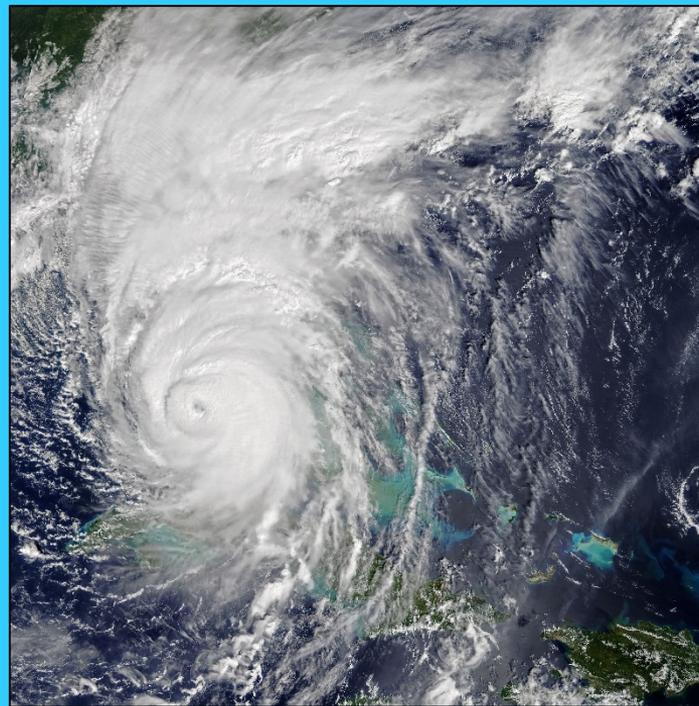
Impacts of Lake Okeechobee Discharges (2016)



Interannual Variability: Hurricane Season

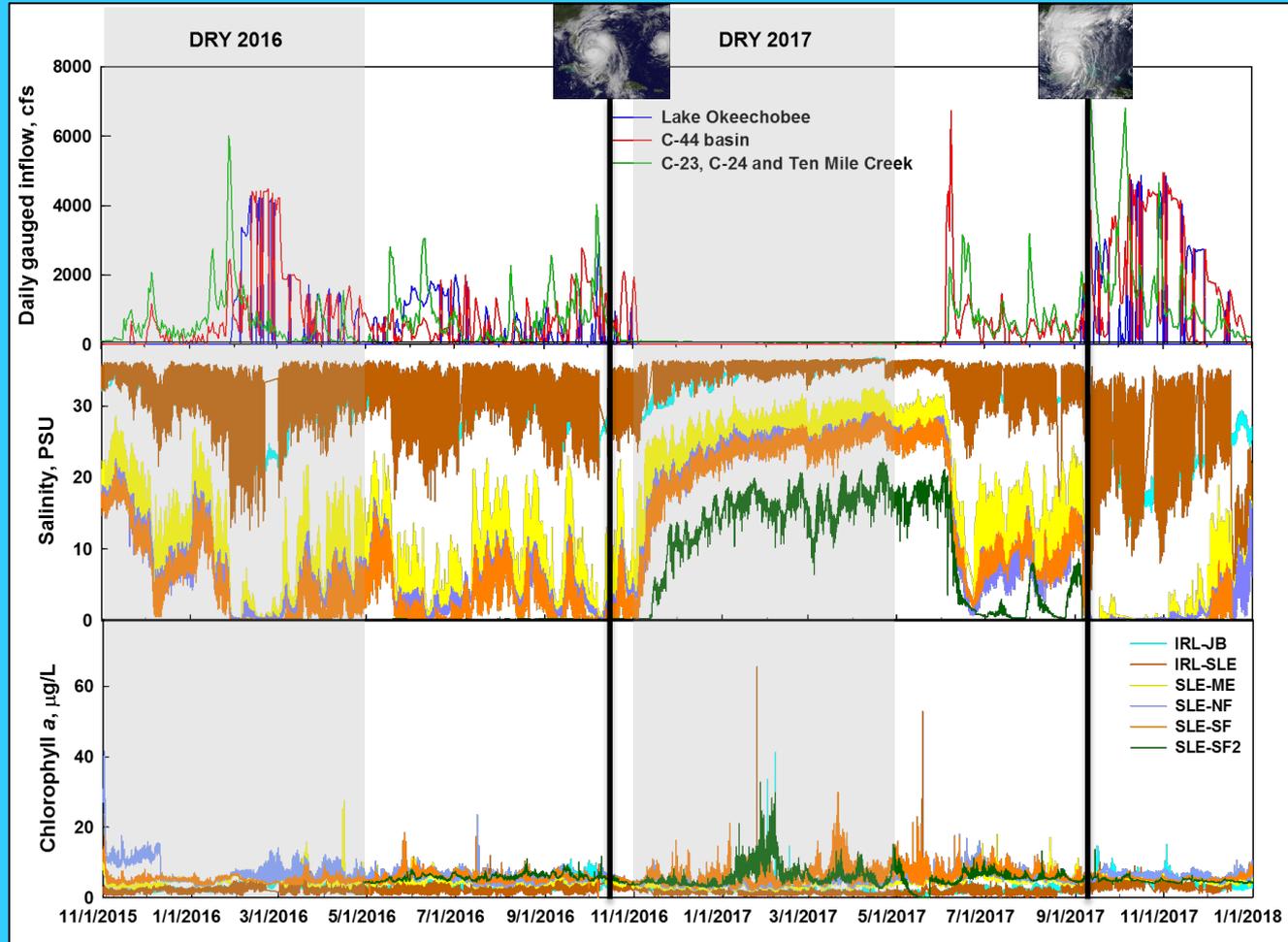


Hurricane Matthew
October 2016



Hurricane Irma
September 2017

IRLON – Southern Network (11/2015 – 12/2017)



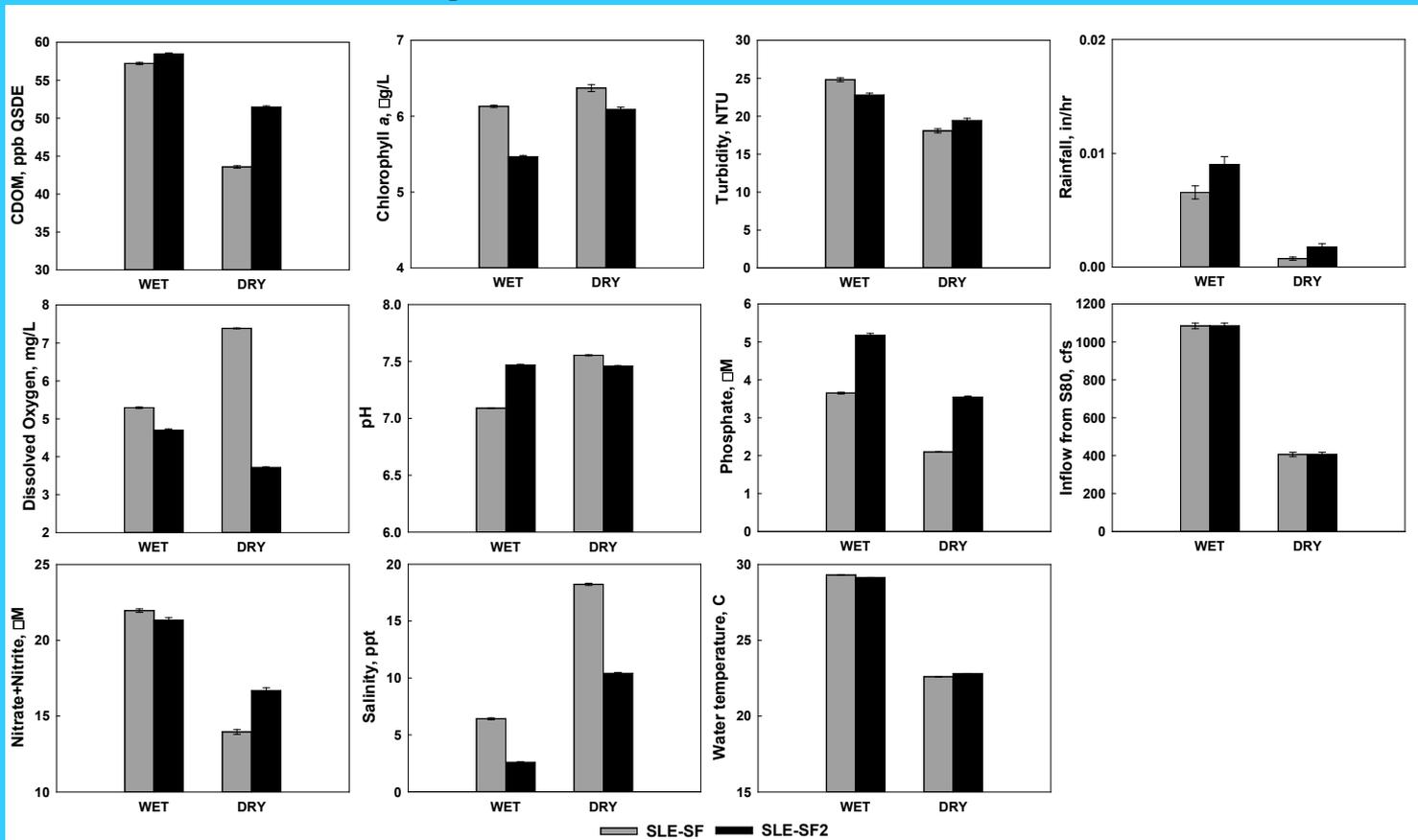
IRLON Southern Network



How does flow from Lake O, or lack of, influence water quality in the South Fork of the St. Lucie Estuary?

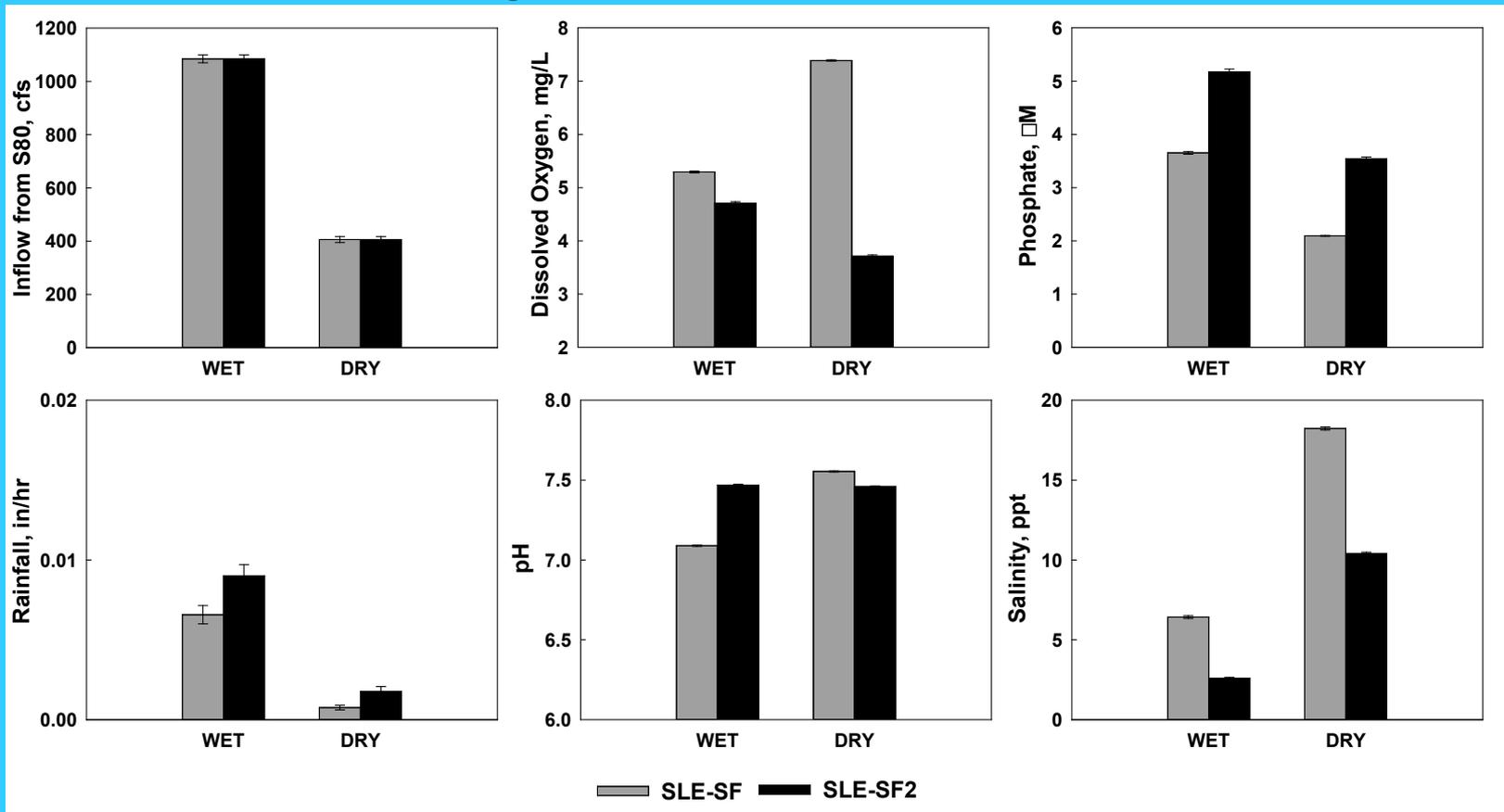
SLE-SF vs. SLE-SF2 (Wet vs. Dry Season)

May 2016 – April 2018

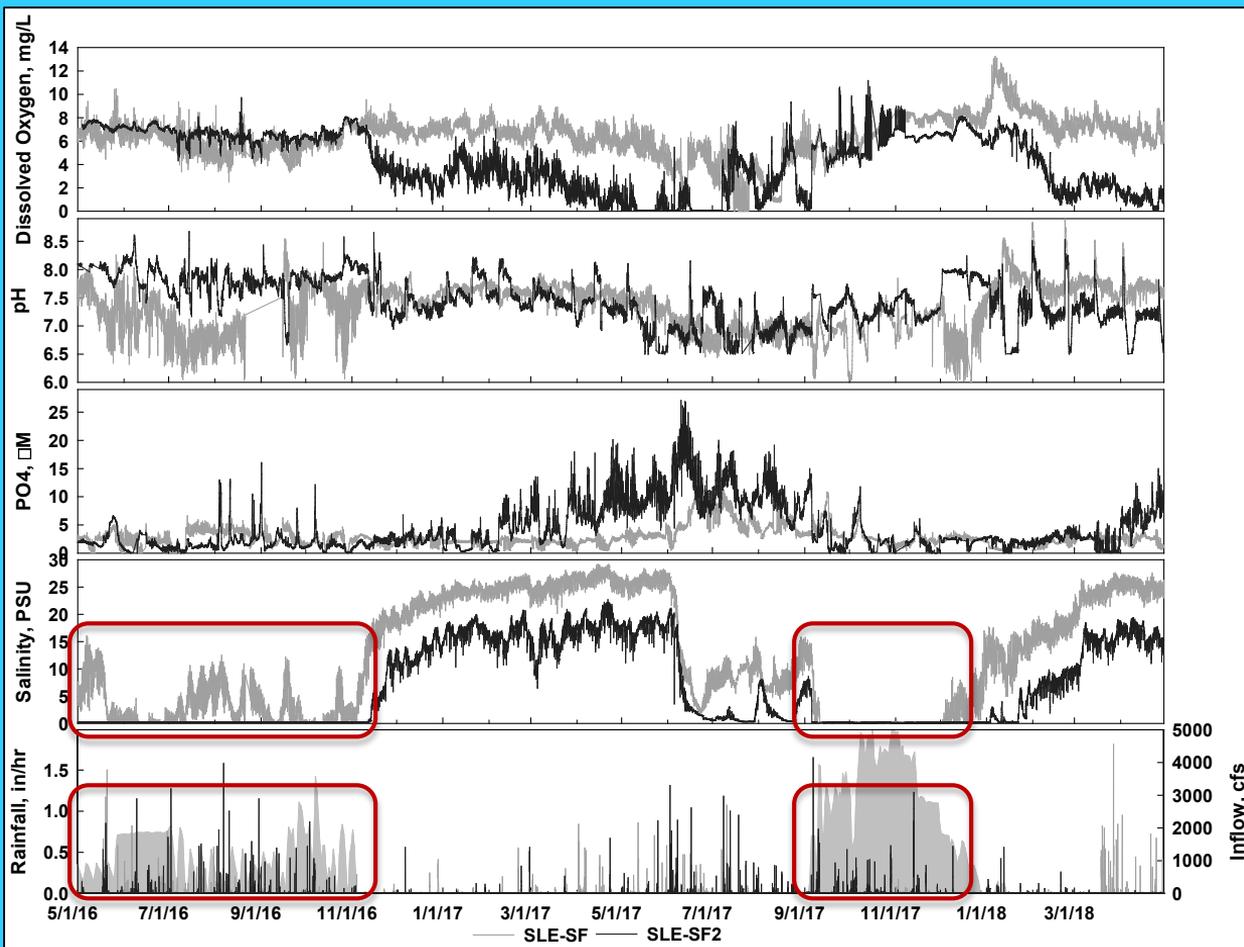


SLE-SF vs. SLE-SF2 (Wet vs. Dry Season)

May 2016 – April 2018

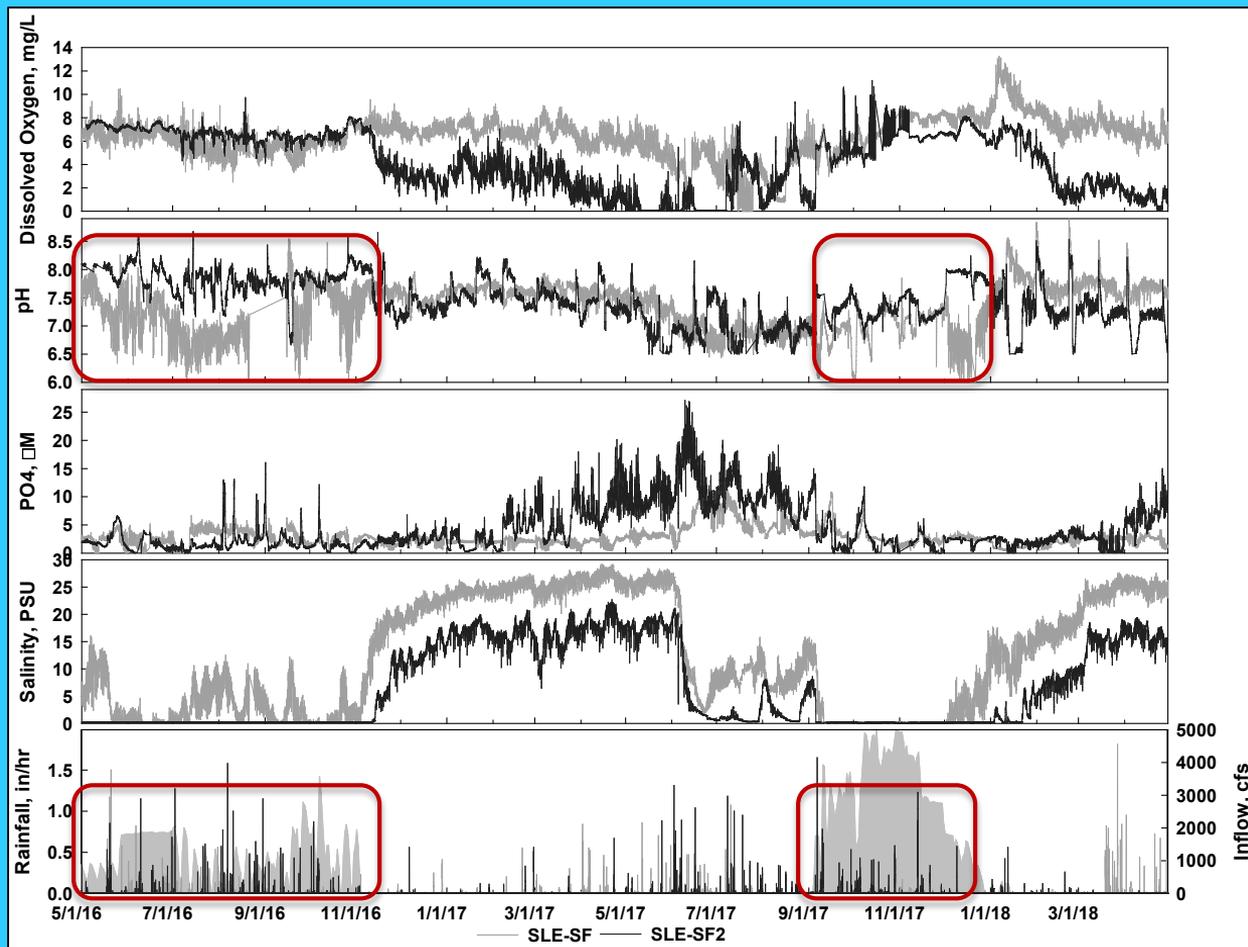


SLE-SF vs. SLE-SF2 (May 2016 – April 2018)



When Lake O flows are strong, SF2 is completely a freshwater system (as is SF at times)

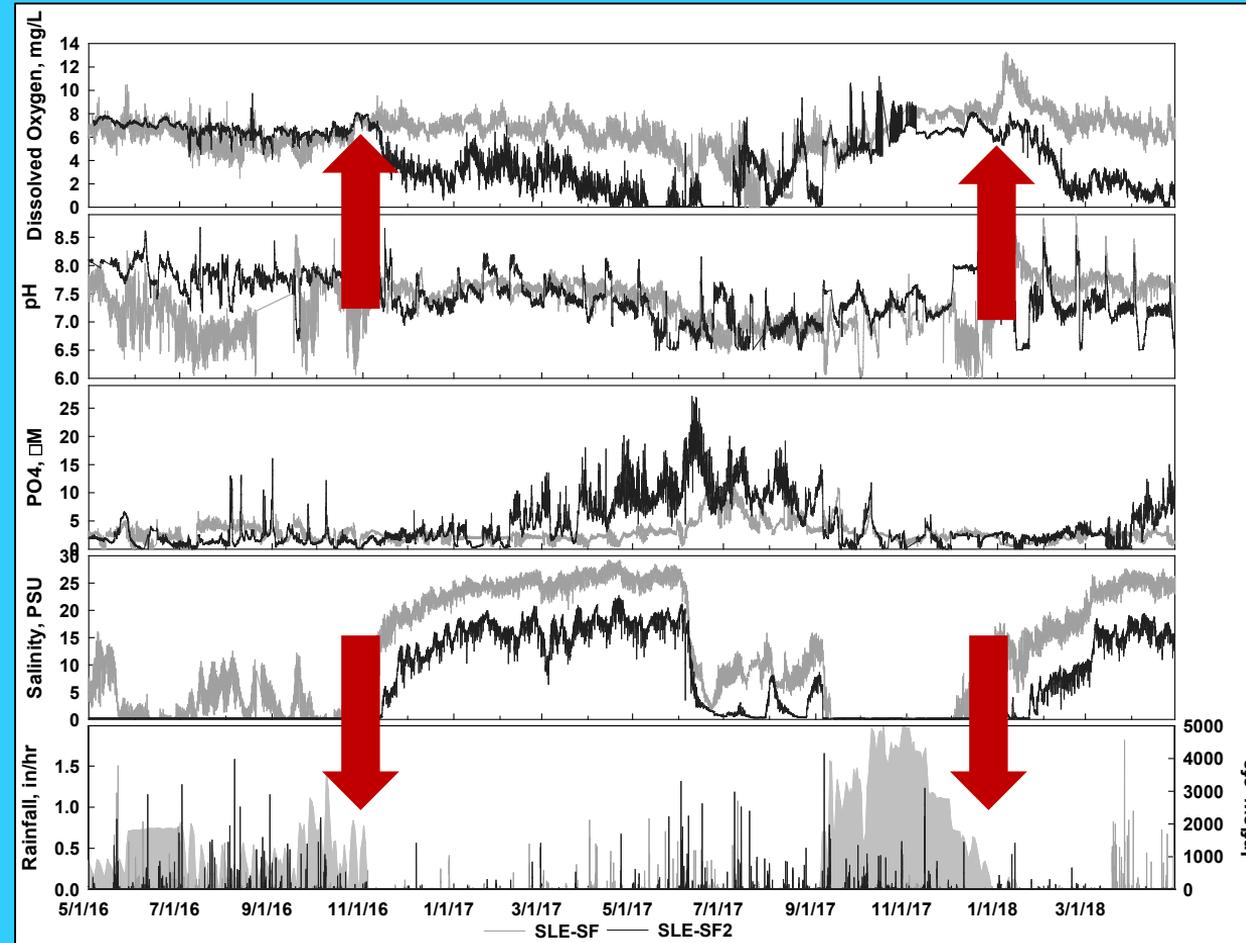
SLE-SF vs. SLE-SF2 (May 2016 – April 2018)



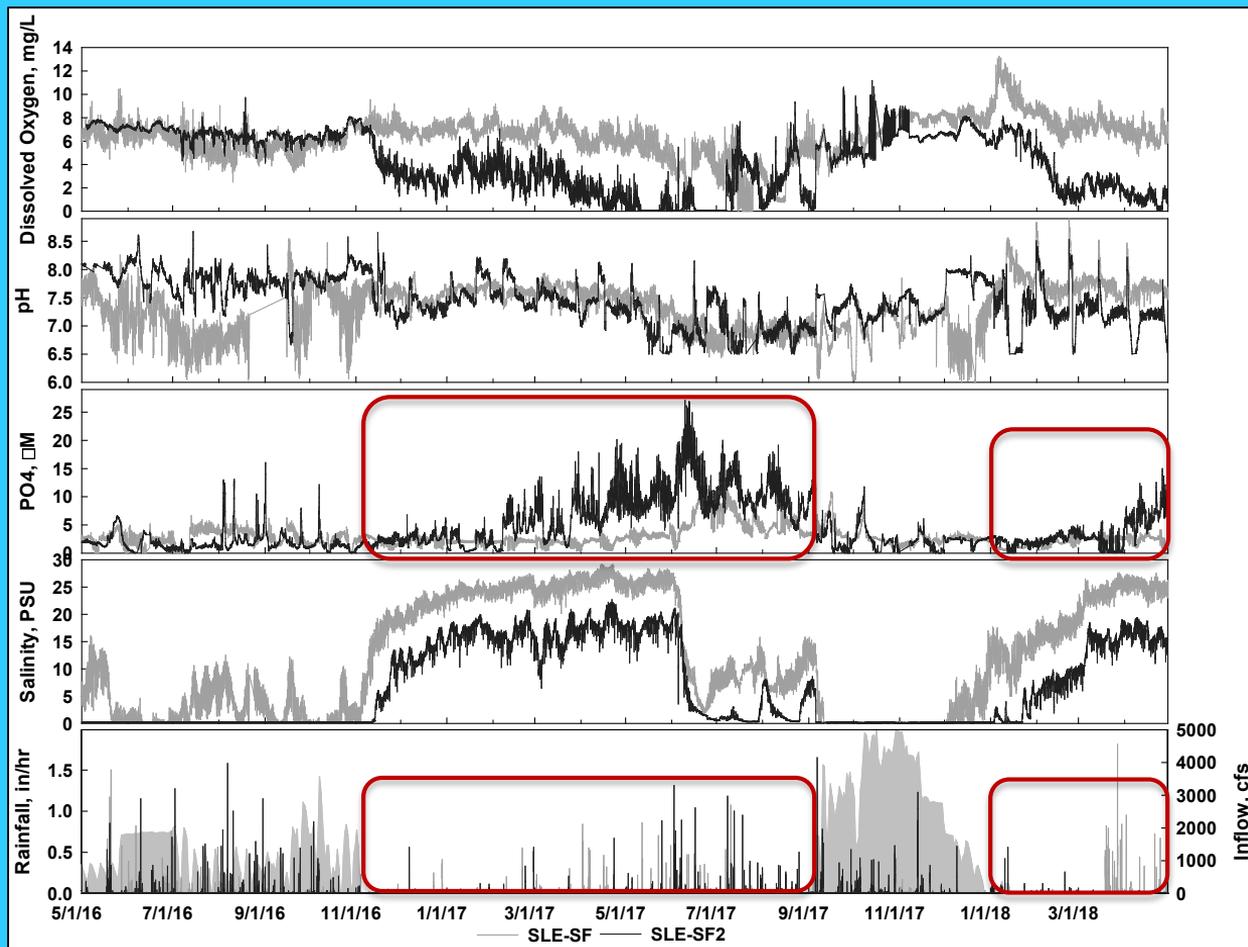
When Lake O flows are strong, pH is depressed downstream at SF2

SLE-SF vs. SLE-SF2 (May 2016 – April 2018)

When Lake O flows drop, DO drops sharply at SF2

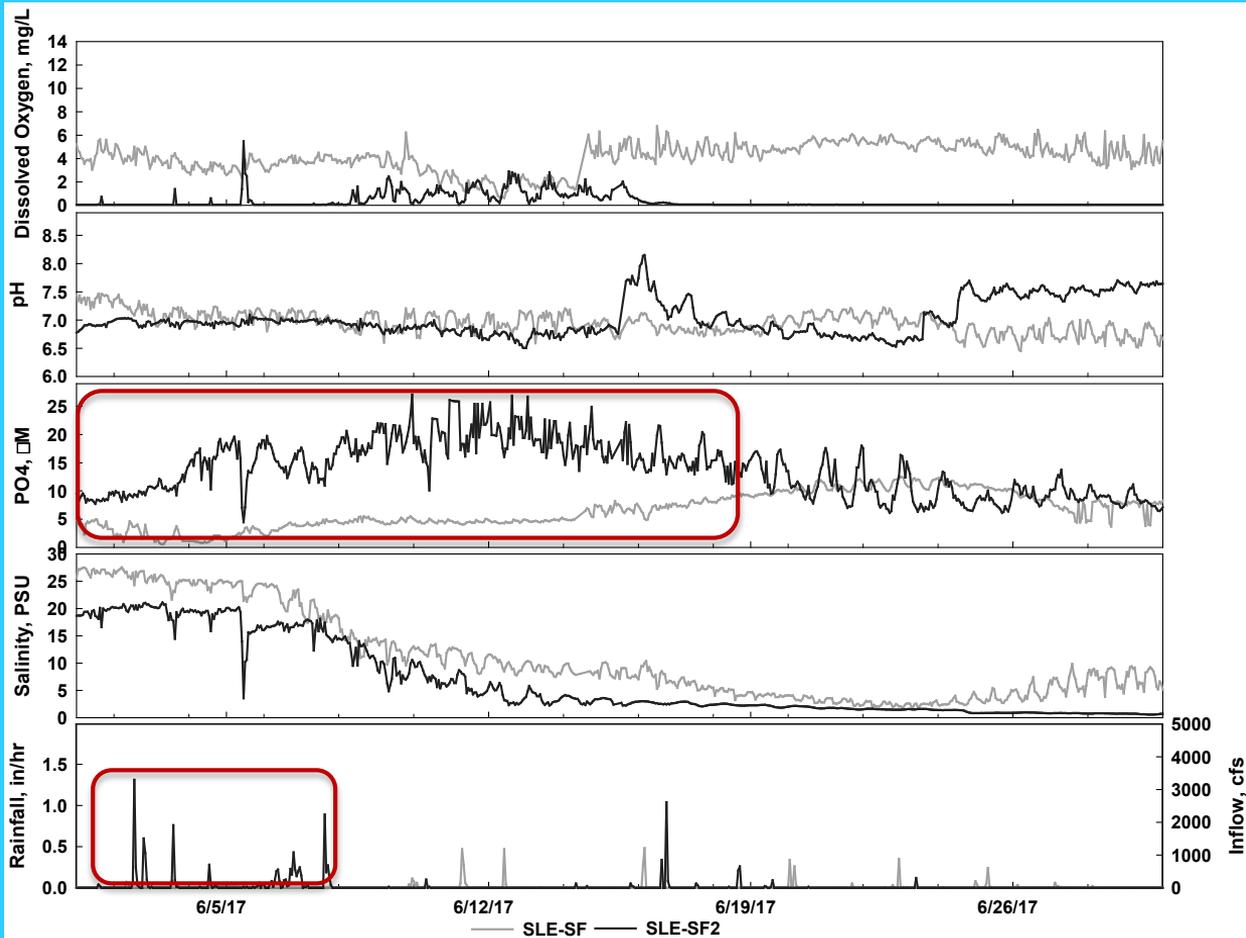


SLE-SF vs. SLE-SF2 (May 2016 – April 2018)



**When Lake O flows stop,
PO₄ is elevated at SF2**

SLE-SF vs. SLE-SF2 – First Flush (June 2017)



When Lake O is not flowing, and there is precipitation, SF2 is well positioned to capture the effects of local runoff

Concluding Remarks

- **The location of IRLON's SLE-SF2 site is unique compared to other IRLON sites; conditions change rapidly based on the flow, or lack of flow, of freshwater from the C-44 canal**
- **The parameters most impacted in the SLE by that flow are salinity, pH, phosphate, and dissolved oxygen**
- **During periods of heavy discharge, salinity plummets and the site is in essence a flowing river of fresh water**
- **When there are prolonged periods without flow from the C-44, the site is essentially a stagnant brackish lake, with increasingly anoxic conditions as time since discharge increases**
- **When precipitation occurs, and when there is no flow from the C-44, this site is positioned to capture the effects of local runoff, such as the spike of phosphate levels during the first flush in June 2017**

Concluding Remarks

- **High-frequency, continuous observatory data are enabling better quantification and modeling of relationships between environmental factors and biological processes in an estuary with tremendous climate-related interannual variability**
- **Real-time data enable researchers to follow environmental changes in the SLE and IRL, assist resource and planning managers to make informed decisions, model and correlate environmental data to biological, chemical and physical phenomena, and contribute to education and public outreach on the lagoon.**
- **Use of continuous data such as those provided by IRLON enhances our ability to understand temporal and spatial variability in estuarine water quality, including major storms which seem to be increasingly frequent**

The Indian River Lagoon Observatory Network of Environmental Sensors (IRLON)



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<http://fau.loboviz.com/>

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HARBOR BRANCH OCEANOGRAPHIC INSTITUTE
FOUNDATION



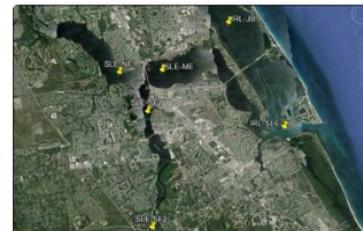
Indian River Lagoon Observations

June 29, 2016: St. Lucie Estuary Algal Blooms

M. Dennis Hanisak
Research Professor & IRLO Director
FAU Harbor Branch

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.



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)



The origin of these blooms is Lake Okeechobee. This year the center of

<http://www.fau.edu/hboi/irlo/index.php>

Save Our Seas Specialty License Plate
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Foundation