

Recent results from Waccamaw River Volunteer Monitoring Program: Events and Trends

Friday, November 9, 2018

Waccamaw Water Quality Data Conference

Leveraging time-series water-quality data from volunteer, USGS, and regulatory monitoring programs to detect illicit discharges and long-term trends in the Waccamaw and Sampit Rivers



Susan Libes

Director, Waccamaw Watershed Academy

Coastal Carolina University

SCWRC 2018

Take-home messages

- ✓ Leverage data across programs to tell a “CSI-style” story

University



Nongovernmental Organization



Water Quality Stories



Federal Agencies



Local Municipalities



Waccamaw River Watershed

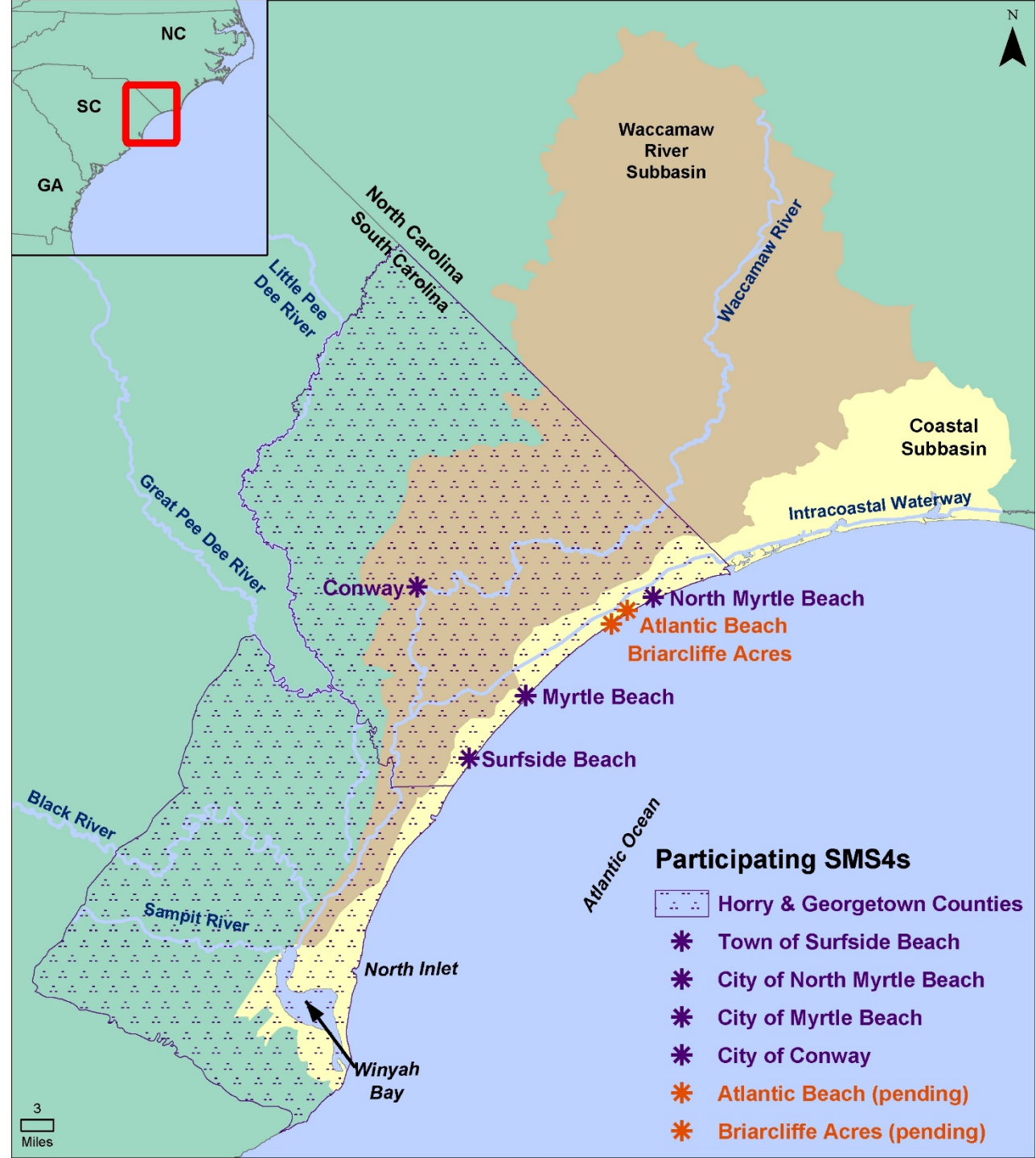
Two states (NC/SC)

Merges with four other rivers in Winyah Bay

1,243,000 acres (46% in SC)

1724 stream miles (61% in SC)

Local water quality management started in 2006 under NPDES Phase II Storm Program requirements



Monitoring programs

2008: CCU's EQL - SC DHEC certified

→ Biweekly at 8 sites.

**2006: Horry-Georgetown-Conway
Volunteer Water Quality Monitors**

→ Biweekly at 18 sites.

**2007: USGS - In situ water quality and
weather sensors**

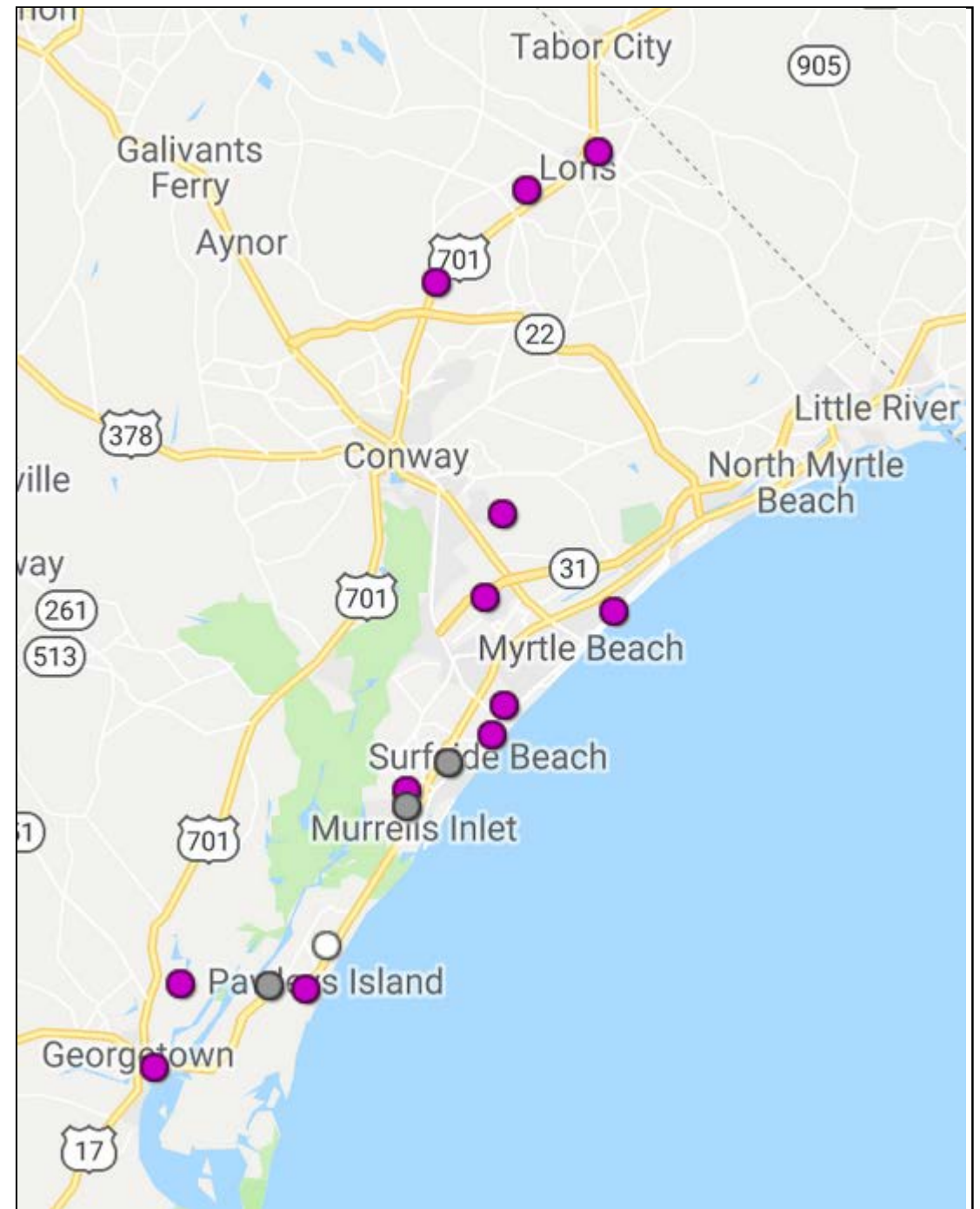
→ 15 minutes at 8 sites.

**2012: CoCoRAHs* – SC State Climatology
Office, volunteers in Horry/Geo
Counties**

→ Daily at 26 sites.

Jun 2016: NOAA NERRS
Winyah Bay

*Community Collaborative Rain, Hail, and Snow Network



Case of high chlorophyll

No WQS for eutrophication indicators although Waccamaw River has low dissolved oxygen

Special water quality standard of 4 ppm for DO established by SC DHEC

DO Total Maximum Daily Load (TMDL) approved in 1999 up through Conway. Includes several regulatory permits for wastewater treatment plant dischargers

Still not meeting DO criteria

EPA recommended chlorophyll, turbidity, TN and TP criteria

EPA (2000) Ambient Water Quality Criteria Recommendations Information Supporting the Development of State And Tribal Nutrient Criteria For Rivers And Streams In Nutrient Ecoregion XIV, EPA 822-B-00-022

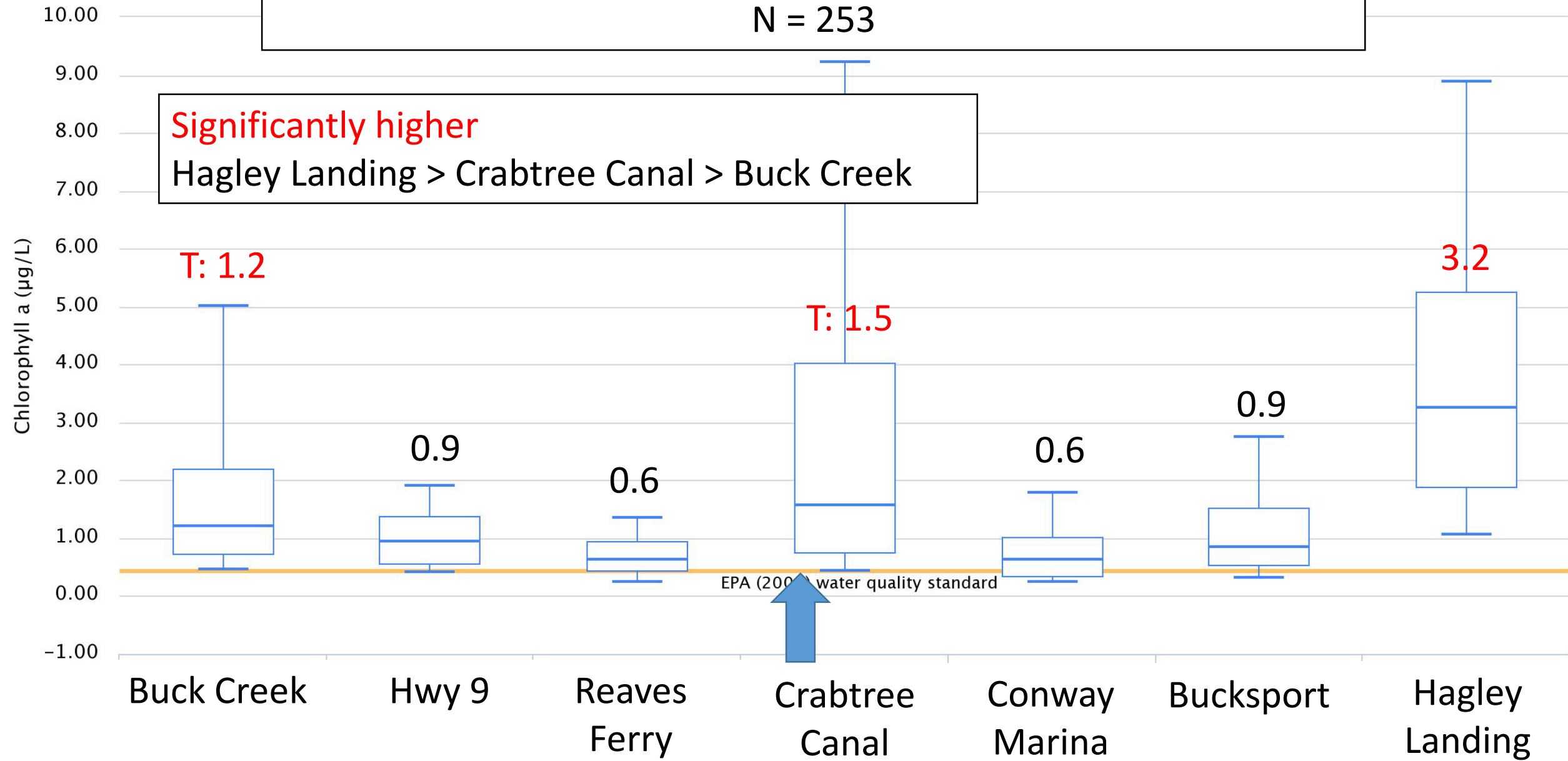
Locally based monitoring

Established site-specific norms (boxplots)

Used to identify times of potential *Illicit Discharges*

Used to identify sites with characteristically elevated levels

Chlorophyll a ($\mu\text{g/L}$)
Data collected between Jan 31, 2008 and Aug 02, 2018
N = 253

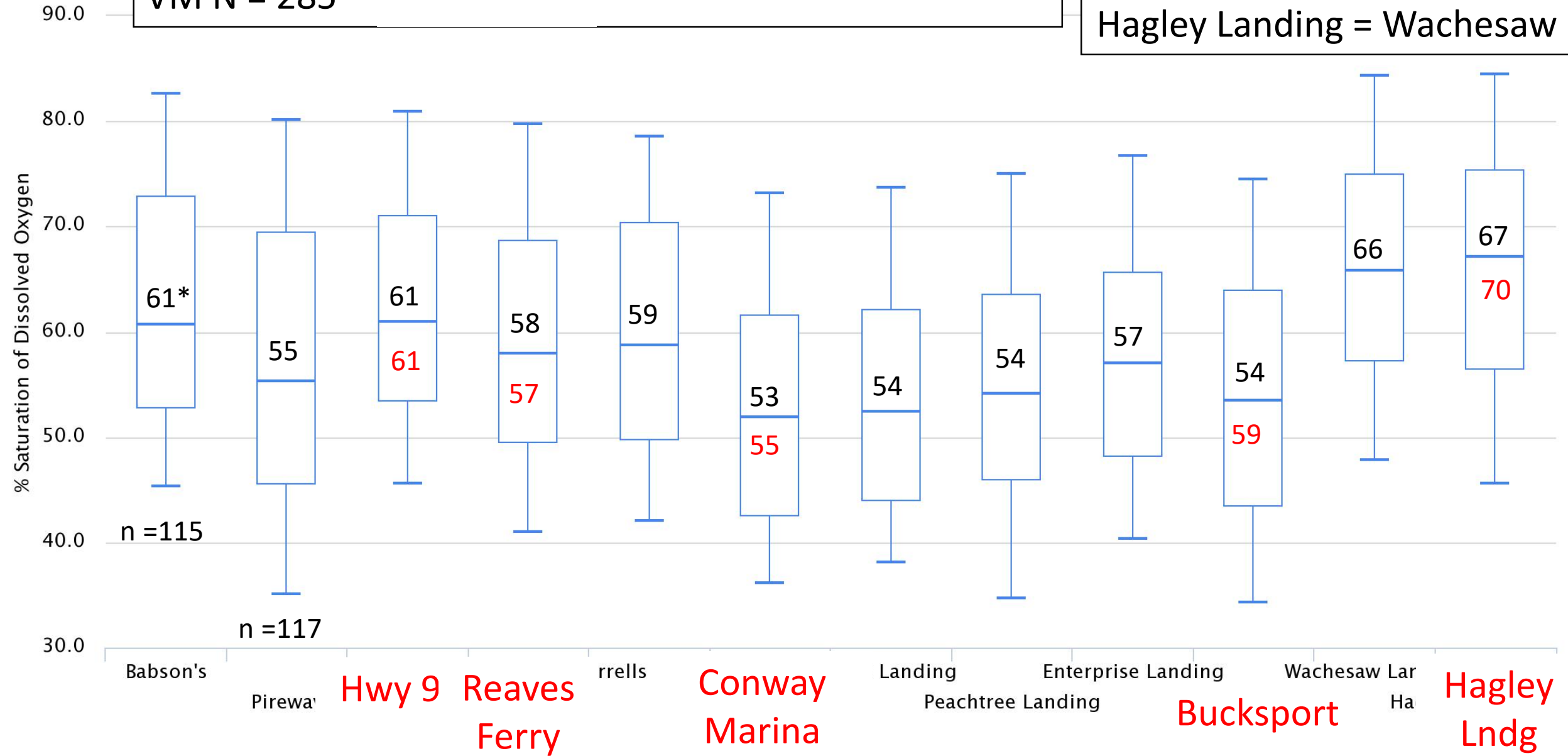


% Saturation of Dissolved Oxygen

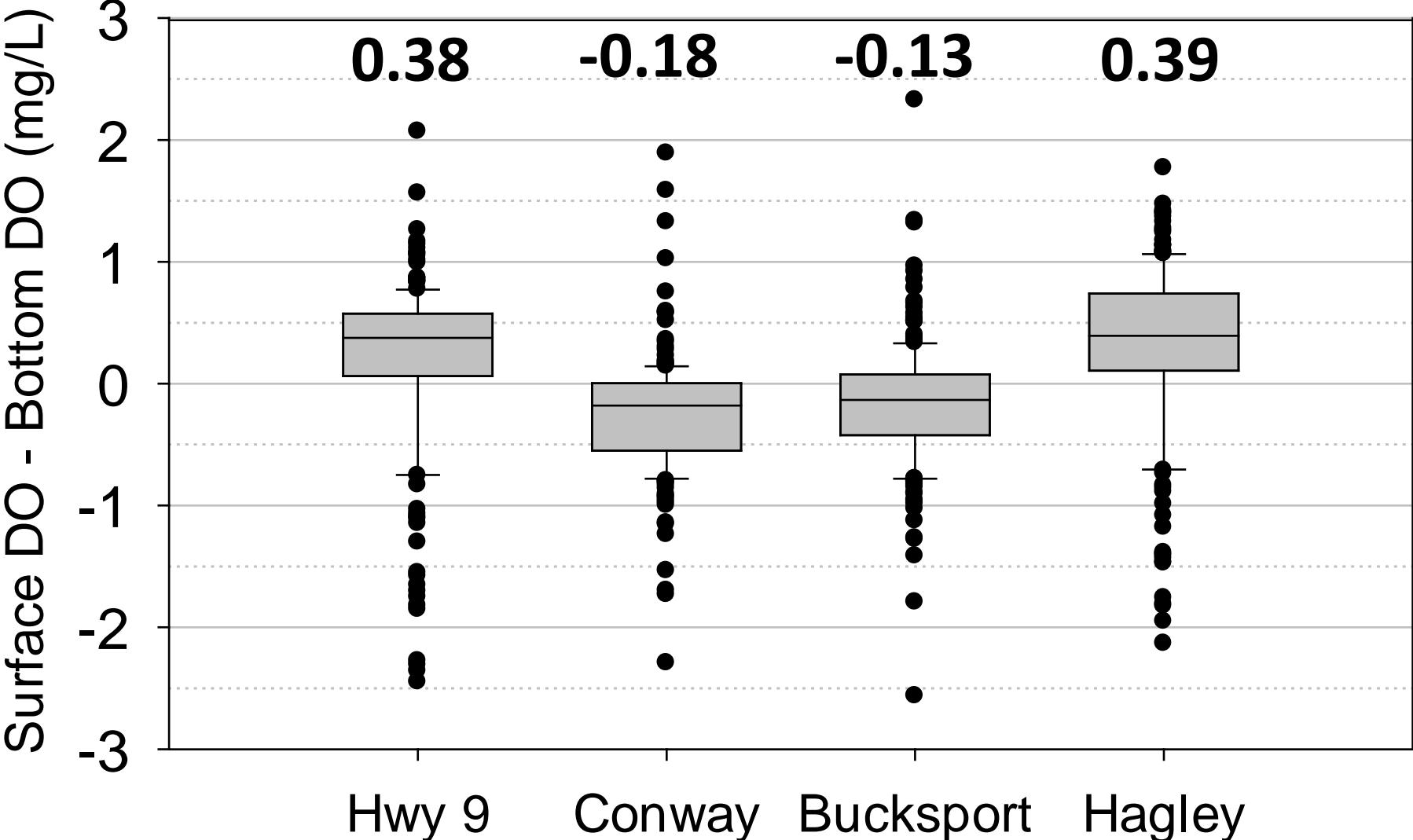
Data collected between Jun 06, 2006 and Aug 23, 2018

VM N = 285

Significantly higher
Hagley Landing = Wachesaw

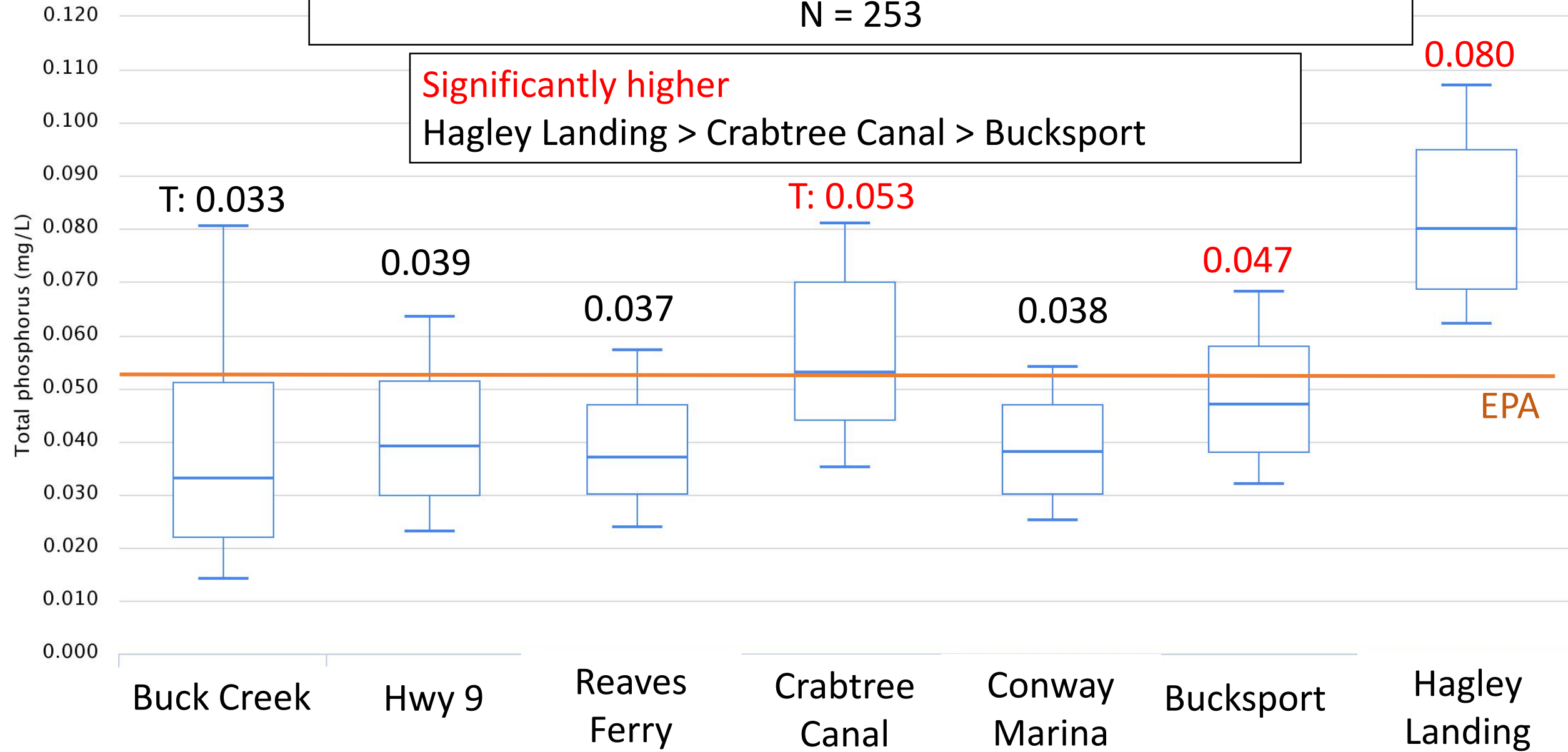


Surface (Vol Mon) – Bottom DO (USGS) Volunteer Monitoring Data, n =196



Total Phosphorus (mg/L)
Data collected between Jan 31, 2008 and Aug 02, 2018
N = 253

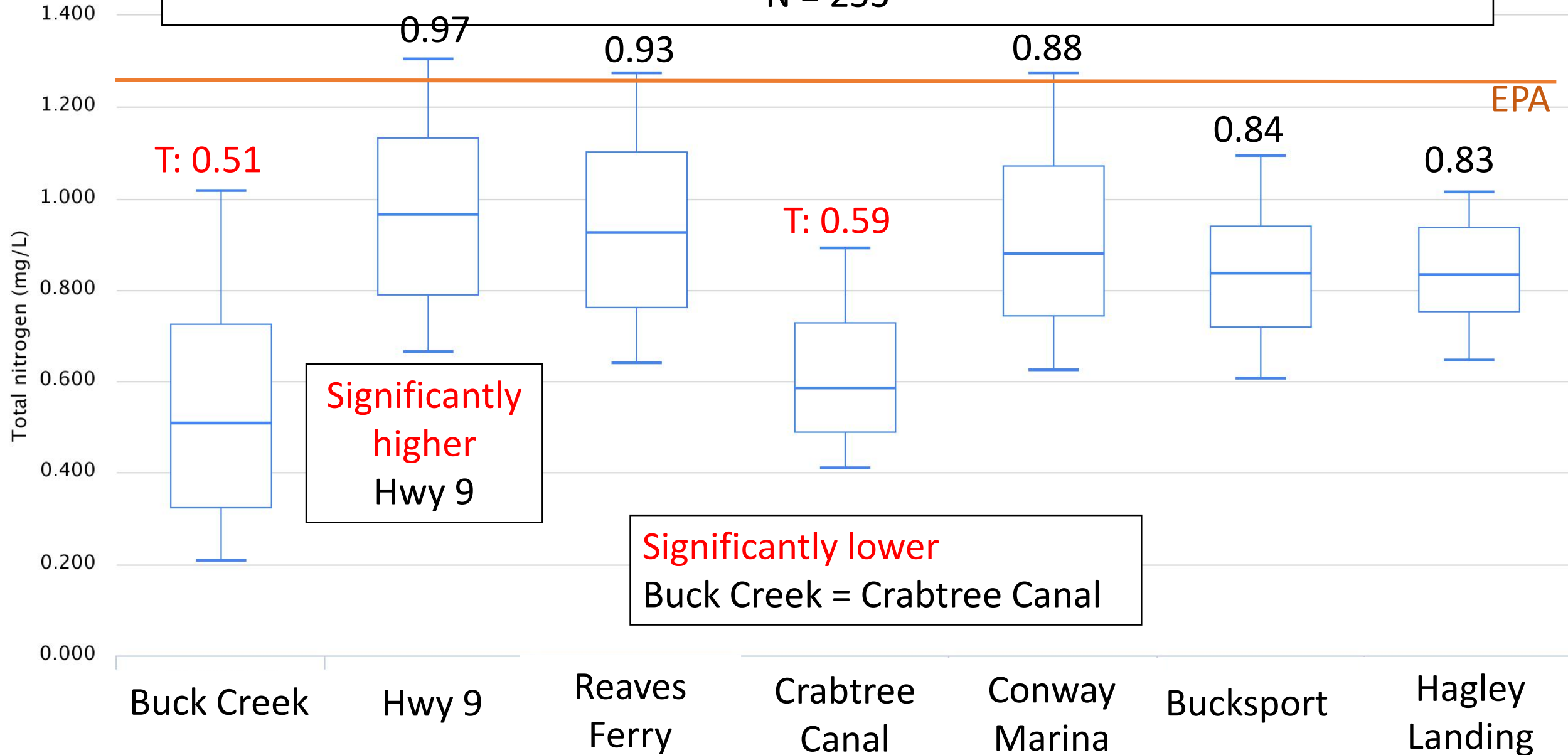
Significantly higher
Hagley Landing > Crabtree Canal > Bucksport



Total Nitrogen (mg/L)

Data collected between Jan 31, 2008 and Aug 02, 2018

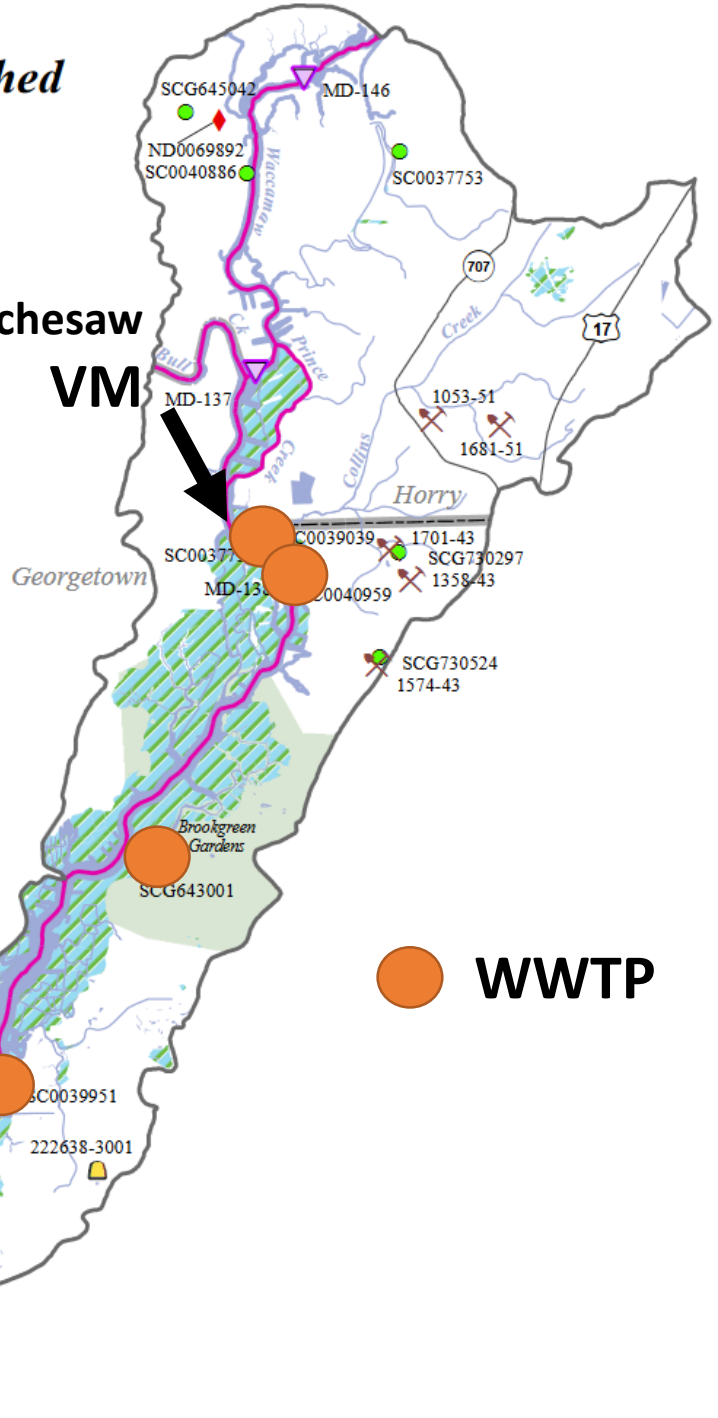
N = 253



Waccamaw River Watershed
(03040206-10)

- ▽ Macroinvertebrate Stations
- ▽ Water Quality Monitoring Stations
- ▽ Approved TMDL
- ▲ Groundwater Monitoring Stations
- ♁ Shellfish Monitoring Stations
- ⚡ Mines
- 🗑 Landfills
- NPDES Permits
- ◆ Land Application Permits
- 🏊 Natural Swimming Areas
- 🛣 Interstates
- 🚂 Railroad Lines
- 🛣 Highways
- 🗺 County Lines
- 🌊 Modeled Stream
- 🌊 Stream
- 🟦 Lake
- 🟩 Bay/Estuary
- 🟩 Wetland
- 🗺 10-Digit Hydrologic Units
- 🏘 Cities/Towns
- 🟩 Public Lands

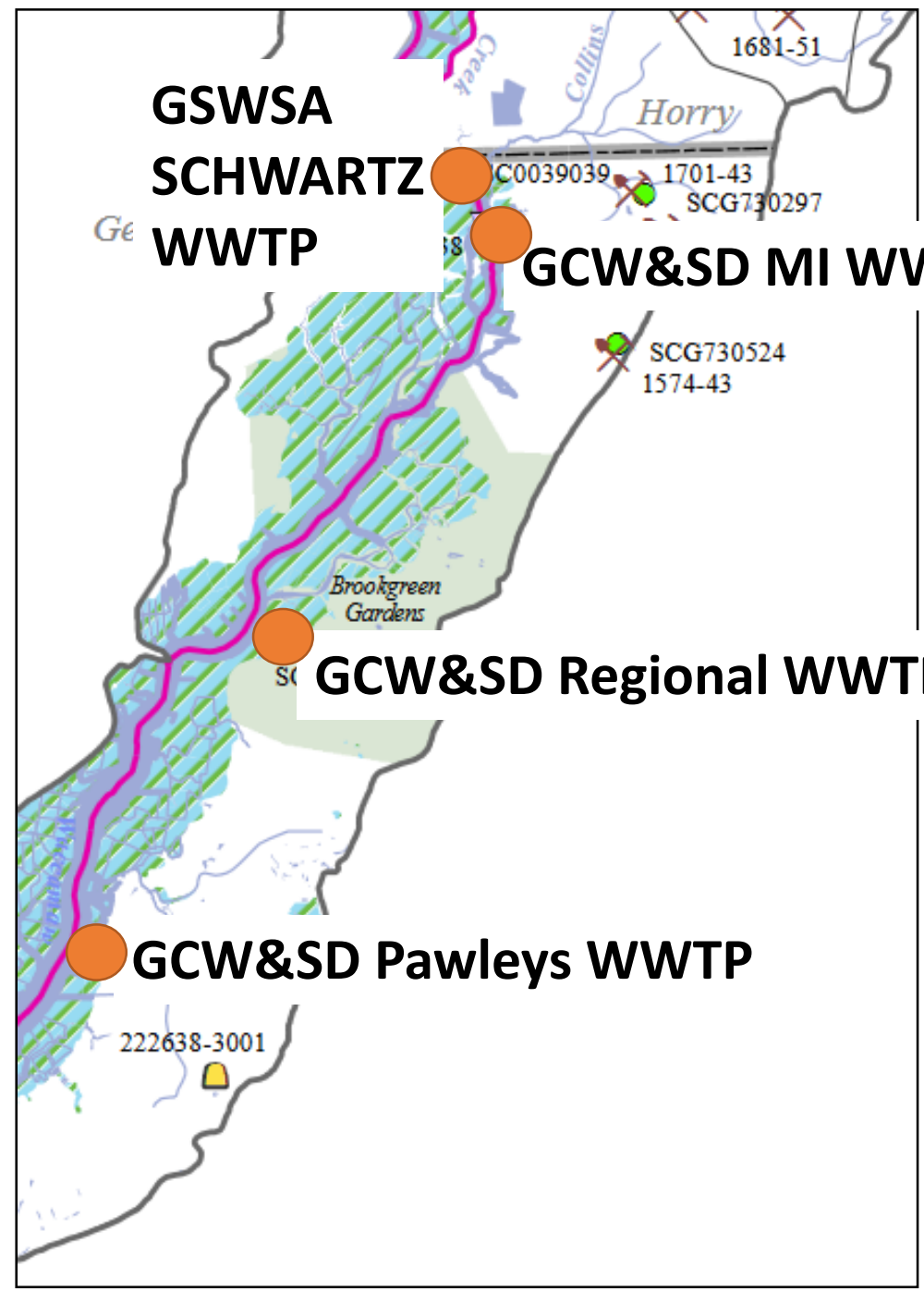
Wachesaw VM



● **WWTP**

USGS

VM & RG



**GSWSA
SCHWARTZ
WWTP**

GCW&SD MI WWTP

GCW&SD Regional WWTP

GCW&SD Pawleys WWTP

Availability-South Carolina's Draft 2018 303(d) List of Impaired Waters

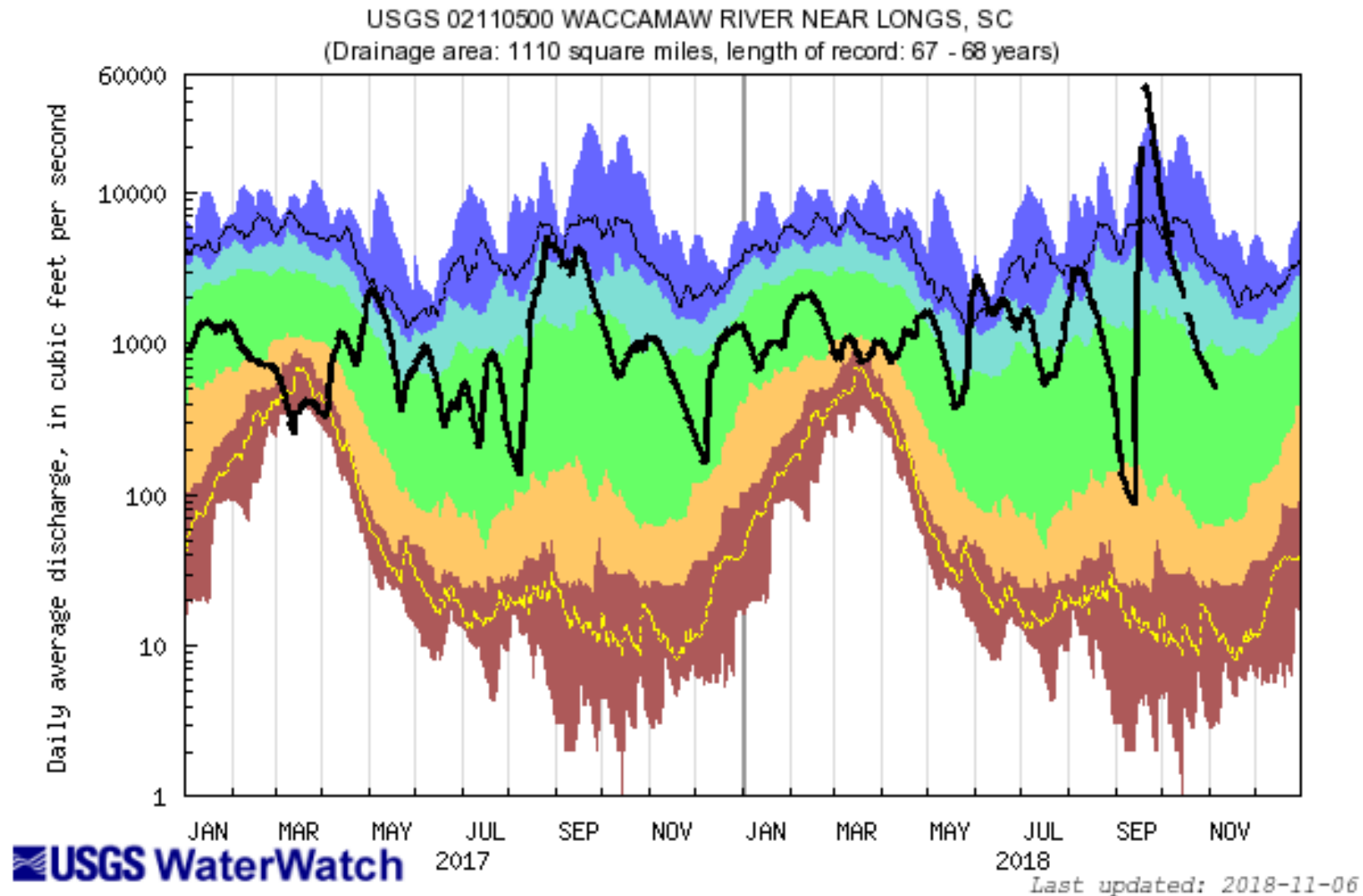
The South Carolina Department of Health and Environmental Control (SCDHEC) is updating its list of impaired waterbodies requiring TMDLs pursuant to Section 303(d) of the Federal Clean Water Act. The list includes waterbodies not meeting the State's water quality standards after application of existing required controls for point and nonpoint sources of pollution.

In accordance with recent EPA guidance and beginning with the 2016 listing cycle, SCDHEC has been incorporating a new long-term vision, or strategy, in order to prioritize impaired locations for TMDL development or alternative restoration plans. The long-term vision is outlined in 2018 303(d) assessment methodology and included in the priority ranking for the 2018 303(d) list.

Public input is being solicited regarding the draft listing, methodology and restoration priorities. A copy of the draft list and methodology may be viewed at the SCDHEC Bureau of Water website at <https://www.scdhec.gov/environmental-public-notice>.

Copies of the draft list can also be obtained by contacting Matt Carswell Bureau of Water, SCDHEC, 2600 Bull Street, Columbia, South Carolina 29201 or, by email: carsweme@dhec.sc.gov. Please submit written comments to the attention of Matt Carswell. To be considered, comments regarding the draft list must be received by 5:00 PM on Wednesday, December 5, 2018.

and then there was Florence.....



SCDOT: Total closure of 501 Bypass is imminent, section of Main Street closed

by Briana Rivas | Sunday, September 16th 2018



SCDOT: S.C. 22 to reopen Thursday at 2 p.m.

by WPDE | Thursday, September 27th 2018



S.C. Highway 22 is flooded between SC-90 and SC-905 on Saturday, Sept. 22, 2018, in Conway, S.C. An officer with the South Carolina State Highway Patrol marks the water level to compare against previous days. The blocked road has traffic snarled around Conway and the Waccamaw River continues to rise past record levels. (Jason Lee/The Sun News via AP)

AA

Horry County, S.C. (WPDE) — SCDOT tweeted today that SC 22 in Horry County at 2 p.m. today, Sept. 27.



260 CLOSURES



STEAMER TRACE RD

Closed - 2 hours ago



PEARLIE LN, JULIOUS LN, CORNWALL DR

Closed - 9 hours ago



ZEDDIE LN

Closed - 9 hours ago



CLOVIS CIR

Closed - 10 hours ago



RIVERSIDE DR

Closed - 10 hours ago



WAYLAND CIR

Closed - 10 hours ago



RIVER CLIFF DR

Closed - 10 hours ago



ISLANDER DR

Closed - 10 hours ago



RIVER BEND RD

Closed - 10 hours ago



REEF RD

Closed - 10 hours ago



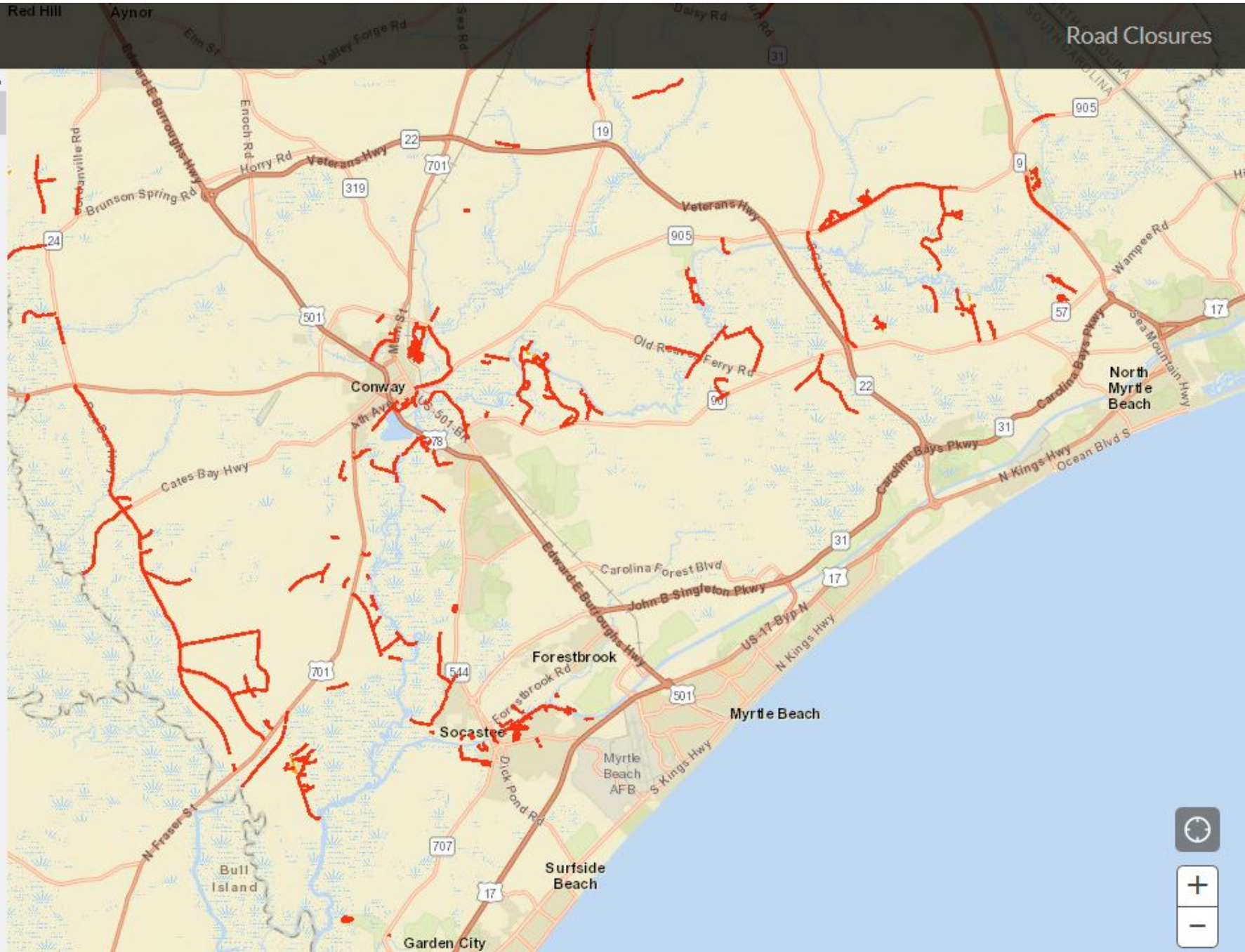
RIVER RD

Closed - 10 hours ago



DOWNYBROOK RD

Closed - 10 hours ago



Conway hopes for less traffic while Myrtle Beach hopes for more

by Madeline Montgomery | Wednesday, September 26th 2018



Barrier on U.S. 501 Bypass near former Lake Busbee to be removed starting Monday

by WPDE | Friday, September 28th 2018



Highway 501 Bypass after the Waccamaw River reached 14.3 feet following Florence. The road is an evacuation route for Grand Strand residents. (SCDOT Twitter)

Waccamaw River floods Murrells Inlet restaurant

by WPDE | Tuesday, September 25th 2018



Deck 383 at the Wacca Wachie Marina (Ariane Lieberman)

Colored
organic matter
comes from
blackwater
rivers





As waters recede in the Longs area, fish begin to die off. The waters of the Waccamaw are becoming unsafe for them.
Jason Lee - jlee@thesunnews.com

LOCAL

Here's why dark water is flowing and dead fish are being left behind in neighborhoods



BY TYLER FLEMING

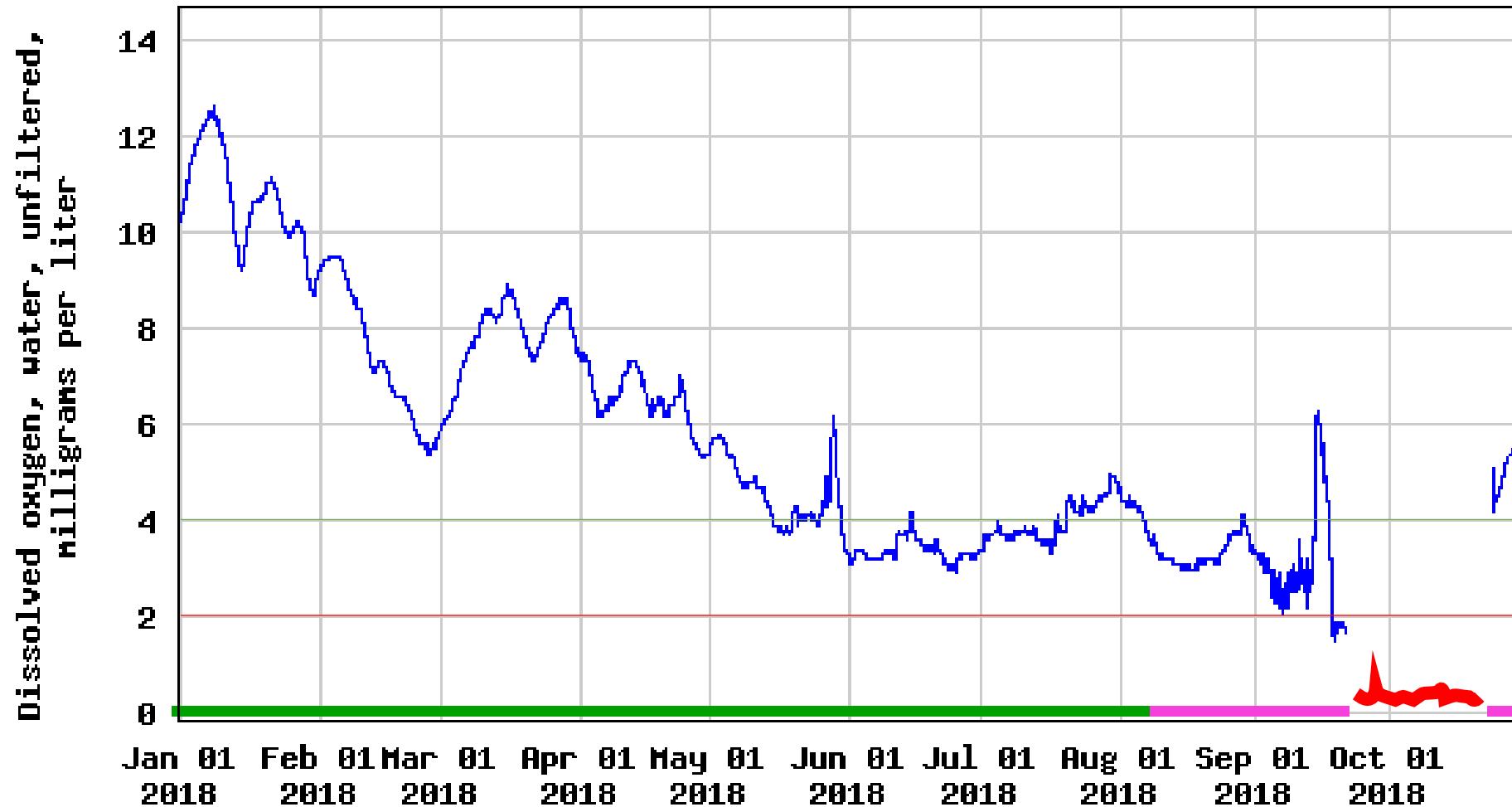
tfleming@thesunnews.com



September 25, 2018 04:01 PM

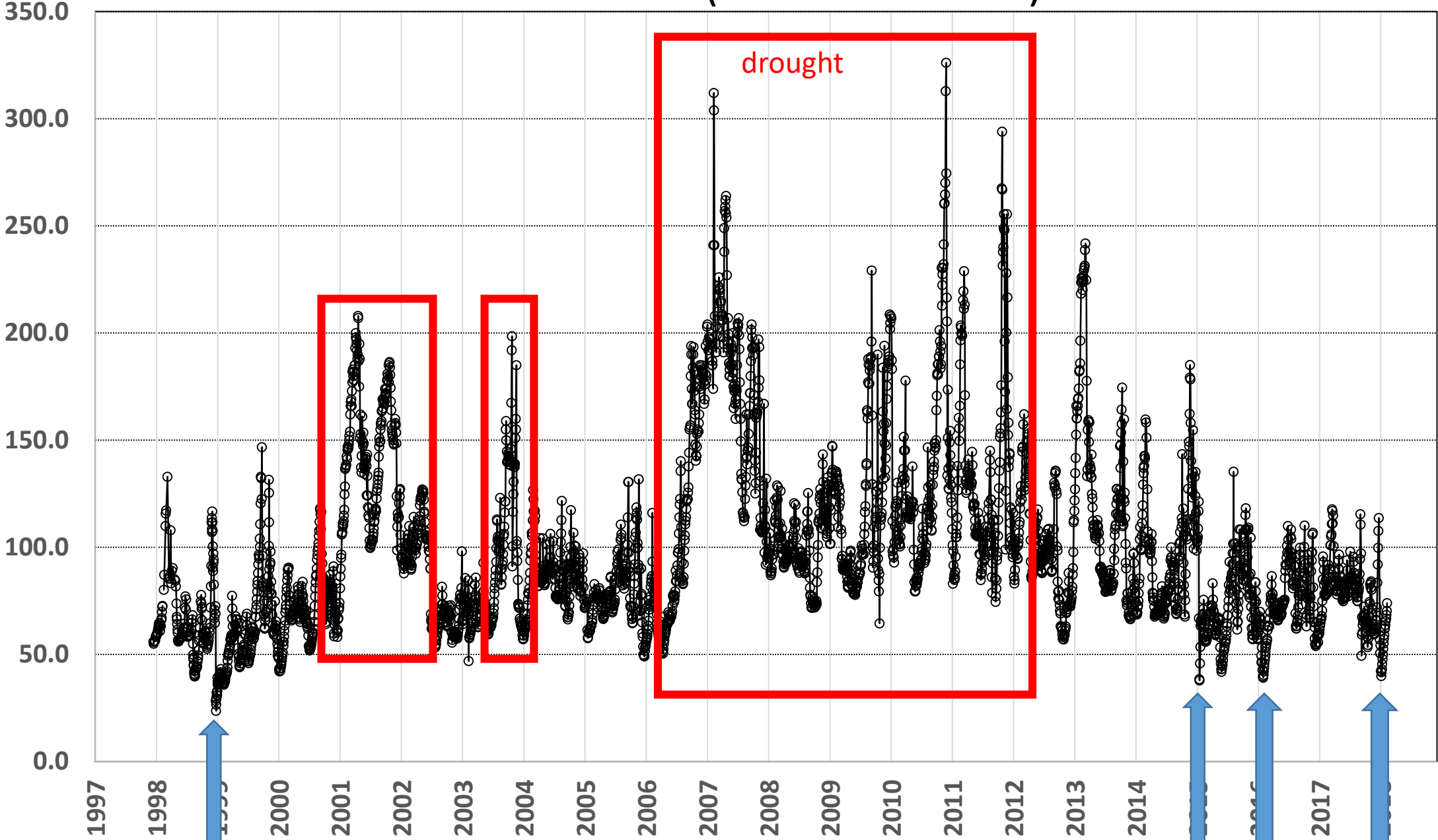
Updated September 25, 2018 03:45 PM

USGS 02110550 MACCAMAH RIVER ABOVE CONWAY, SC



— Dissolved oxygen
— Period of approved data
— Period of provisional data

CONDUCTIVITY (dissolved solids)



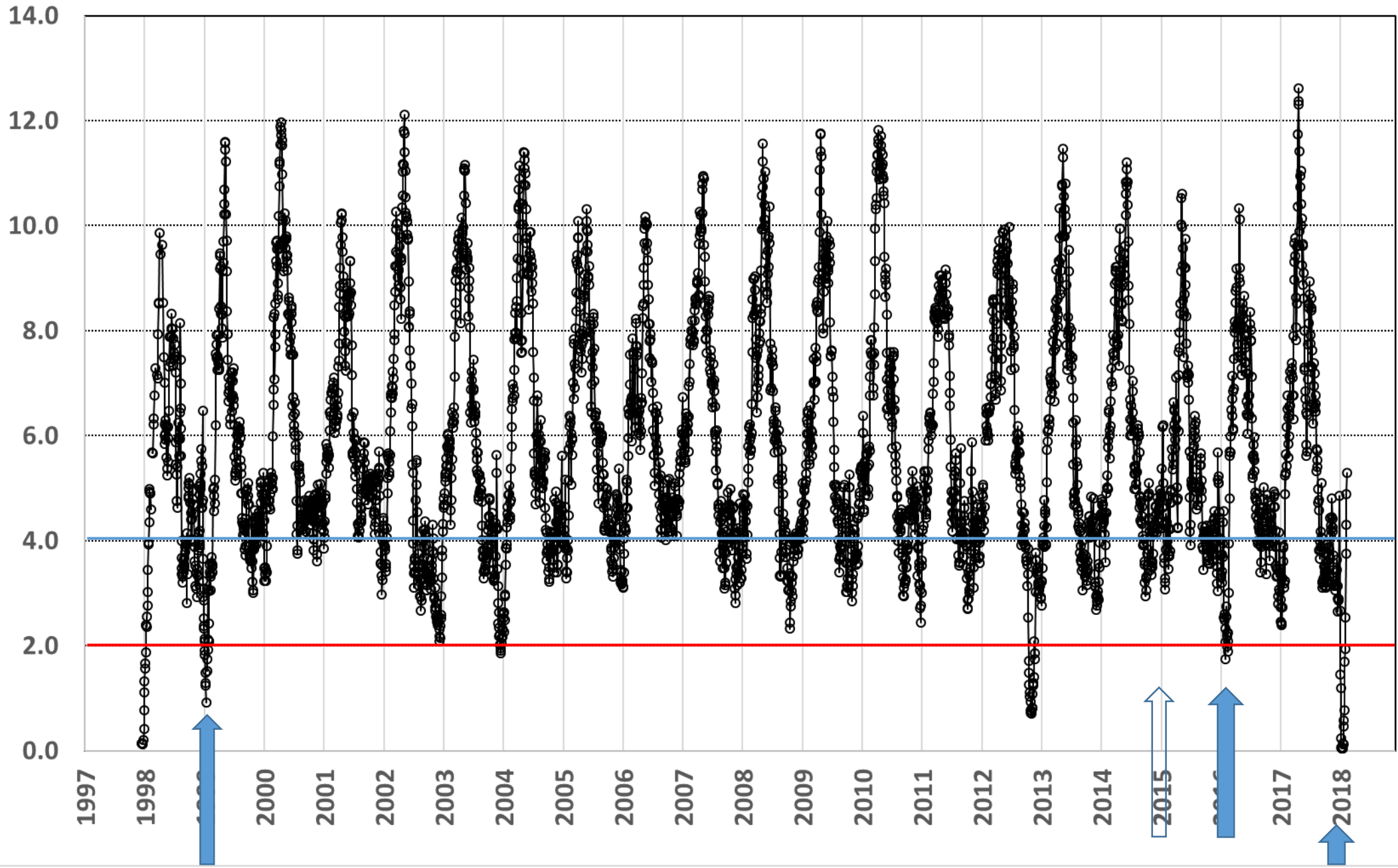
Floyd

Joaquin

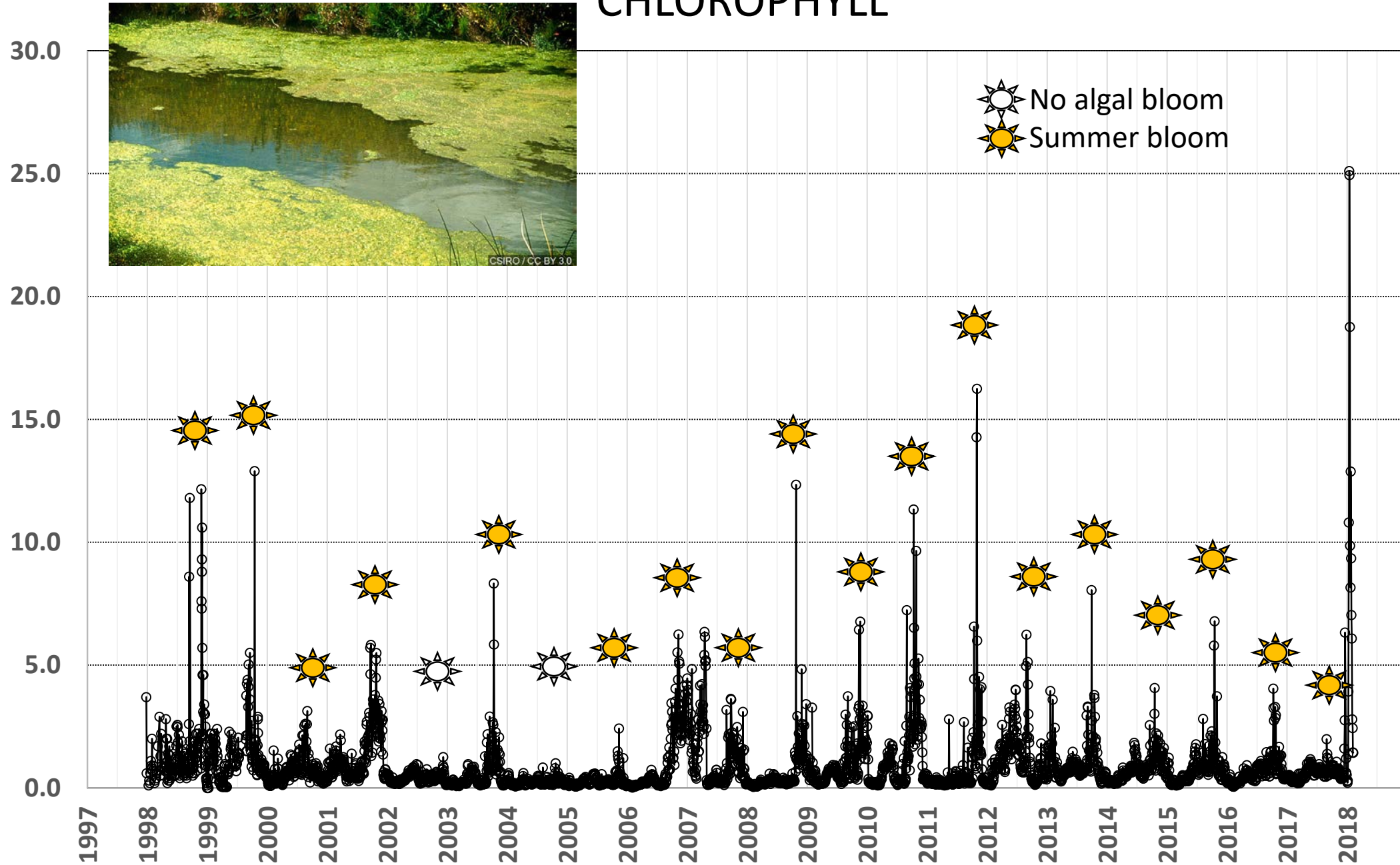
Matthew

Florence

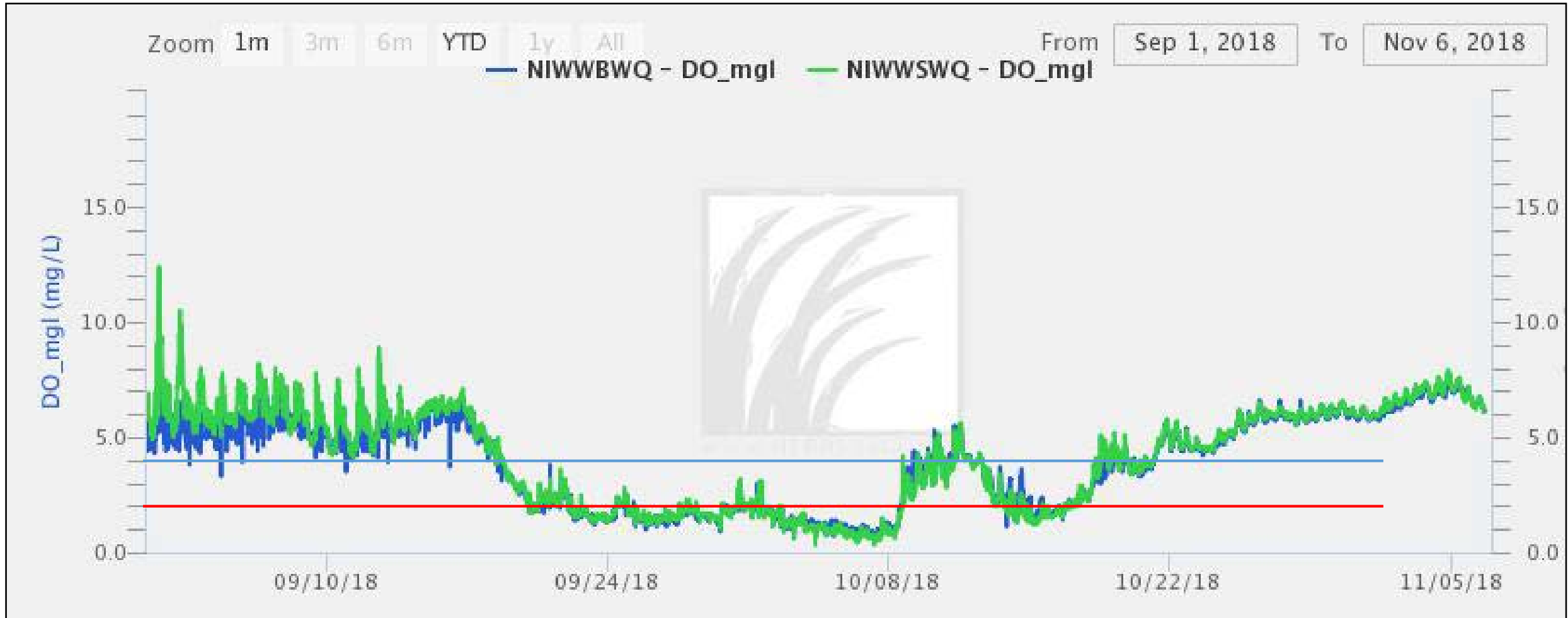
DISSOLVED OXYGEN



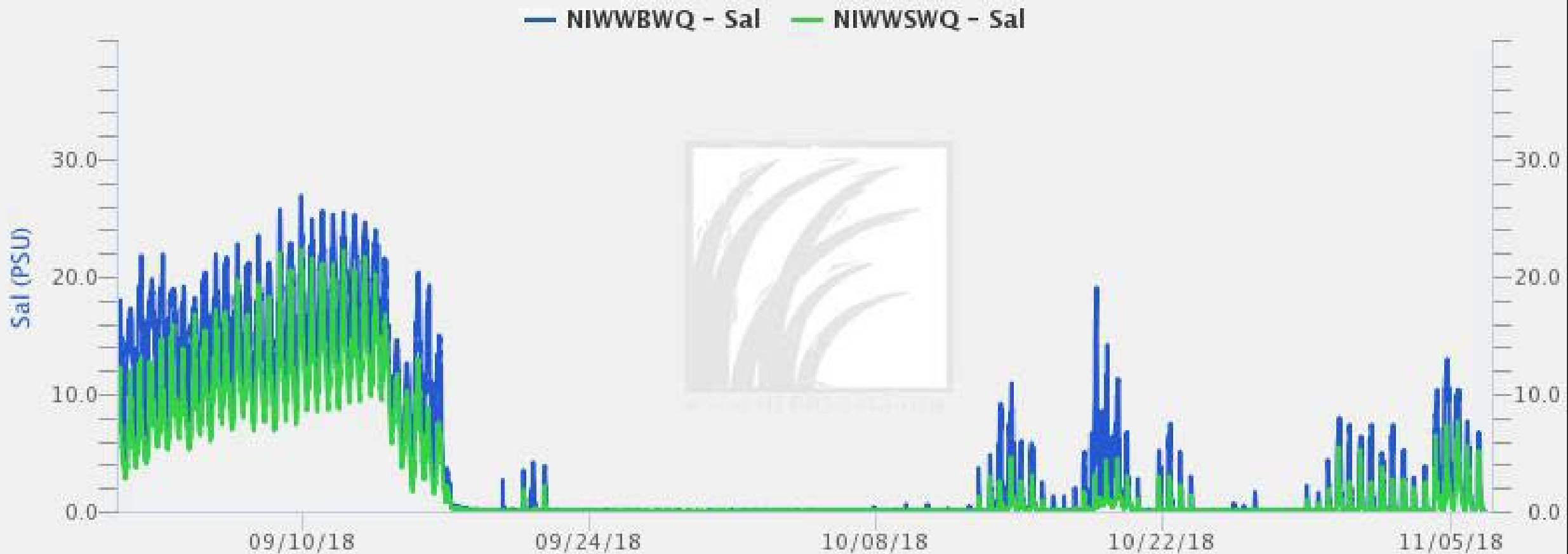
CHLOROPHYLL



Winyah Bay Dissolved Oxygen



Winyah Bay Salinity



Coastal Ocean Impacts



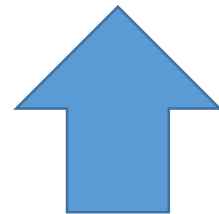
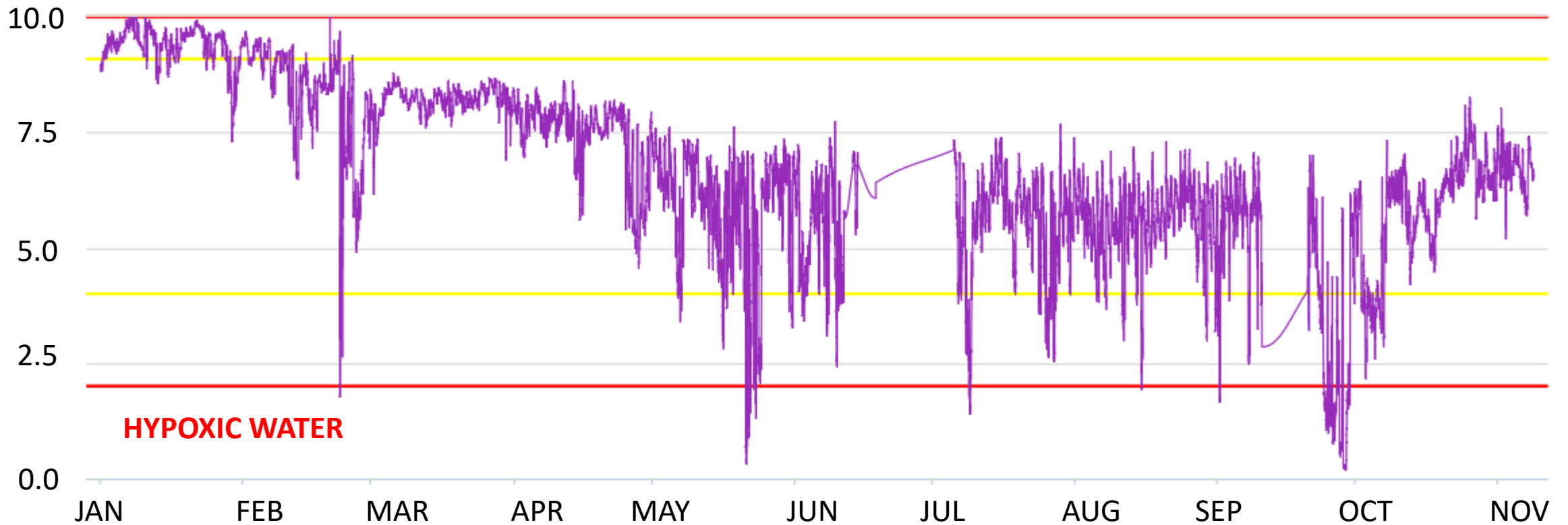
acquired September 19, 2018.

<https://landsat.visibleearth.nasa.gov/view.php?id=92786>

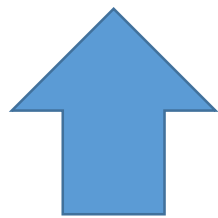
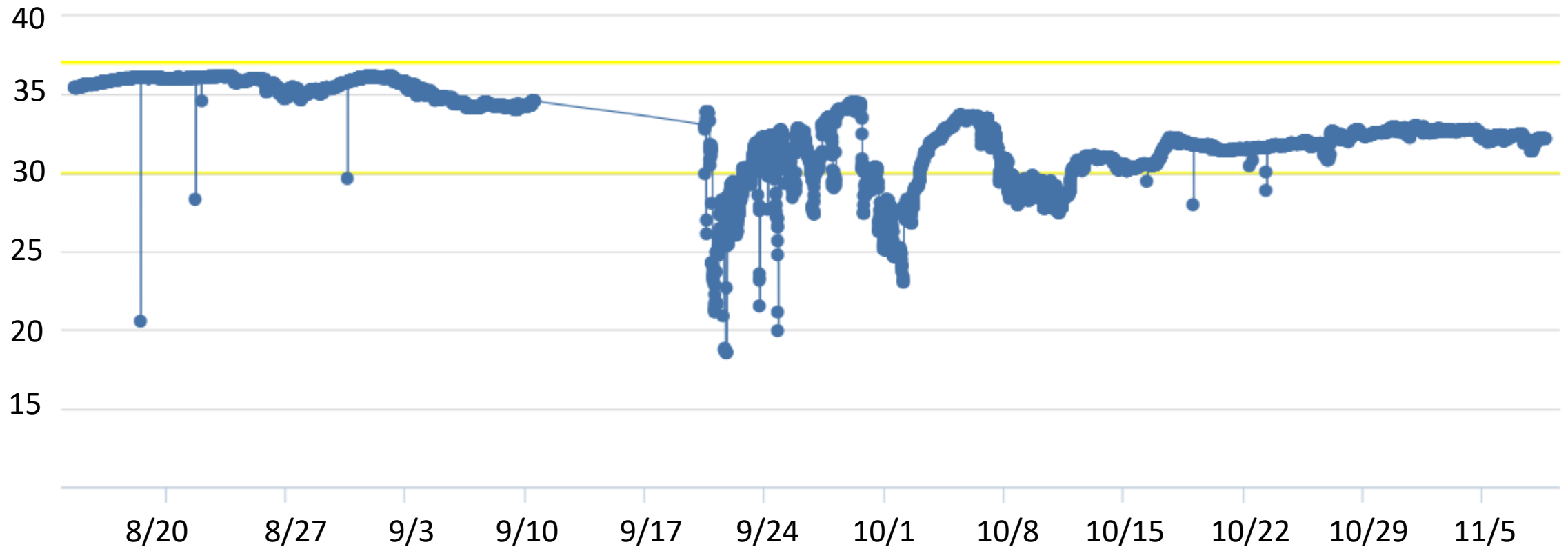




Cherry Grove Bottom Dissolved Oxygen



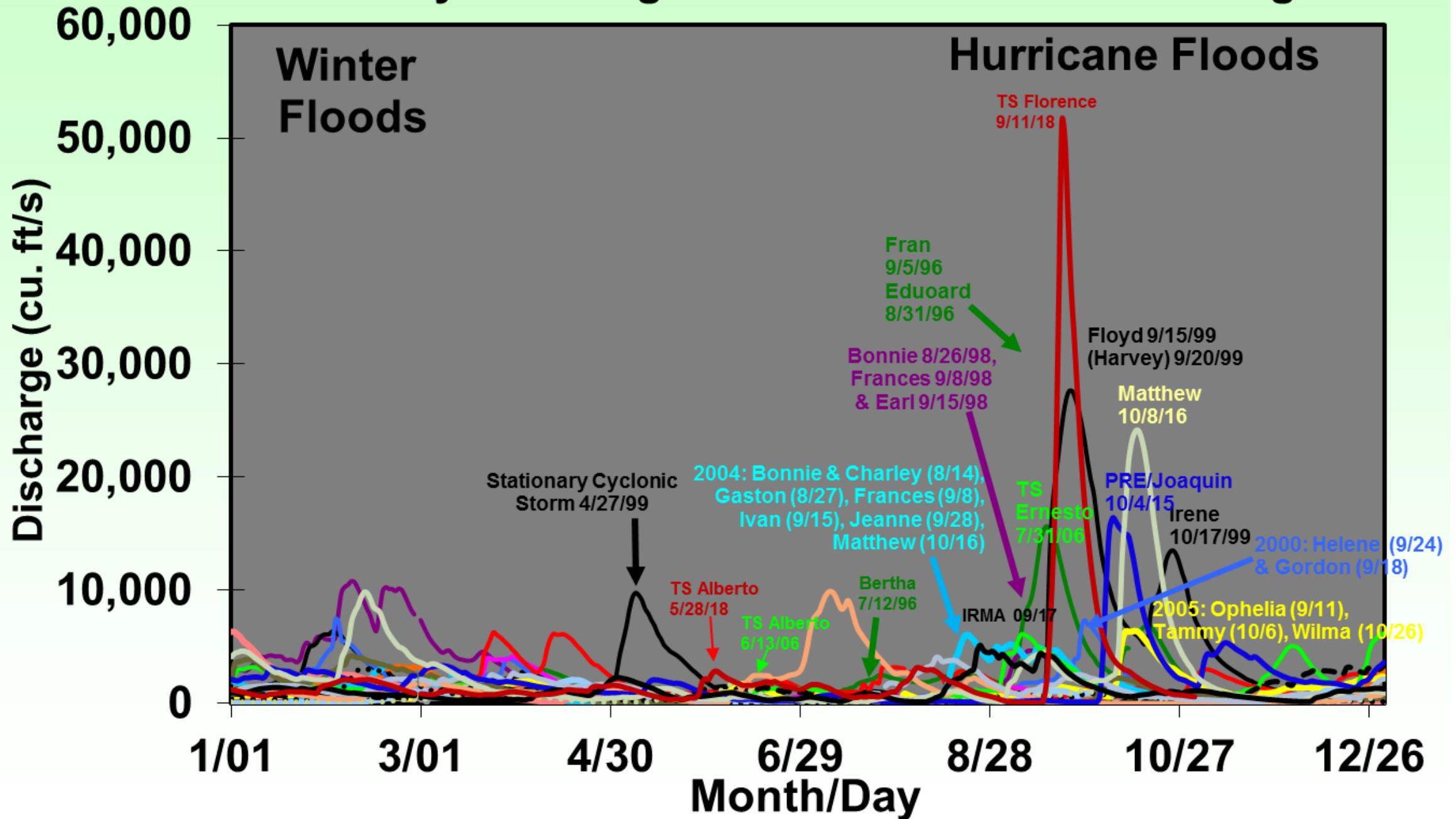
Cherry Grove Bottom Salinity





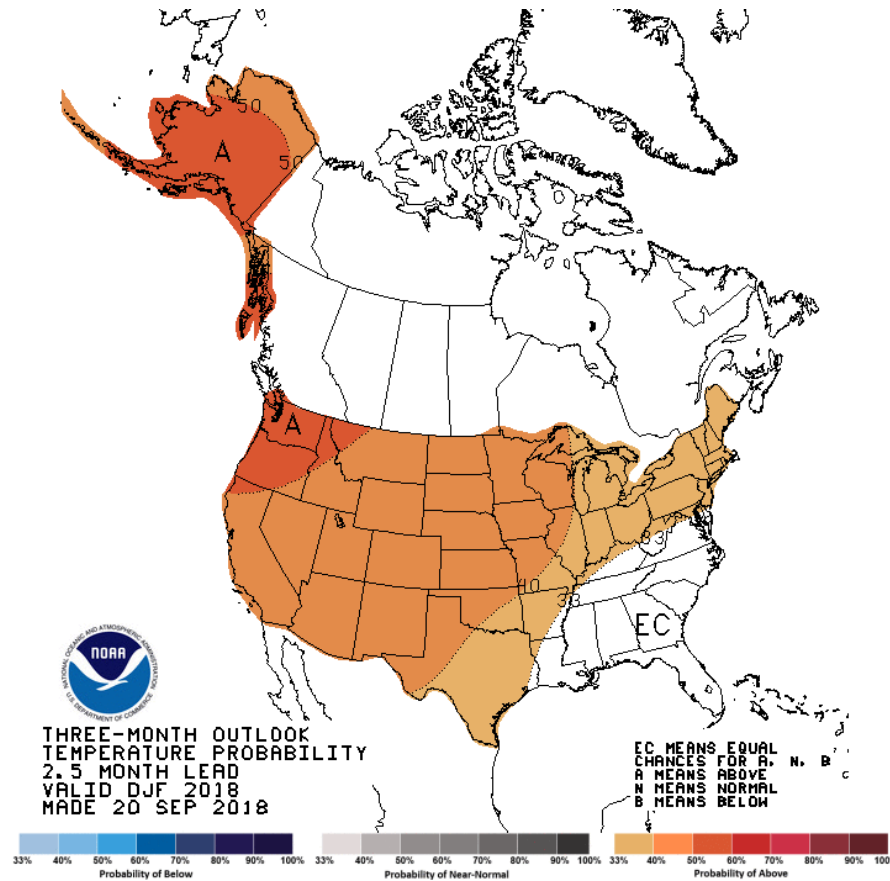
<http://www.wmbfnews.com/clip/13530373/beach-renourishment-underway-in-surfside-beach>

USGS Daily Discharge of Waccamaw River at Longs

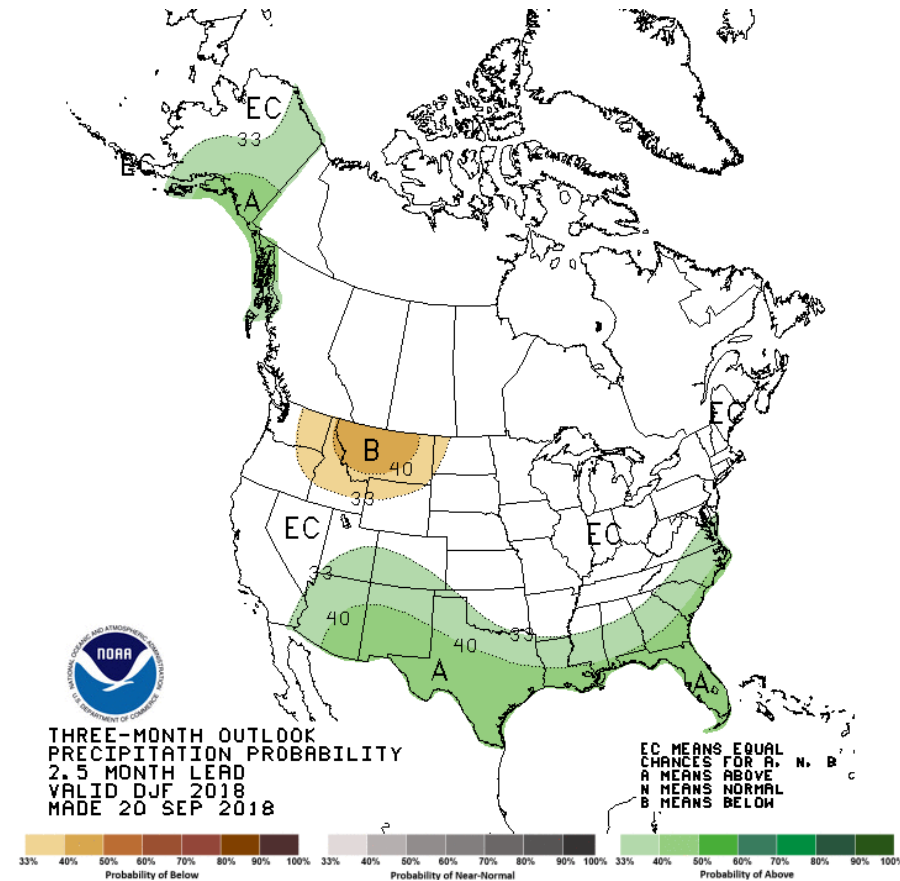


Outlook for Dec. 20187 – Feb 2019

Temperature



Precipitation

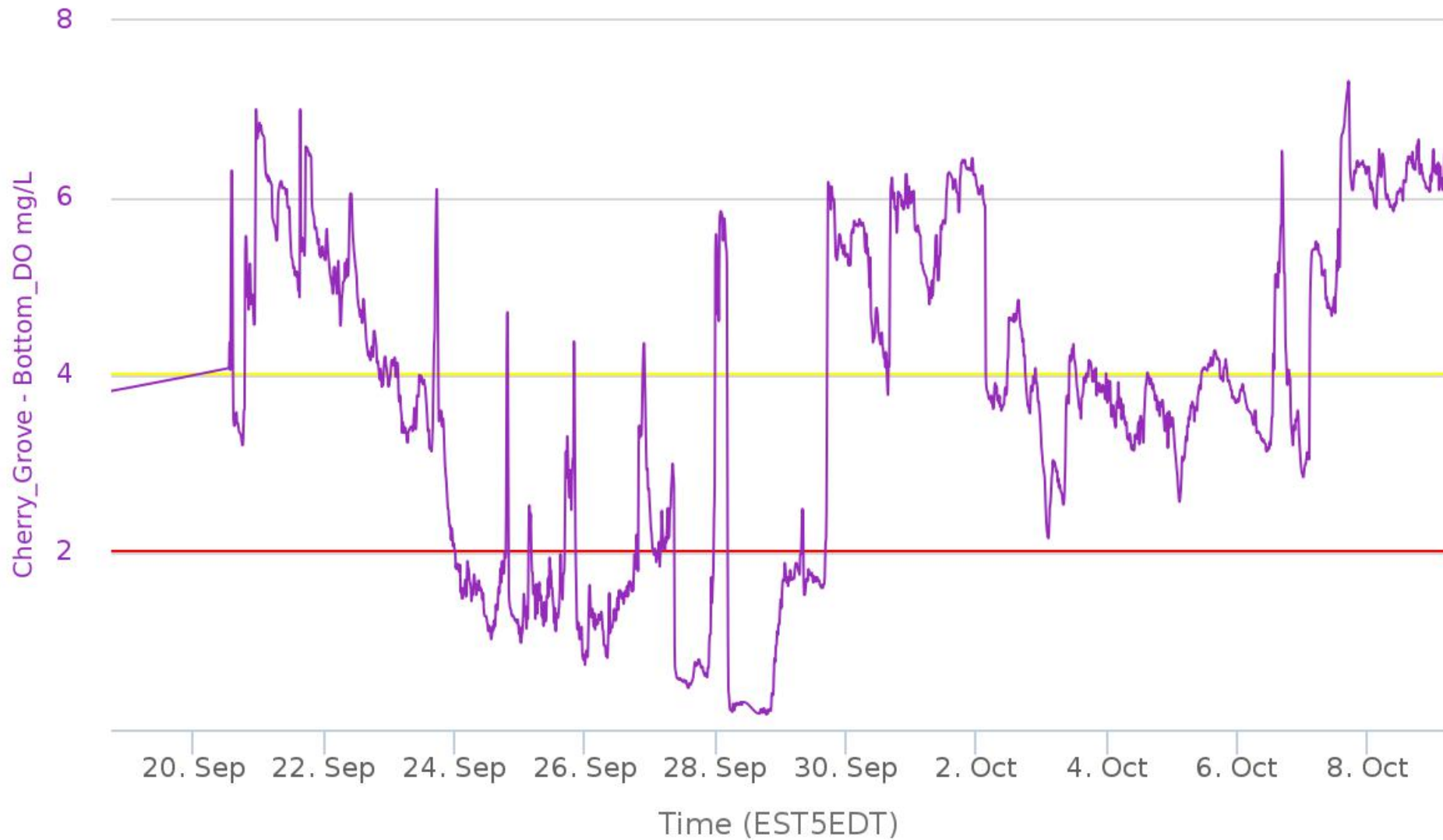


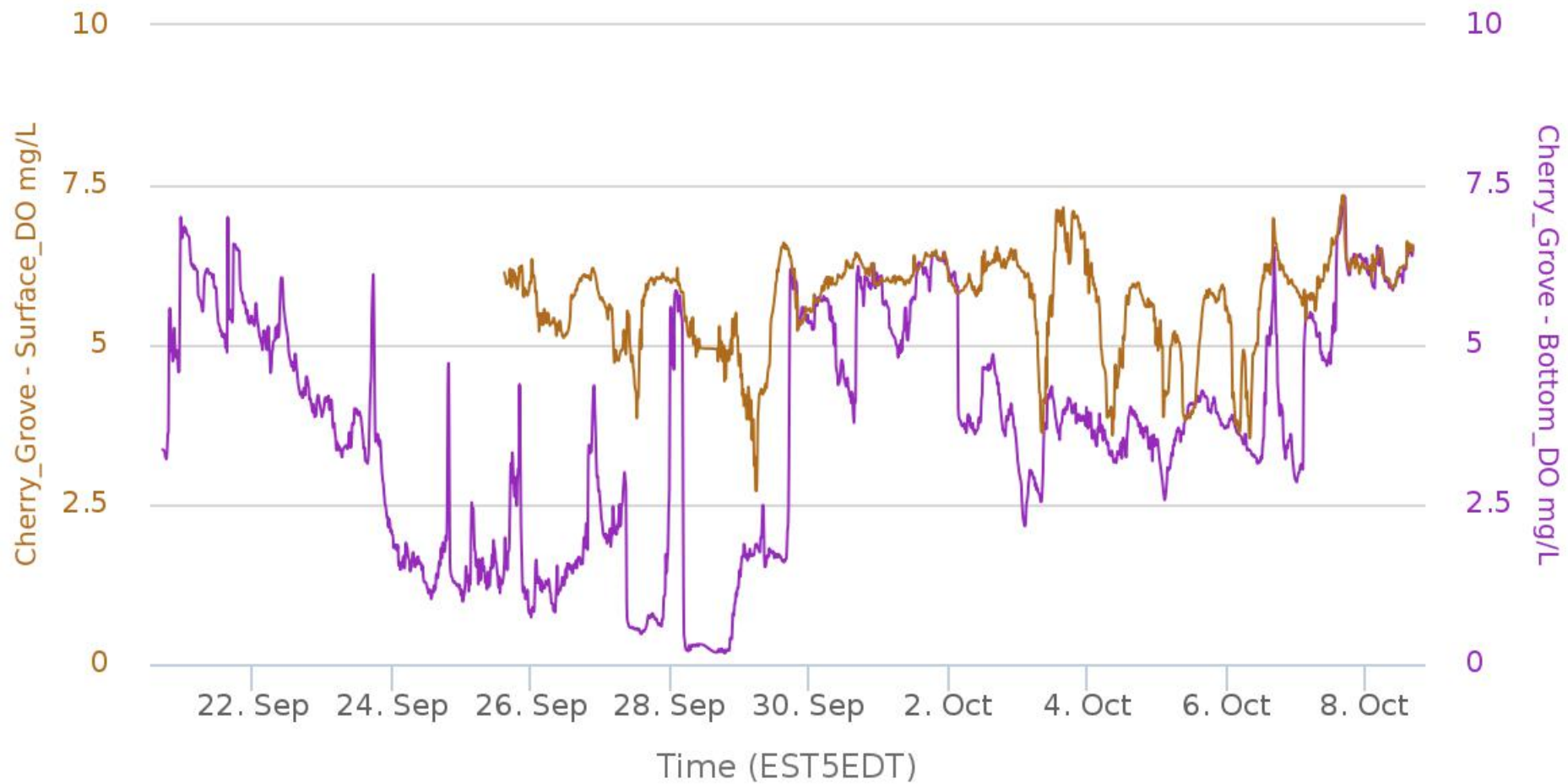
Southeast: Normal temps.

50% probability for wetter than normal due to El Niño forecast.

El Niño favored to form in the next couple of months and continue through the Northern Hemisphere winter 2018-19 (70-75% chance).

Cherry_Grove - Bottom_DO





— **Cherry_Grove - Bottom_DO** — **Cherry_Grove - Surface_DO**