

Water Quality 101: Interpreting recent data from Murrells Inlet, Surfside Beach and the Waccamaw River



Susan Libes

Volunteer Water Quality Monitoring Luncheon 2017

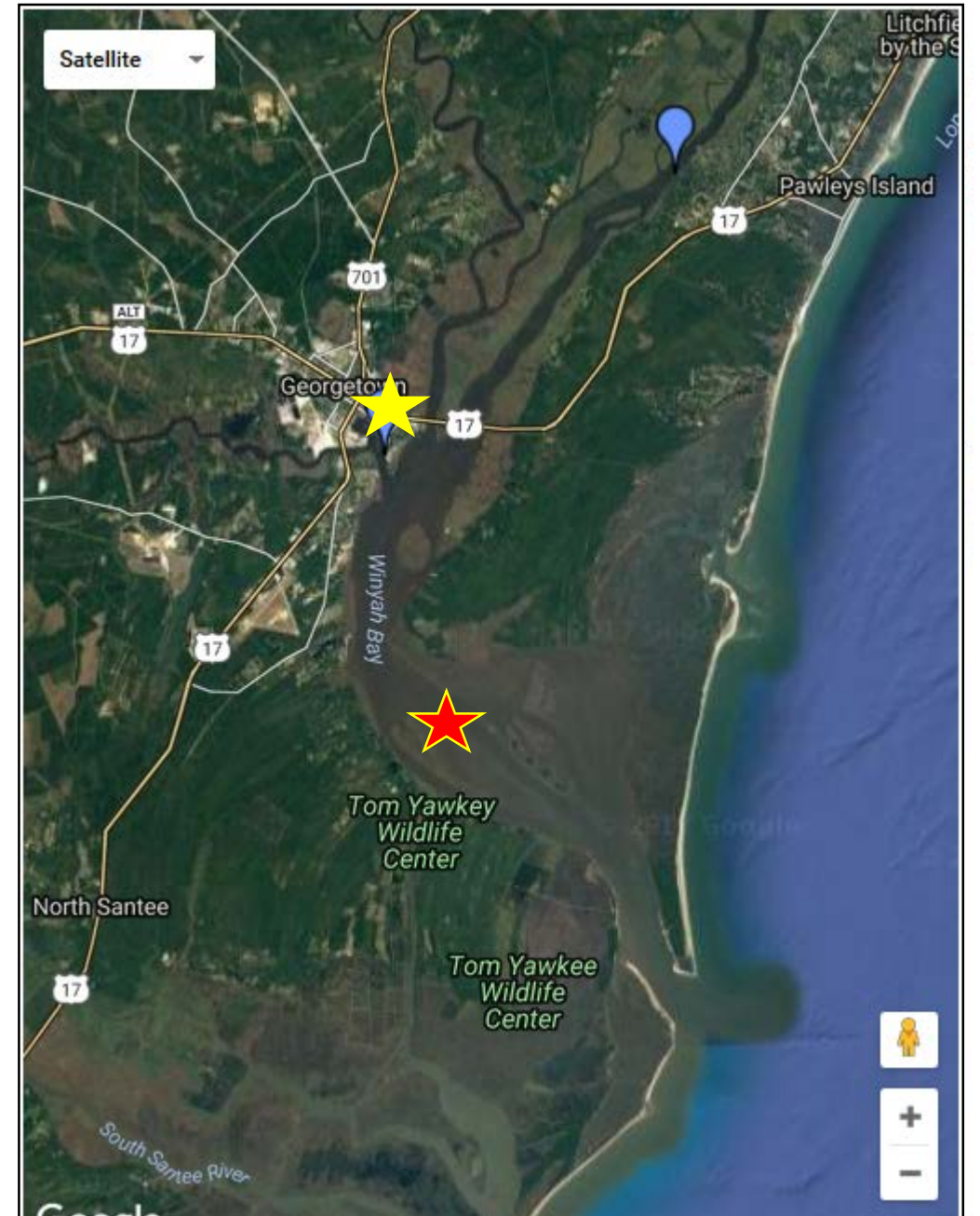
TOPICS

- Spring Bloom in Winyah Bay: DO and pH
- Sterritt Swamp: pH, conductivity and turbidity (increasing DO)
- Lake Dogwood: illicit discharges of turbidity. Hurricanes and conductivity.
- Marina Colony Pond: Nutrients

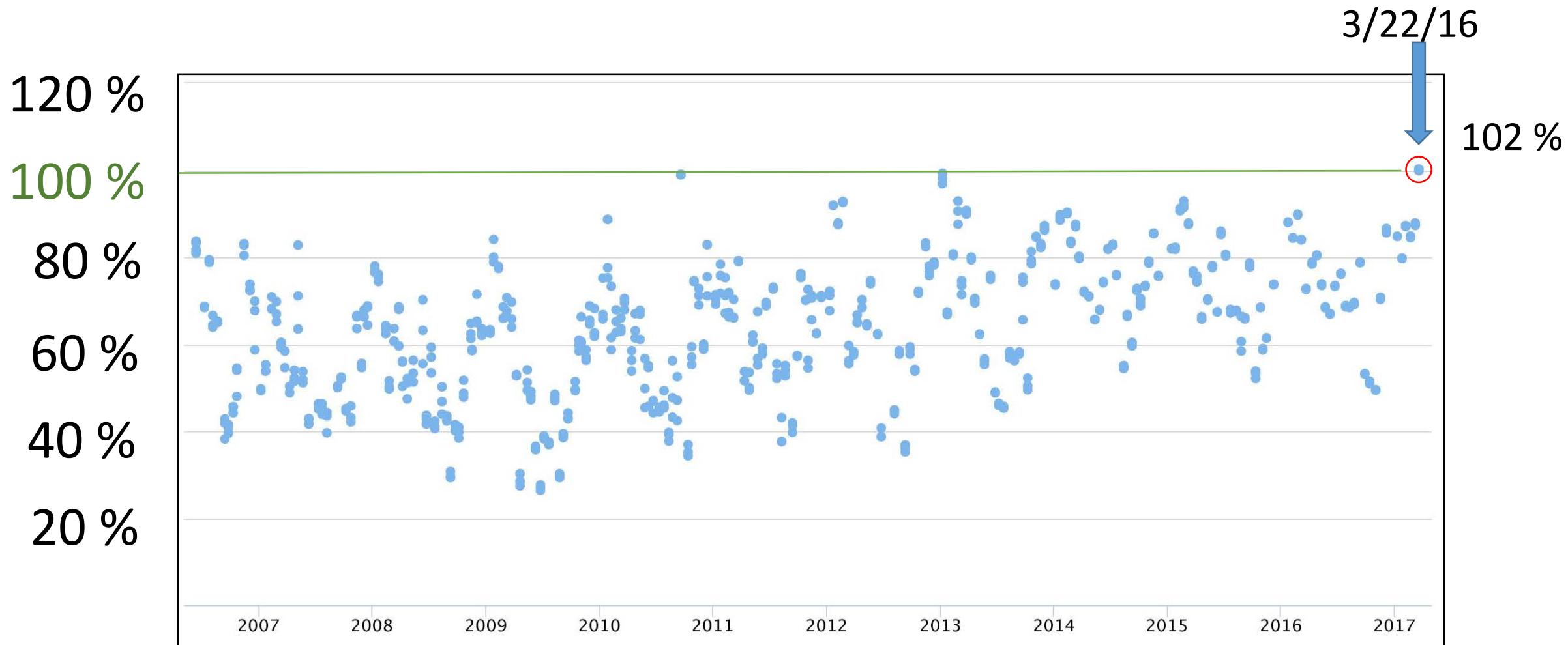


Case of high oxygen and high pH

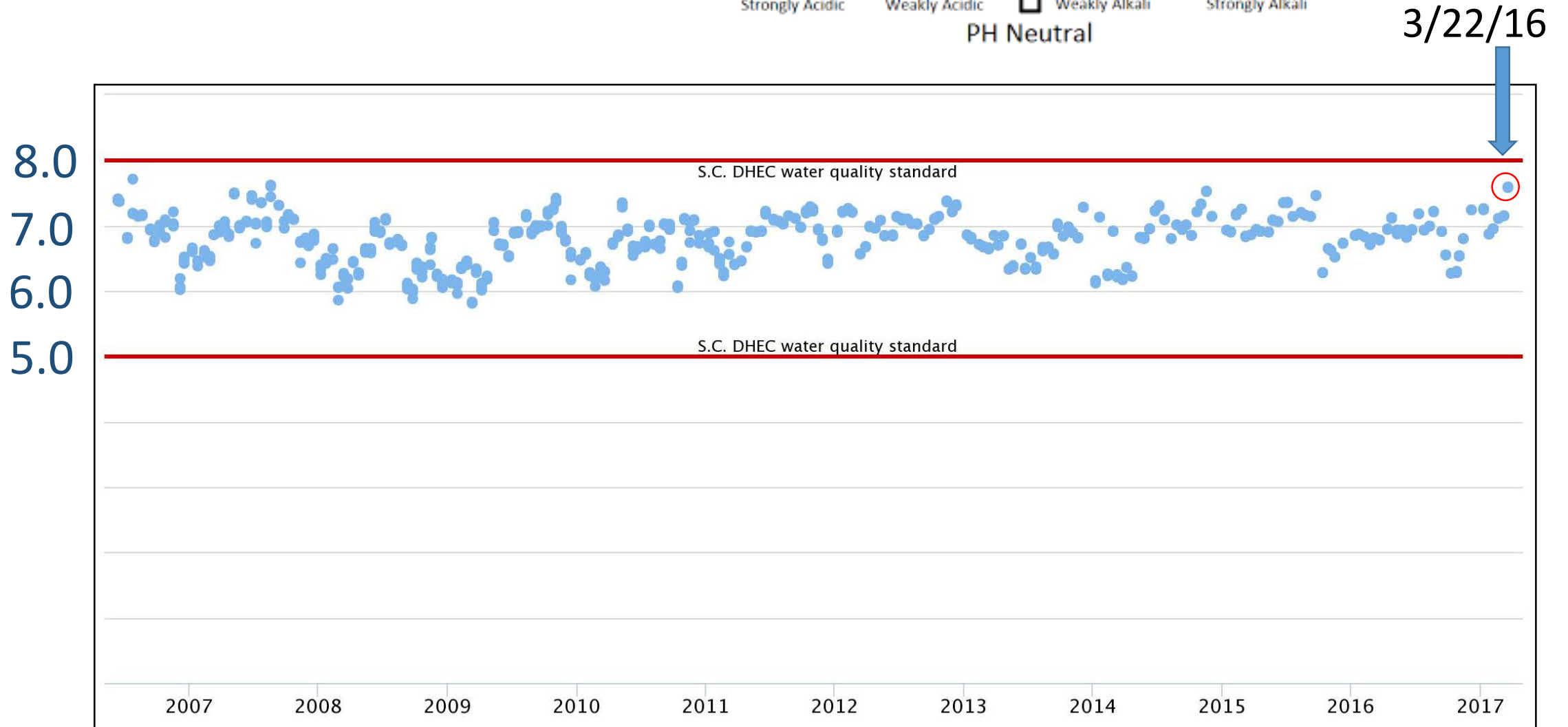
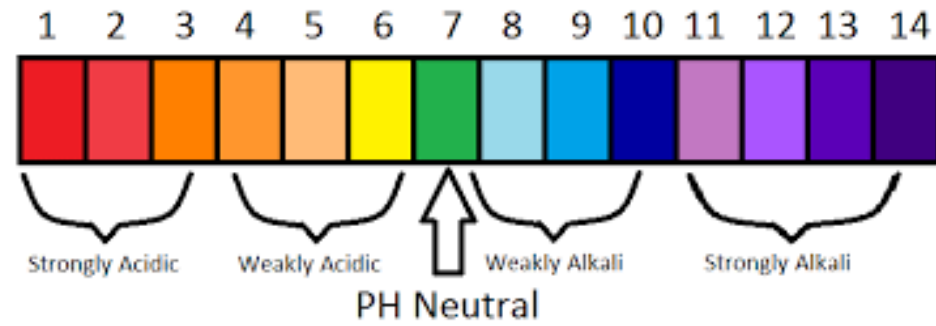
Sampit River samplers alerted us on 3/22/17 to exceptionally high oxygen levels.



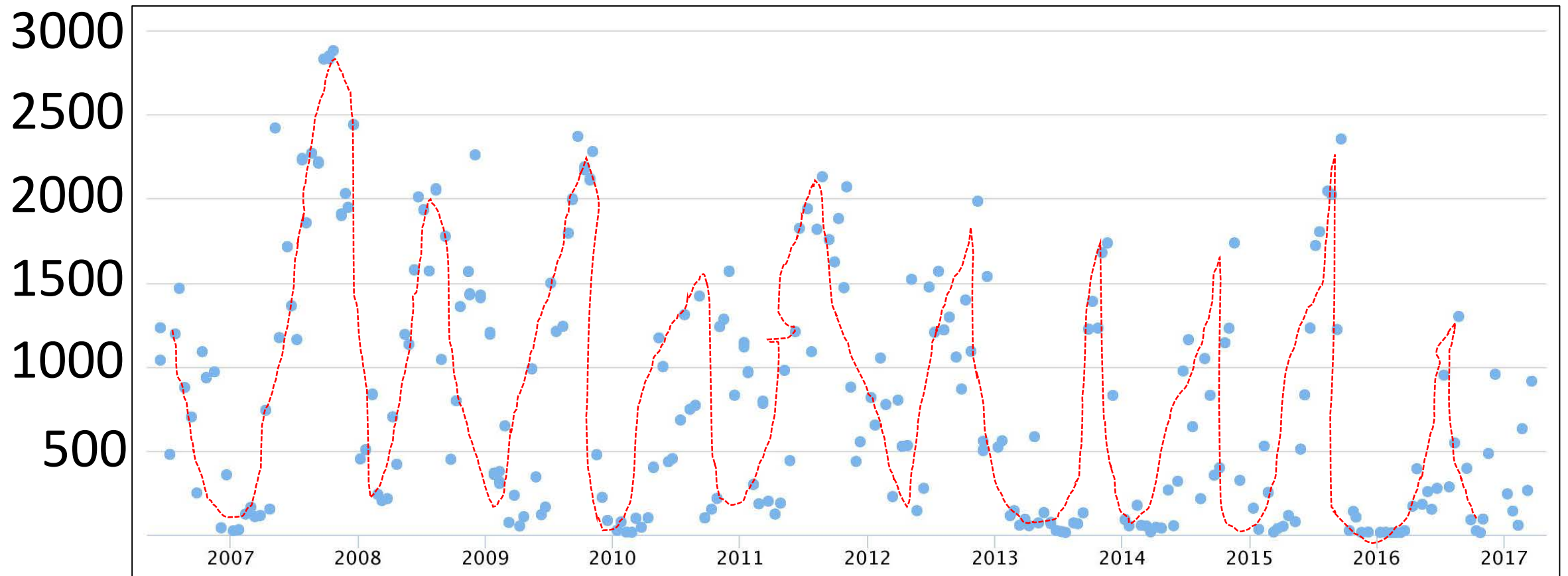
Sampit River Oxygen Saturation



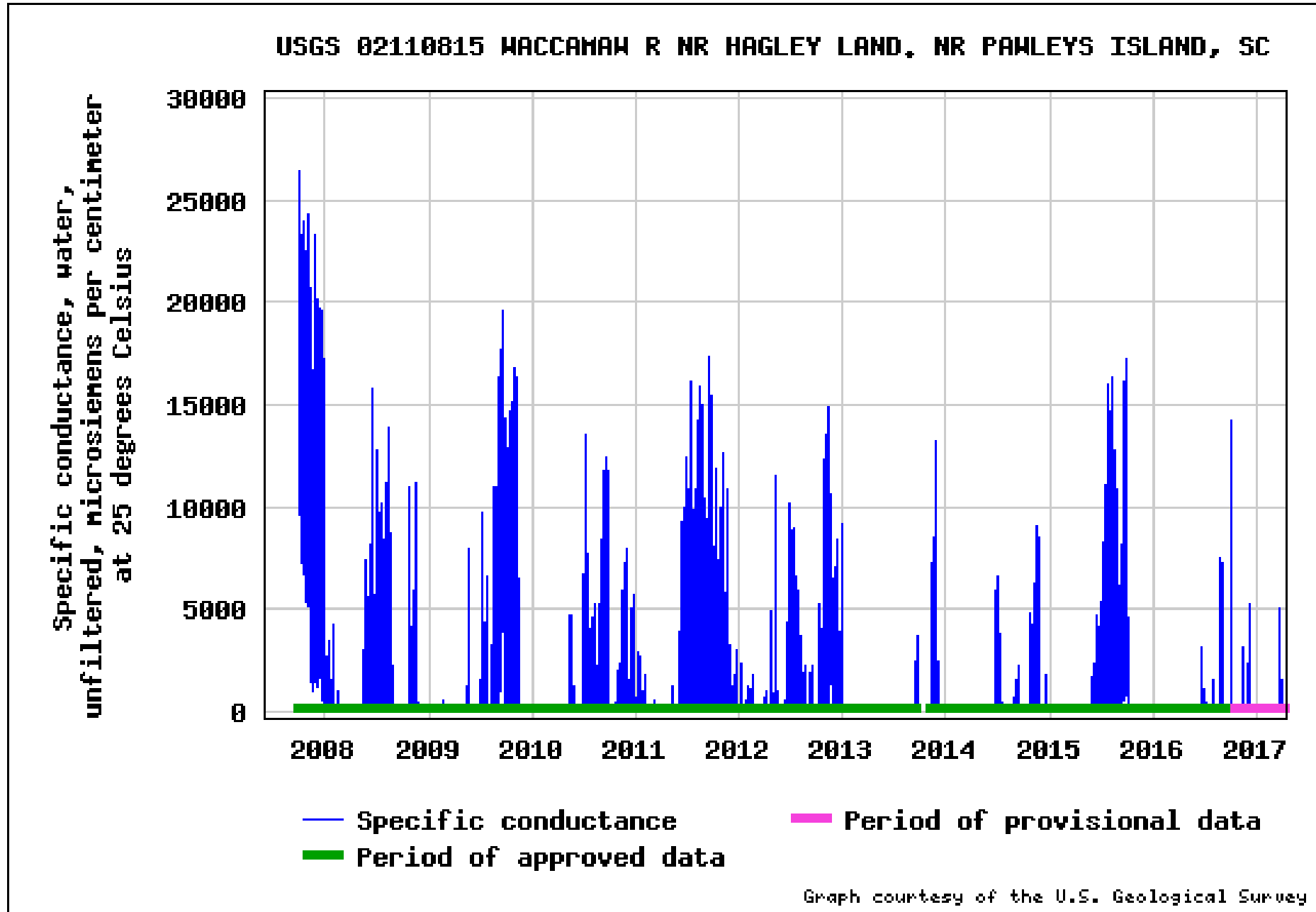
Sampit River pH



Sampit River Conductivity ($\mu\text{S}/\text{cm}$) (aka total dissolved solids in milligrams per liter)



USGS conductivity data upstream at Hagley Landing



Downstream in Winyah Bay



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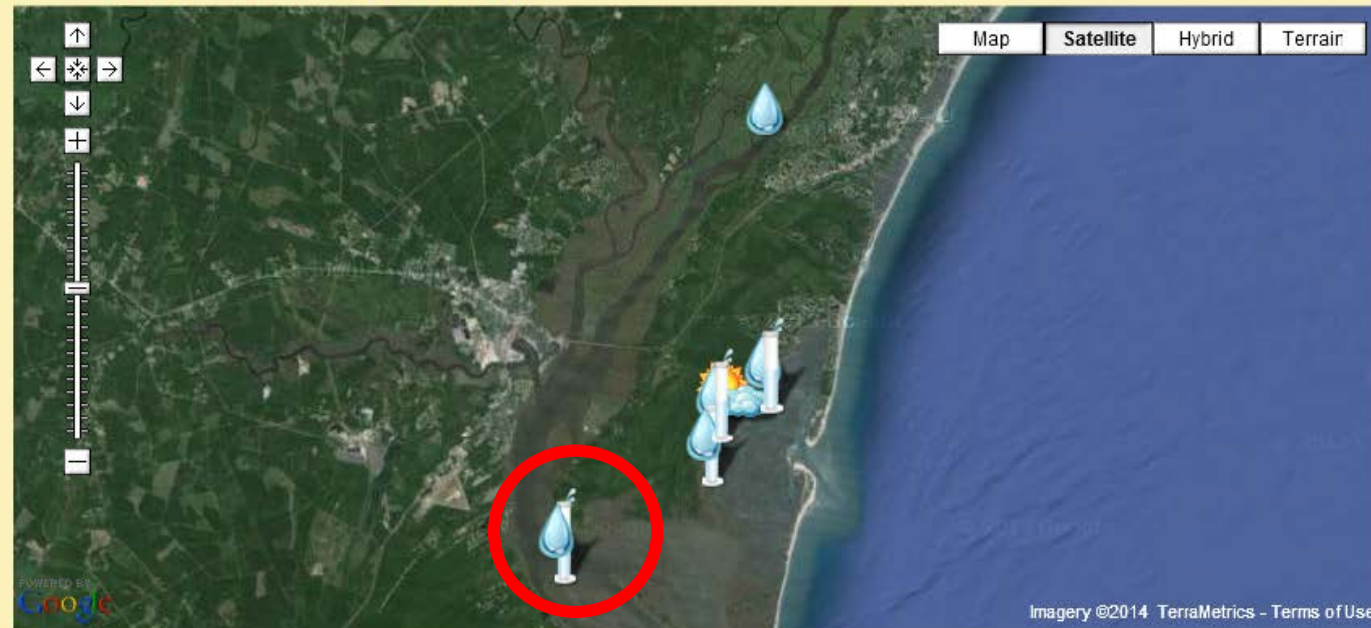
Please select a sampling station from North Inlet Winyah Bay, SC:

Filter sampling stations by data type:

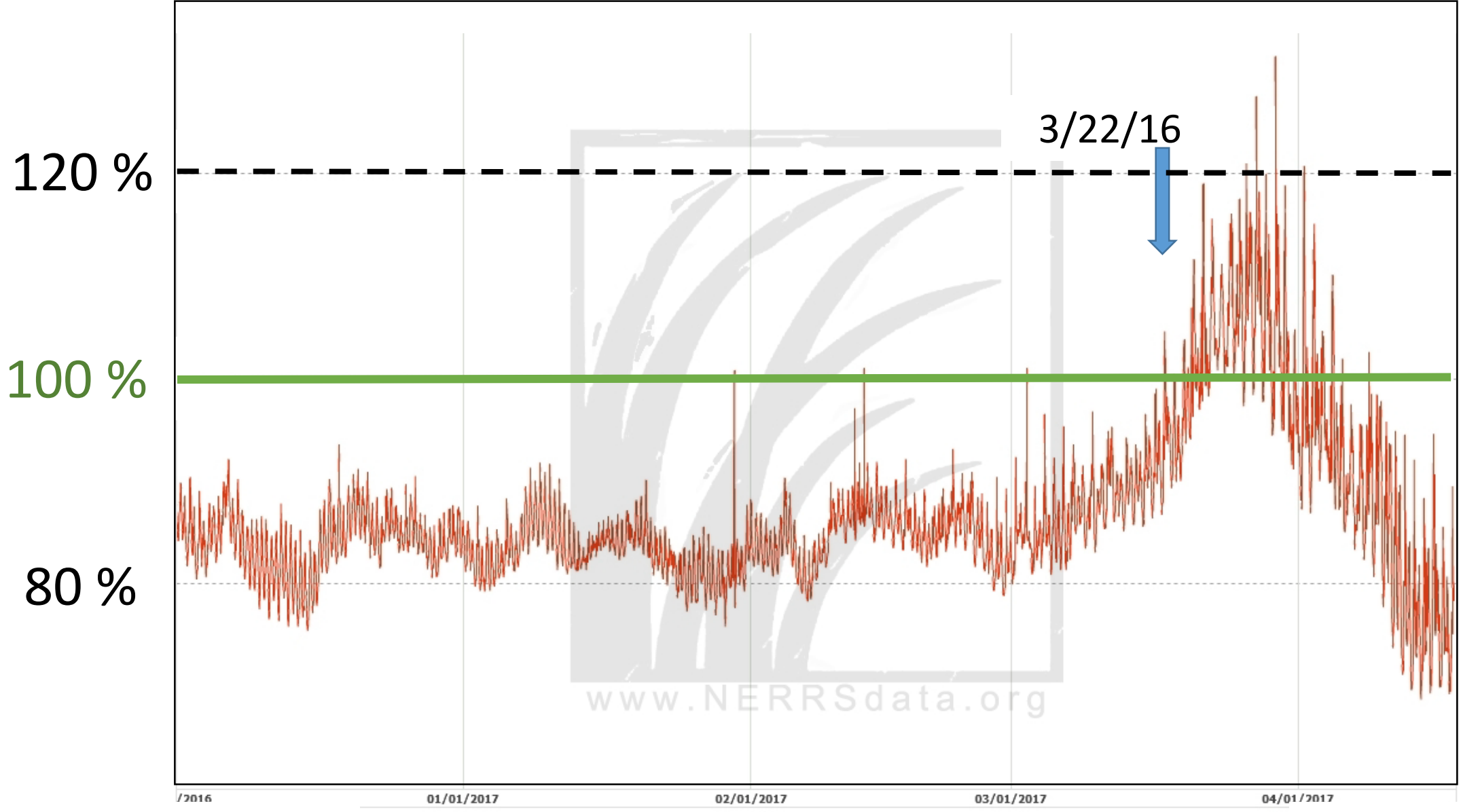
All Stations

Station Name	SWMP	Real Time	Status	Data Type	Station Code
Oyster Landing	P	Yes	Active	meteorological	OL
Winyah Bay Bottom	S	Yes	Active	water quality	WB
Debidue Creek	P	Yes	Active	water quality	DC
Winyah Bay Surface	S	Yes	Active	water quality	WS

Your Station Selection: Choose above



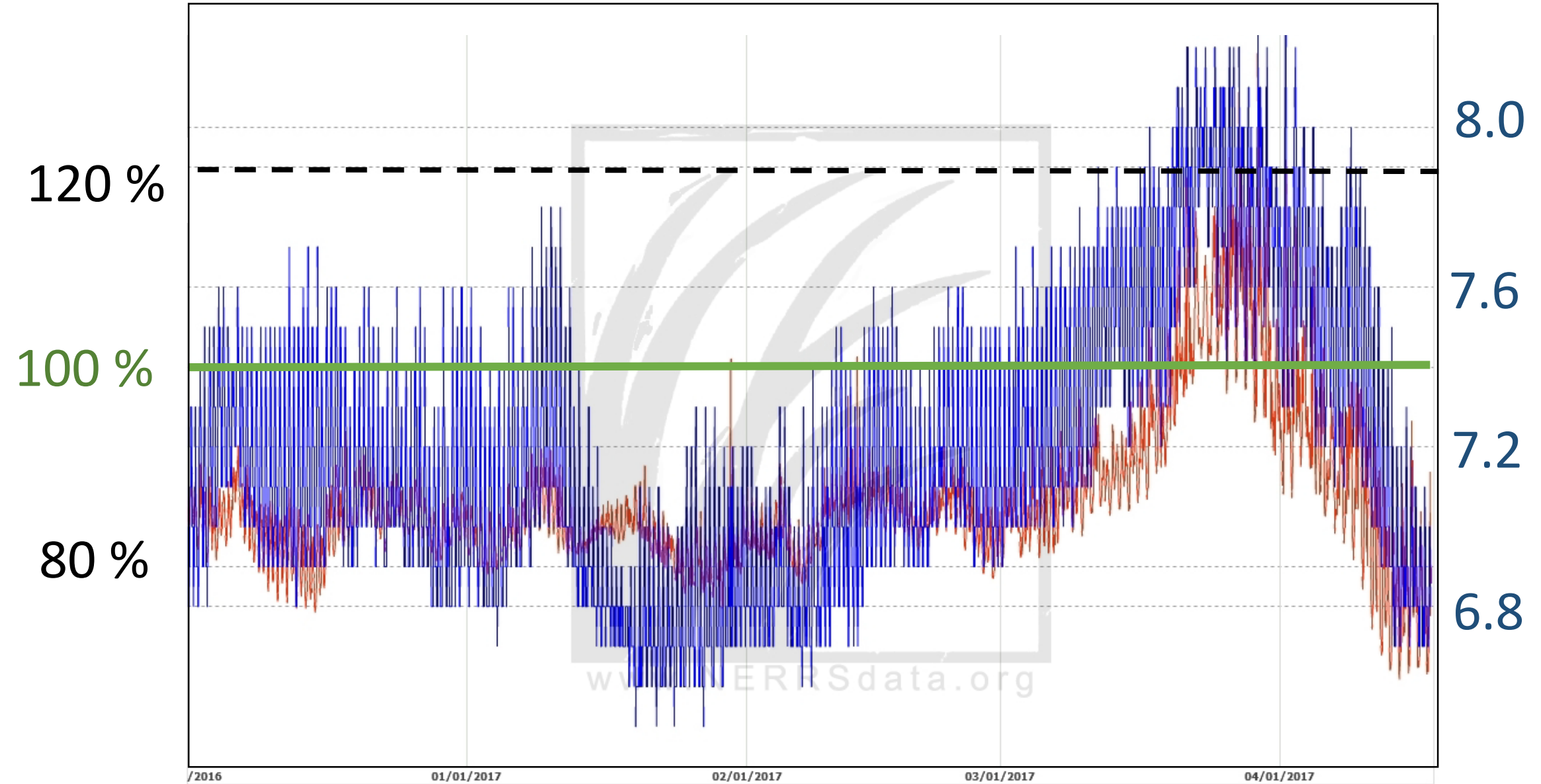
Winyah Bay Surface Oxygen Saturation



Dec 2016

April 2017

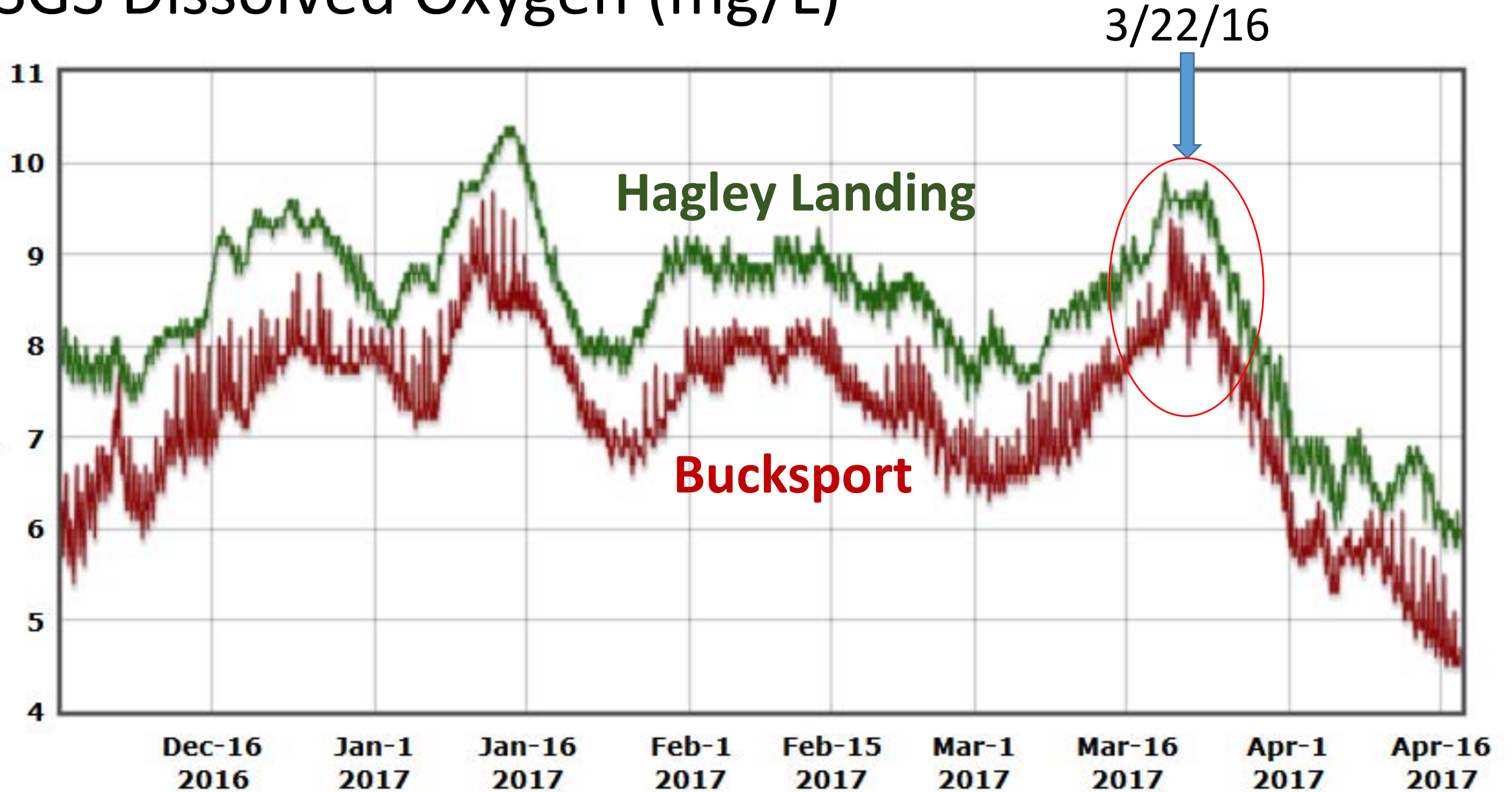
Winyah Bay Surface Oxygen Saturation & pH



Dec 2016

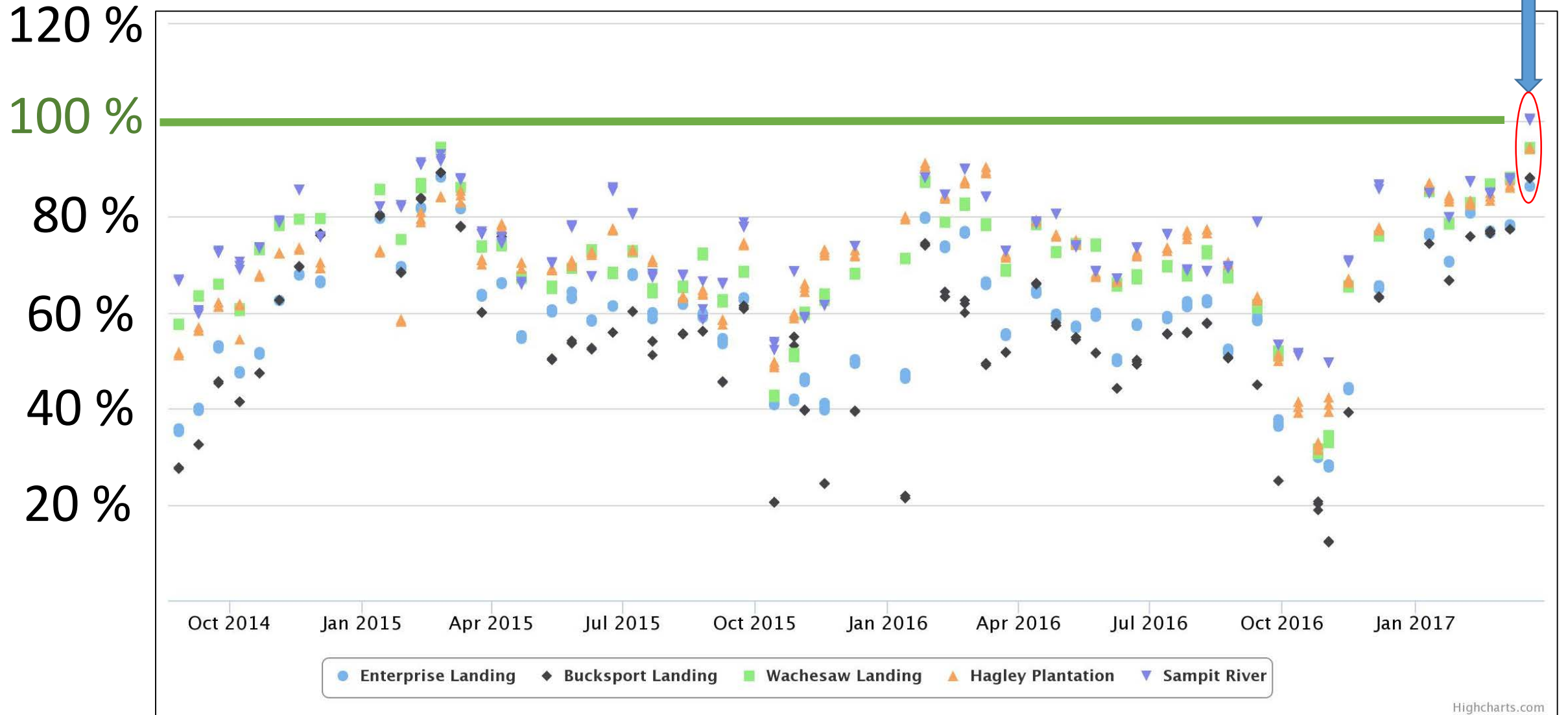
April 2017

USGS Dissolved Oxygen (mg/L)



Oxygen saturation at Enterprise, Bucksport, Wachesaw, Hagley and Sampit

3/22/16



Why?

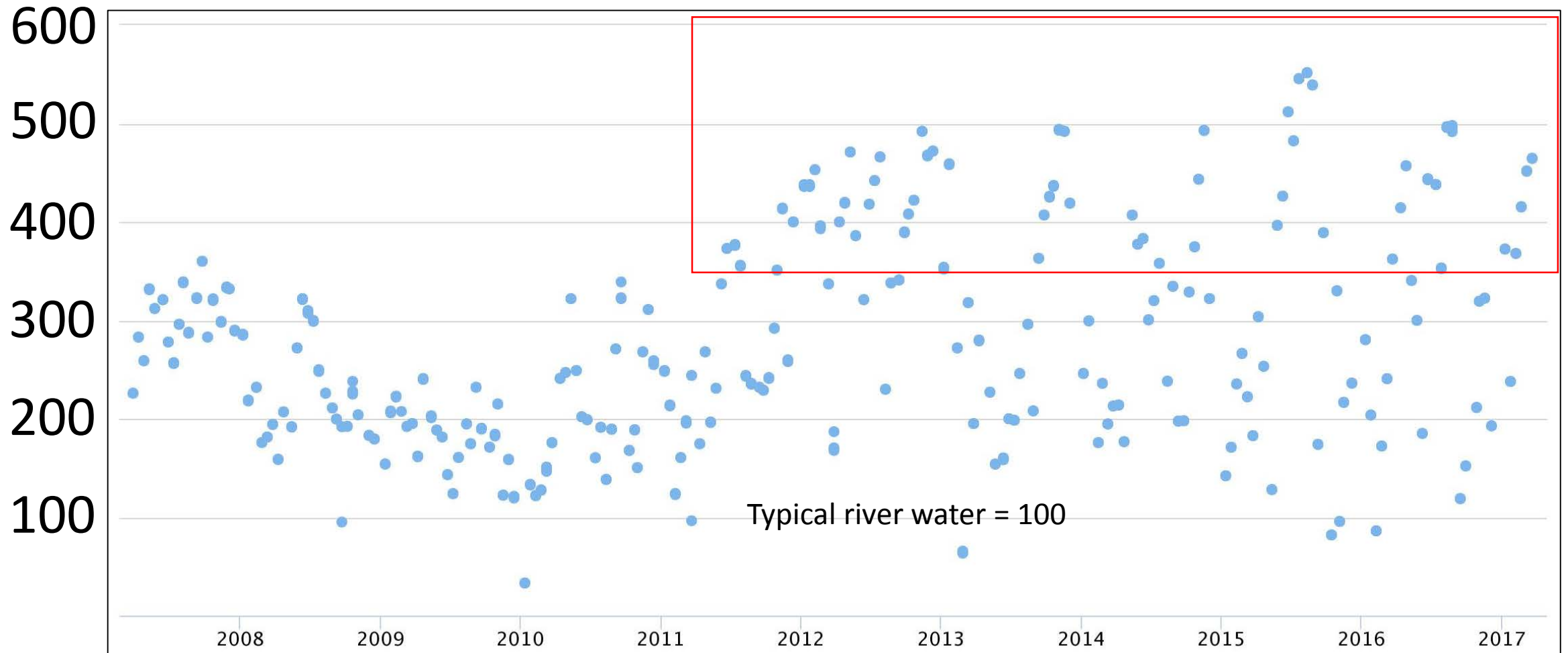
- **pH:** When algae photosynthesize, they remove acid (CO_2) so the pH increases
- **Oxygen:** Algae produce oxygen, so the oxygen saturation increases. $>100\%$ usually means you have an algal “bloom”
- **Conductivity:** This should have no impact on conductivity

Case of high conductivity and high pH

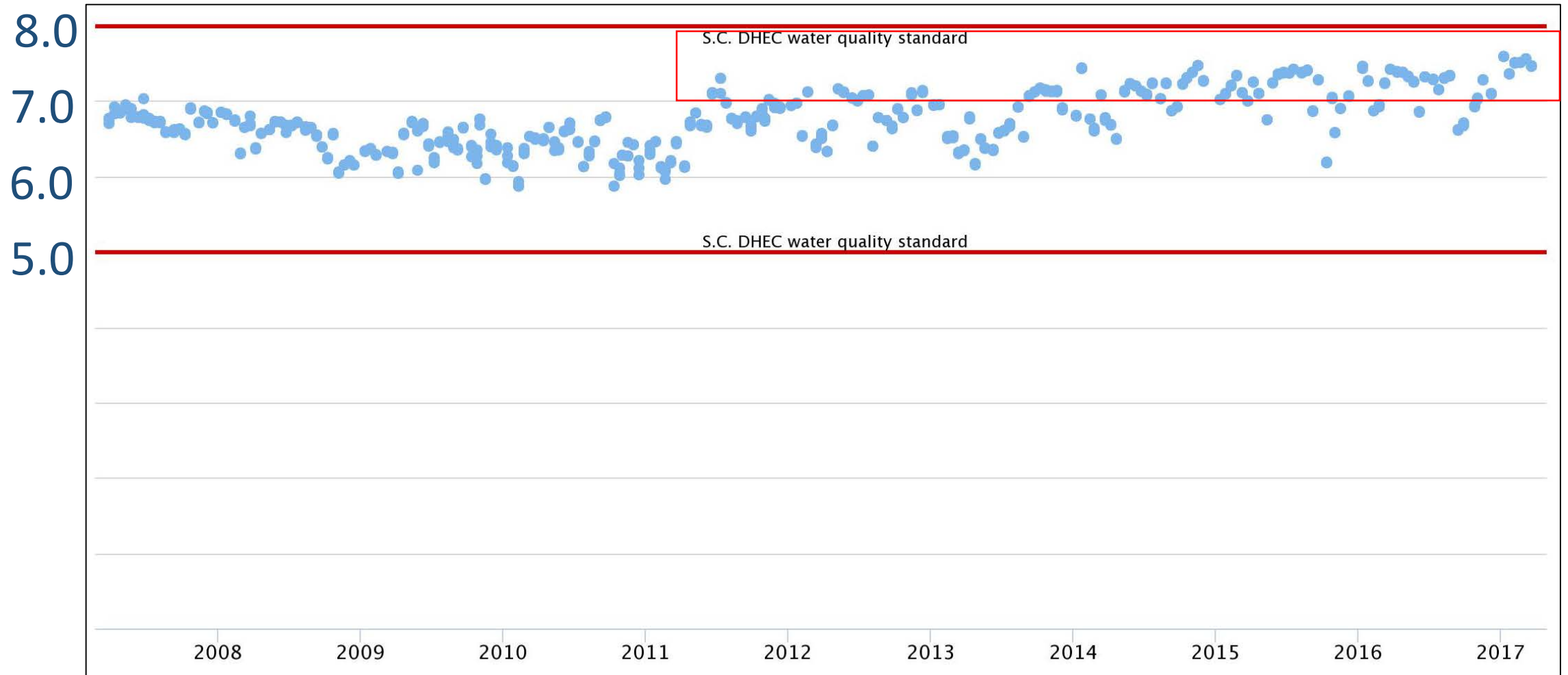
- Sterritt Swamp – tributary to the Waccamaw River
- **Conductivity** is a measure of total dissolved solids
 - It is a really good tracer of water source
 - Waters with high levels of dissolved solids: Seawater, Groundwater, Polluted runoff
 - Waters with low levels of dissolved solids: Rain water, Unpolluted runoff
- In freshwaters bicarbonate is a major part of the dissolved solids. This increases the **pH** of water



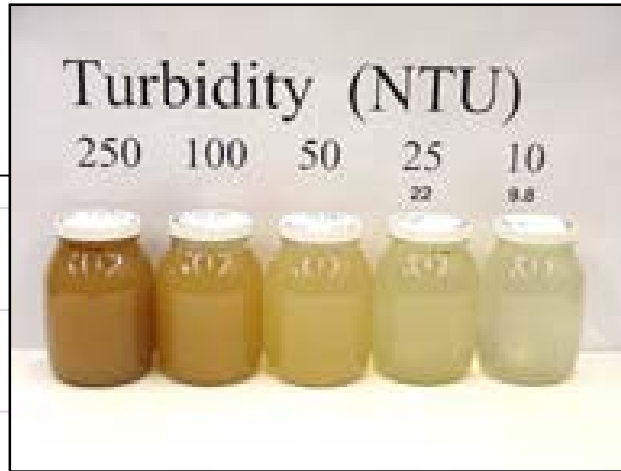
Sporadically high conductivity at Sterritt Swamp



Rising pH at Sterritt Swamp

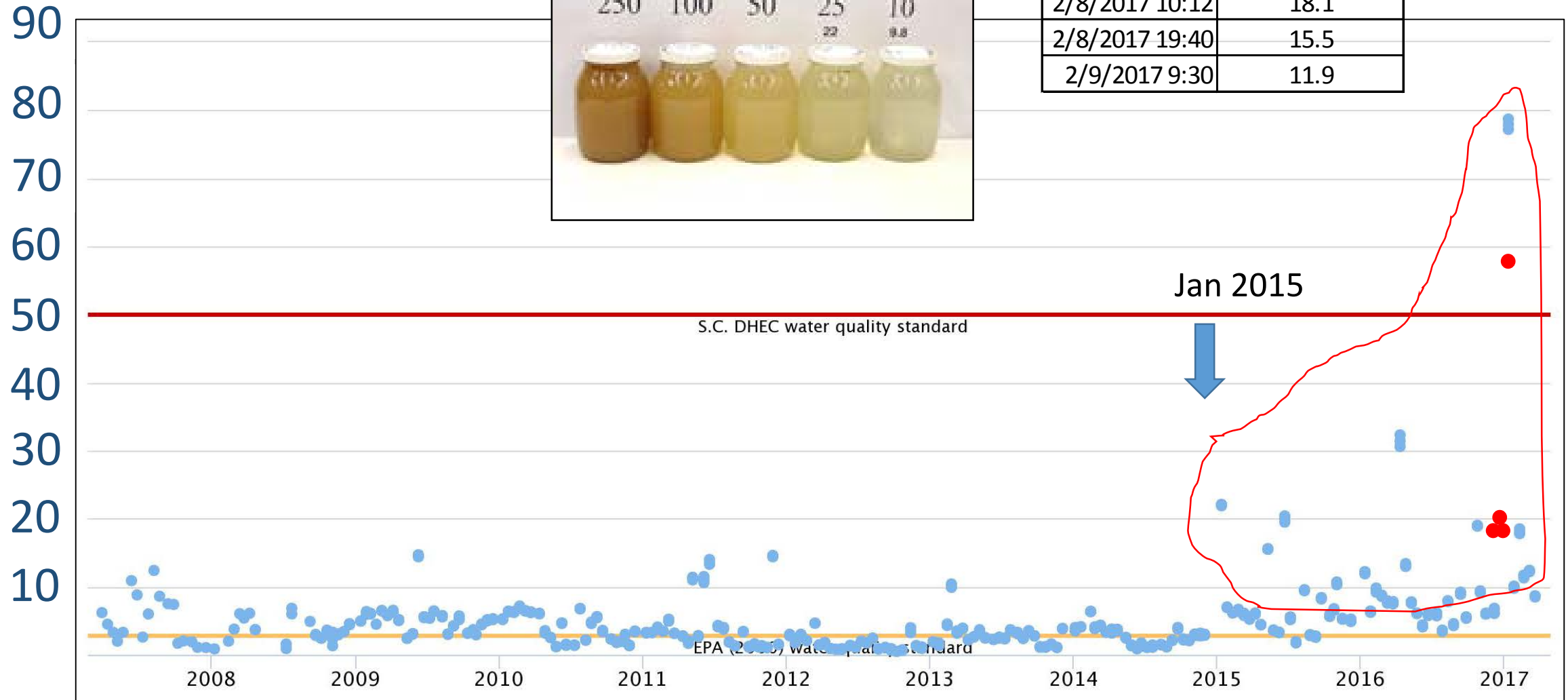


Sporadically high Turbidity (NTU) at Sterritt Swamp

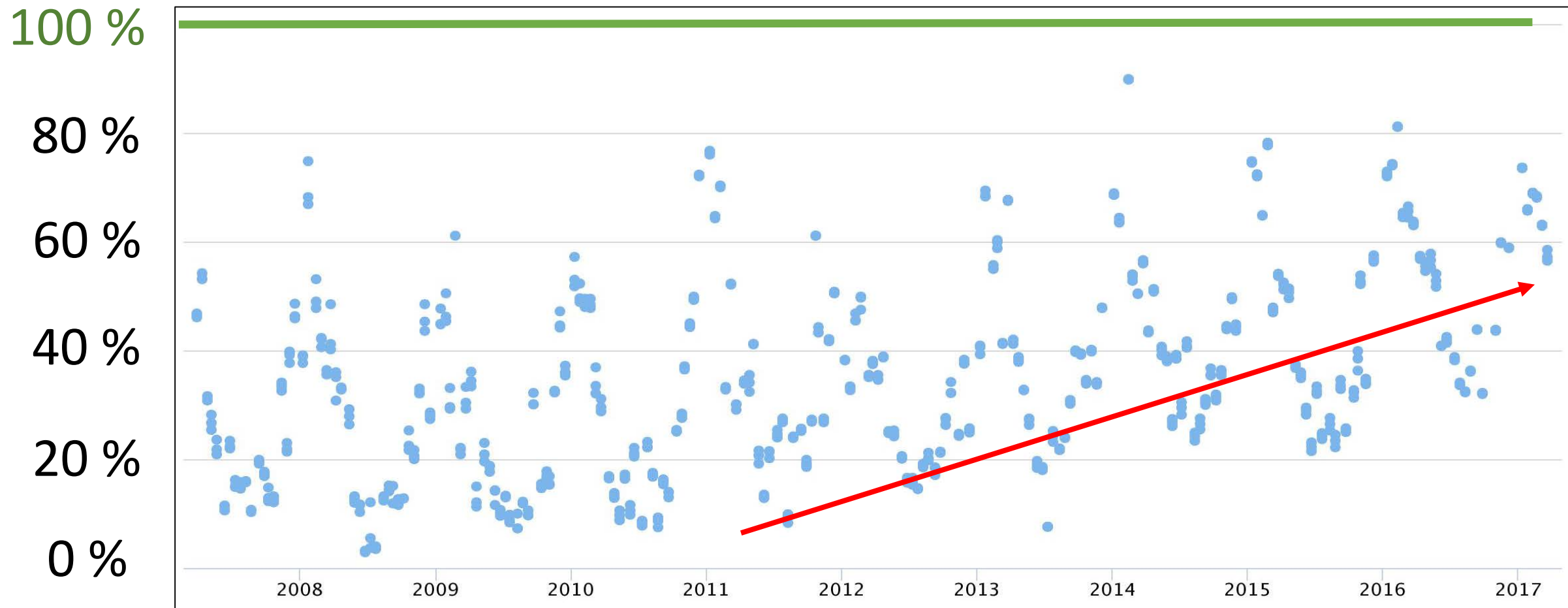


2/3/2017 13:47	14.9
2/4/2017 15:00	164
2/4/2017 18:00	56.7
2/5/2017 12:50	15.4
2/8/2017 10:12	18.1
2/8/2017 19:40	15.5
2/9/2017 9:30	11.9

↑
● 164



Oxygen saturation at Sterritt Swamp



Another case of suddenly high turbidity

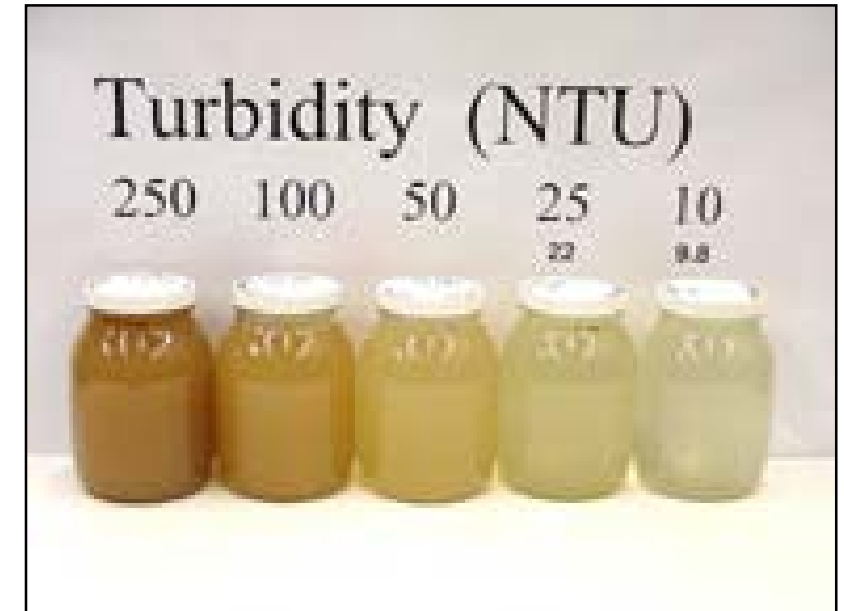
Lake Dogwood in Surfside

Turbidity

Measure of suspended solids

Suspended solids are usually eroded soil particles

SC DHEC has set water quality criteria of 25.0 NTU for shellfish waters (Class SFH) and 50.0 NTU for Class FW waters.



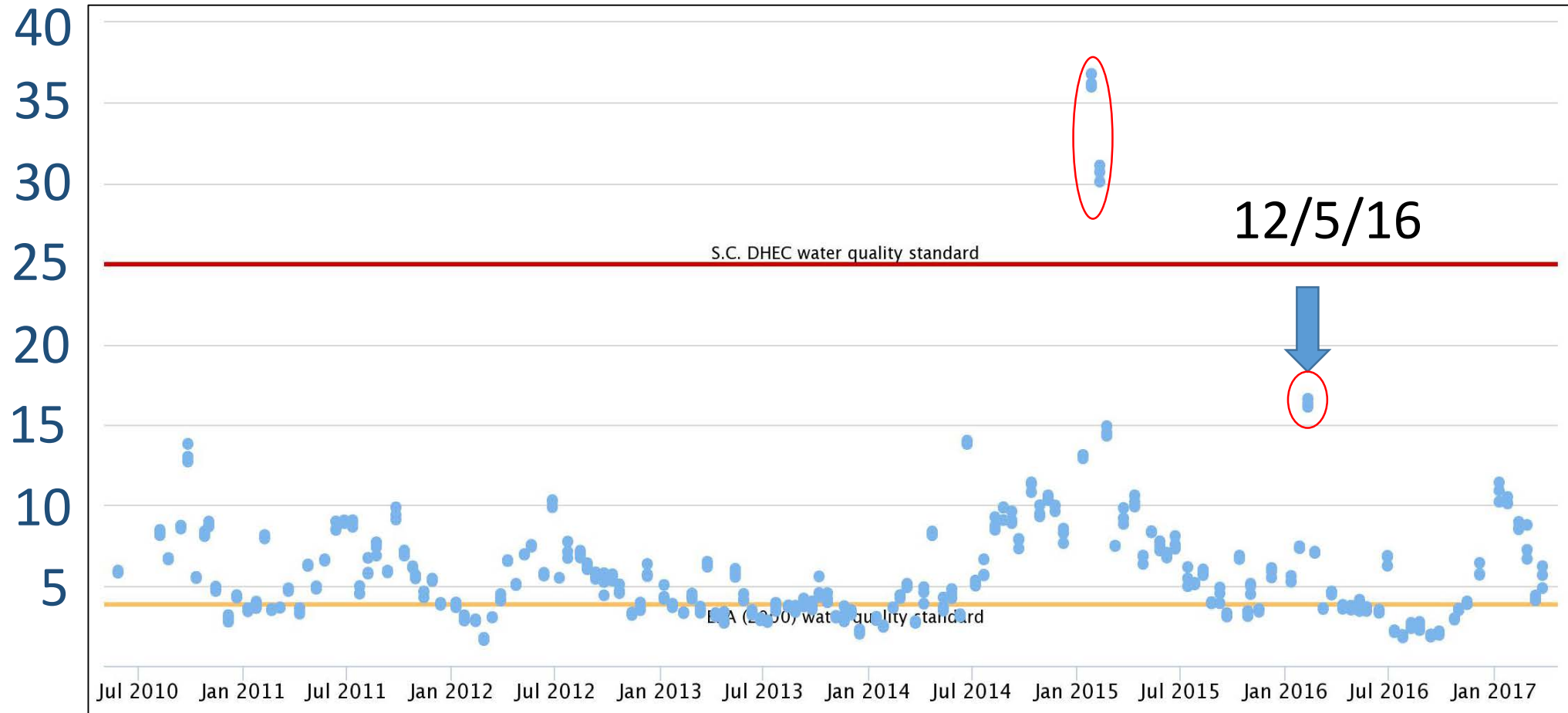


**Dogwood
Swash
Watershed**



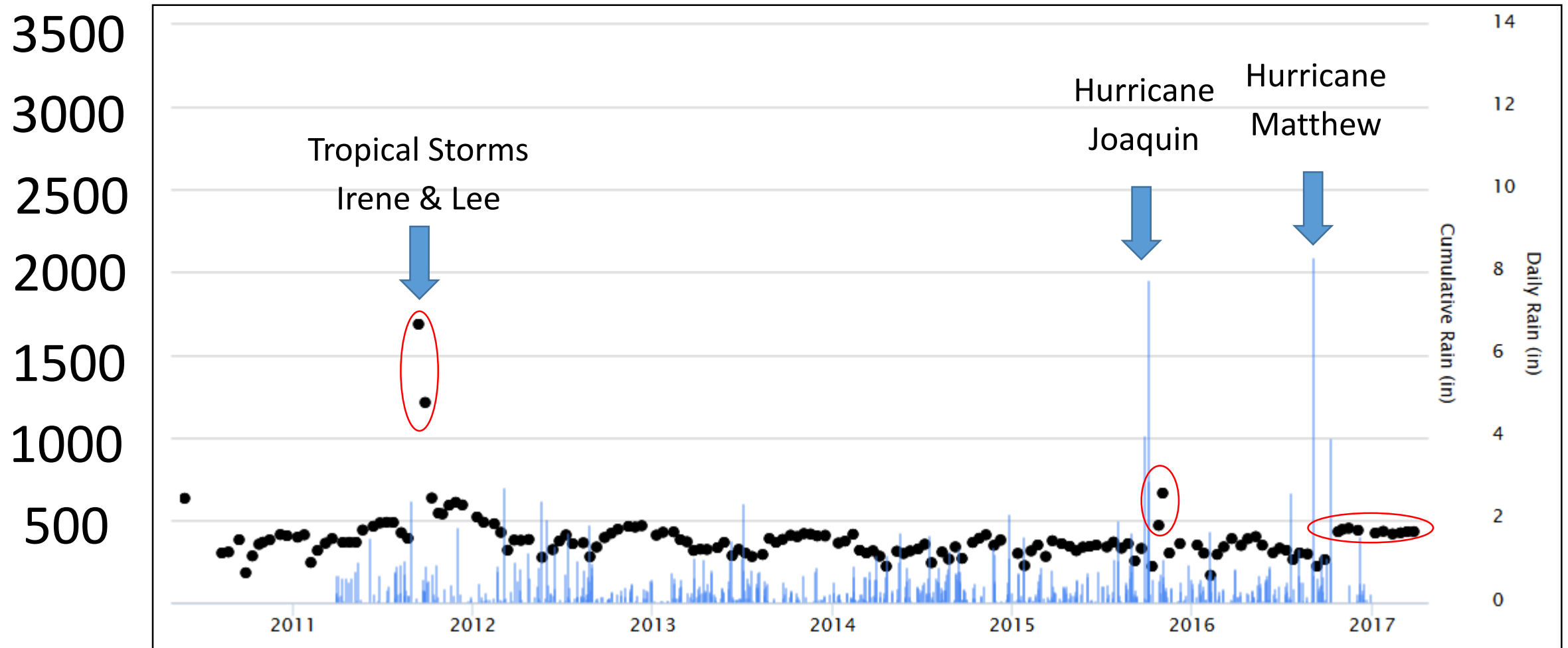
Turbidity in Lake Dogwood

December 2016: Construction of new phase at Mallard Landing. Sediment pond had to be drained to enable its expansion. This suspended fine grain sediments that discharged offsite. Bacteria adhere to particles, so more were transported with the sediment and E. coli levels also spiked.



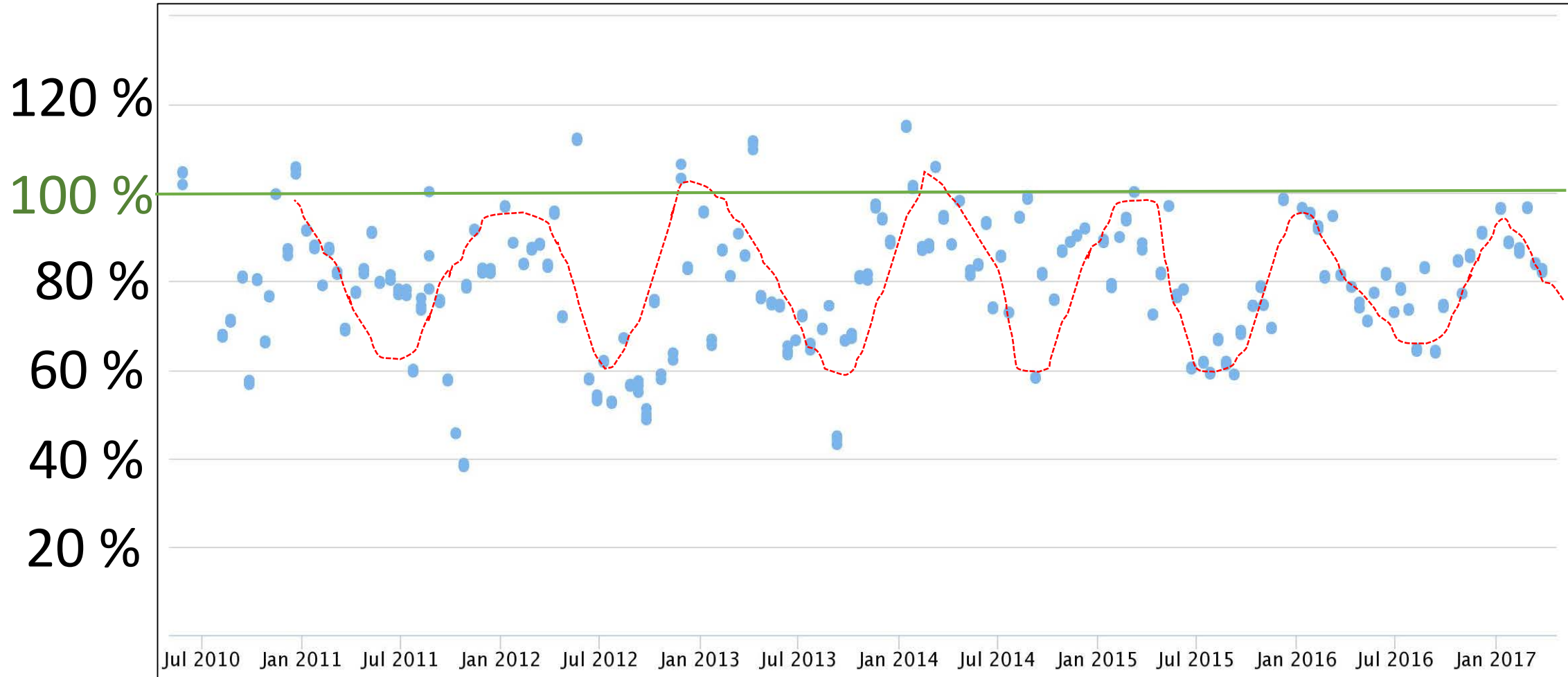
Conductivity in Lake Dogwood

Rises in conductivity after hurricanes from saltwater getting up into Lake Dogwood. Hurricane Matthew drove saltwater over North Dogwood Drive.



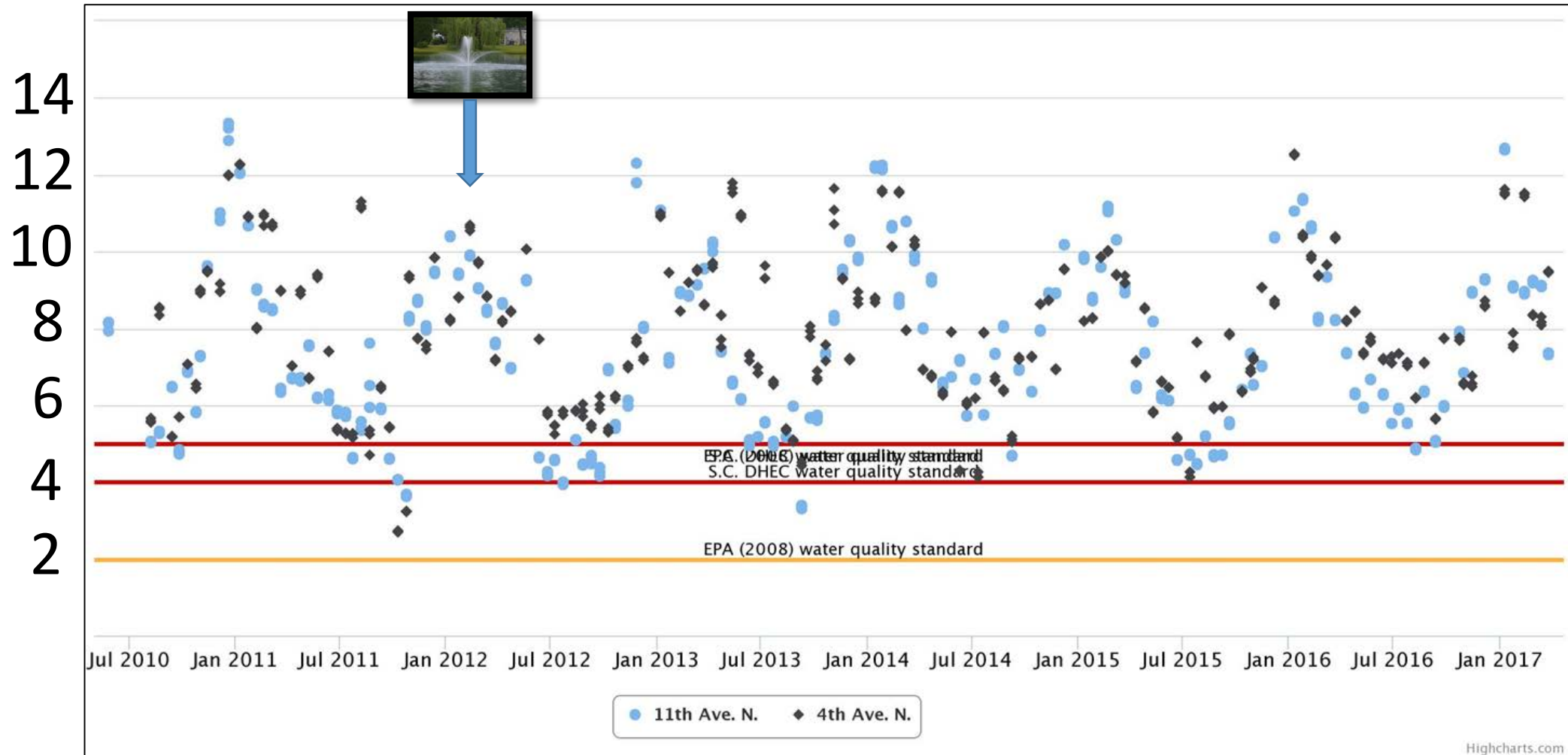
Oxygen saturation at Lake Dogwood

Levels vary seasonally, even when corrected for temperature solubility effects. Suggests diminished aerobic microbial decomposition of detrital organic matter when temperatures are low. Note increasing summer levels.



Oxygen levels at Lake Dogwood and Myrtle Lake

Fewer contraventions of oxygen water quality criteria due to increasing levels of oxygen during warm weather.



Sudden increase in nutrients

Marina Colony Pond in Murrells Inlet

We measure nitrogen as nitrate, nitrite and ammonia

We'd like to measure phosphorus



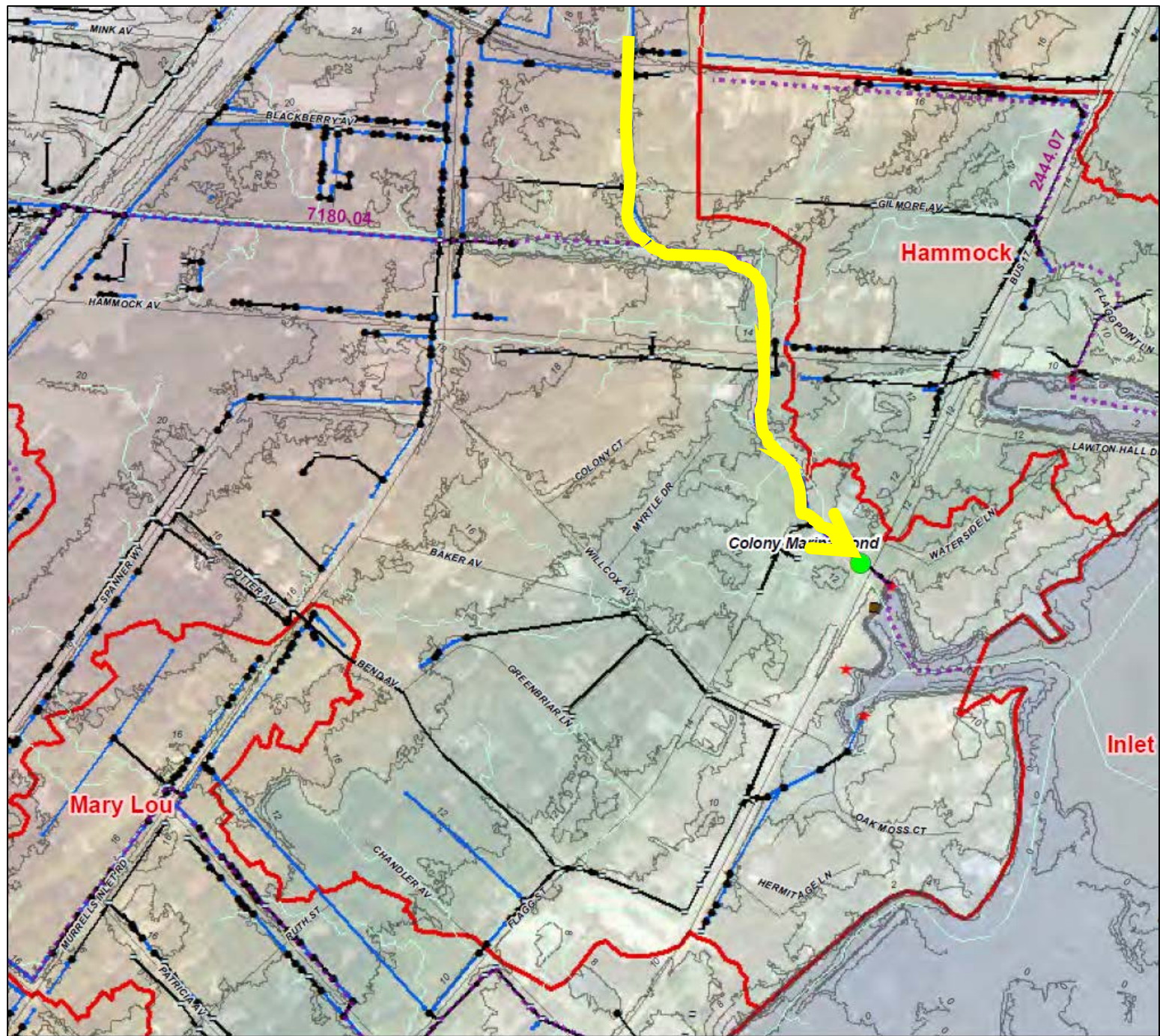
\$1300



\$49

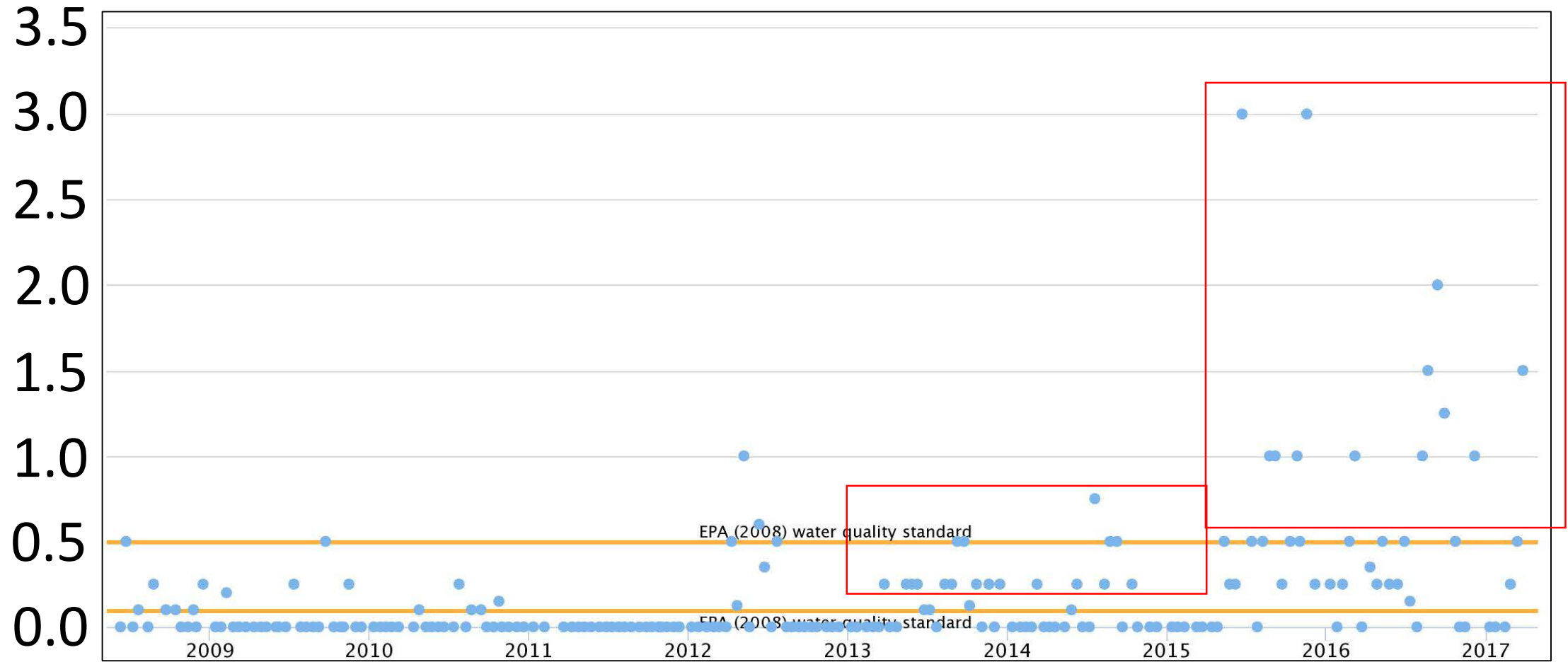
Marina Colony Pond in Murrells Inlet





Nitrate + Nitrite + Ammonia at Marina Colony Pond

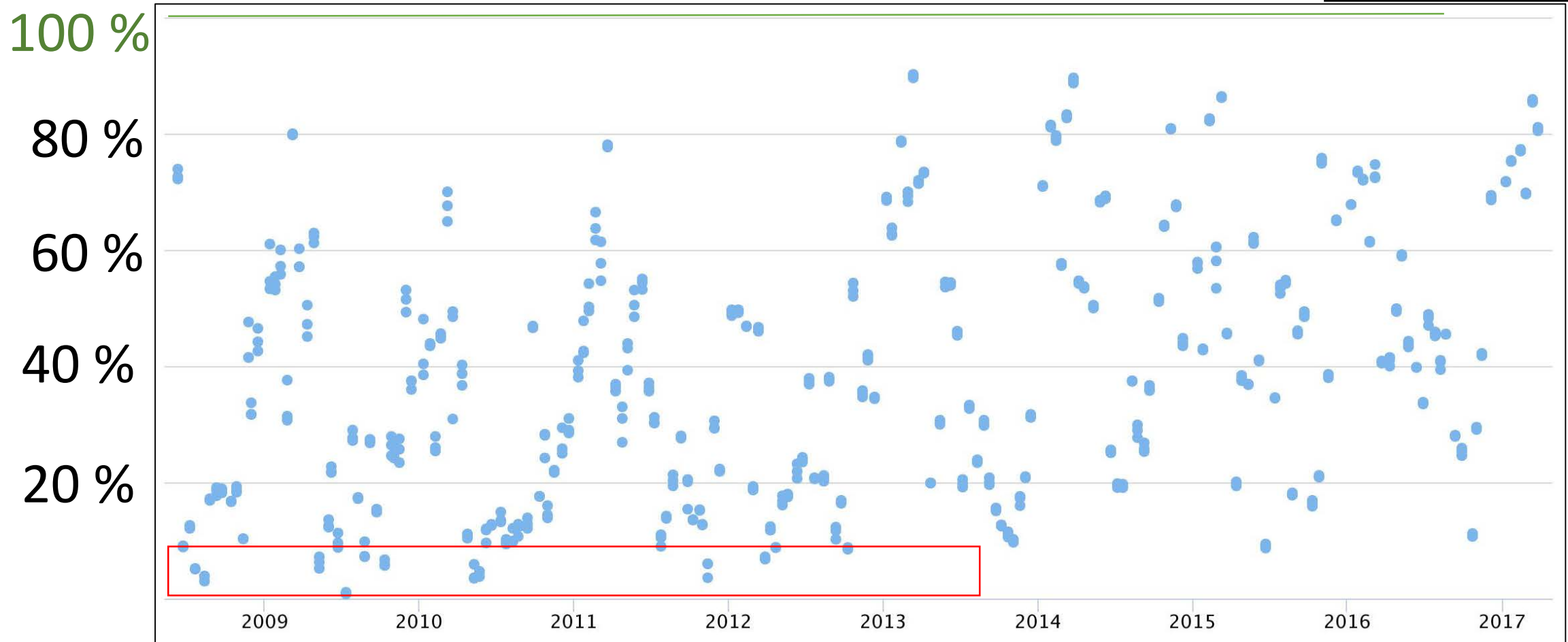
Increase in detections starting in 2013. Increase in levels starting in 2015



Oxygen Saturation at Marina Colony Pond



Improving summer time levels starting in 2013.



Increasing oxygen saturation

- Surfside
- Murrells Inlet
- Sterritt Swamp