



Water River Trends in Nutrient and Chlorophyll Data

Waccamaw River Volunteer Monitoring
Annual Data Conference

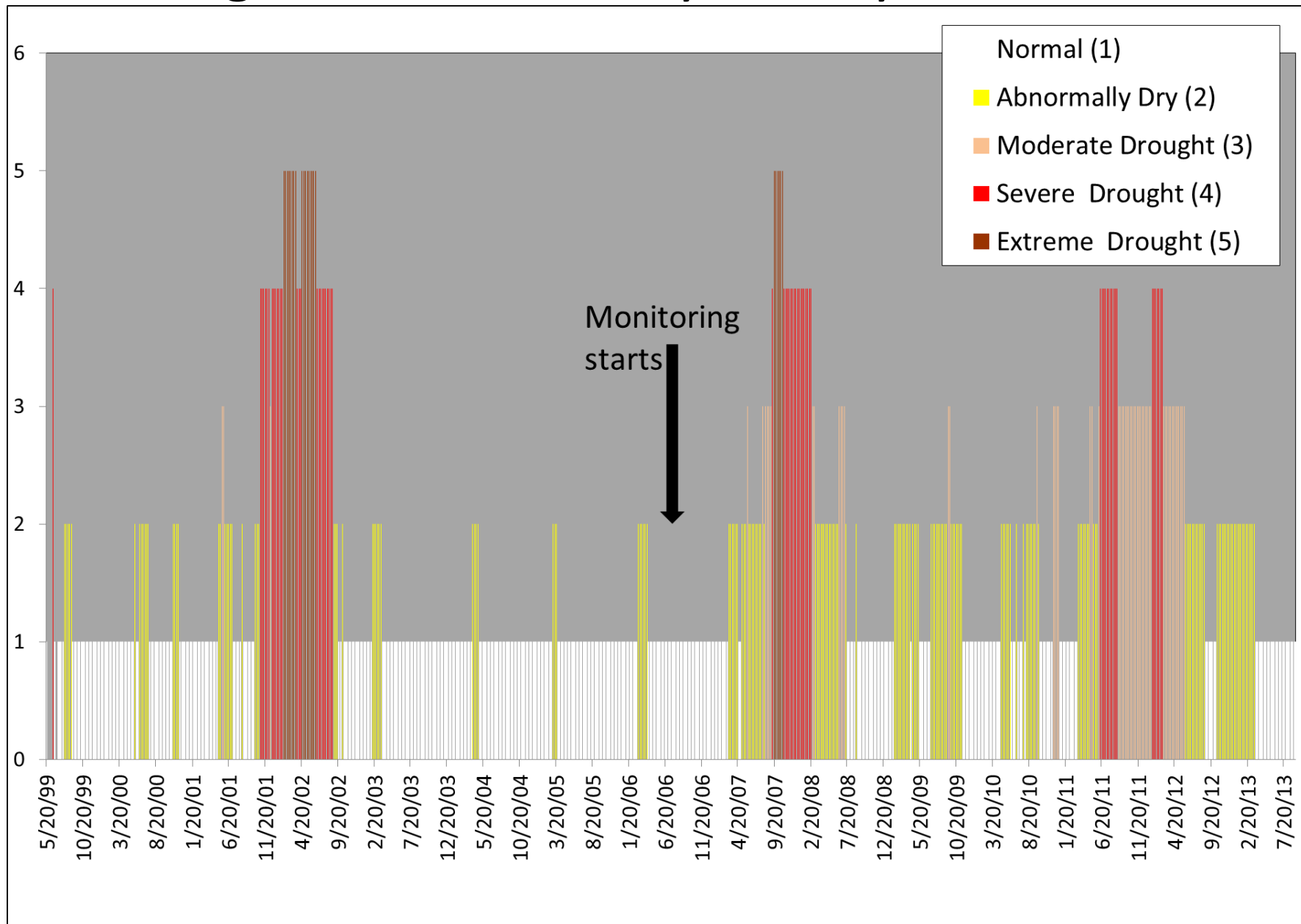
2013



Topics

- Drought
- Flood
- Nutrient trends

Drought Status of Horry County since 1999



Drought

Trends from last conference

- Increasing conductivity (total dissolved solids)
 - Even controlling for decline in discharge
 - Also increased pH and alkalinity
- Baseflow from groundwater
 - Groundwater has elevated phosphorus levels
 - Freshwater algae tend to be phosphorus limited

New insights

- Increasing total phosphorus at most sites CCU's EQL monitors
- Has this stimulated algal growth?



Chinners ↑

Crabtree ↑

Buck Creek

Highway 9 ↑

Conway ↑

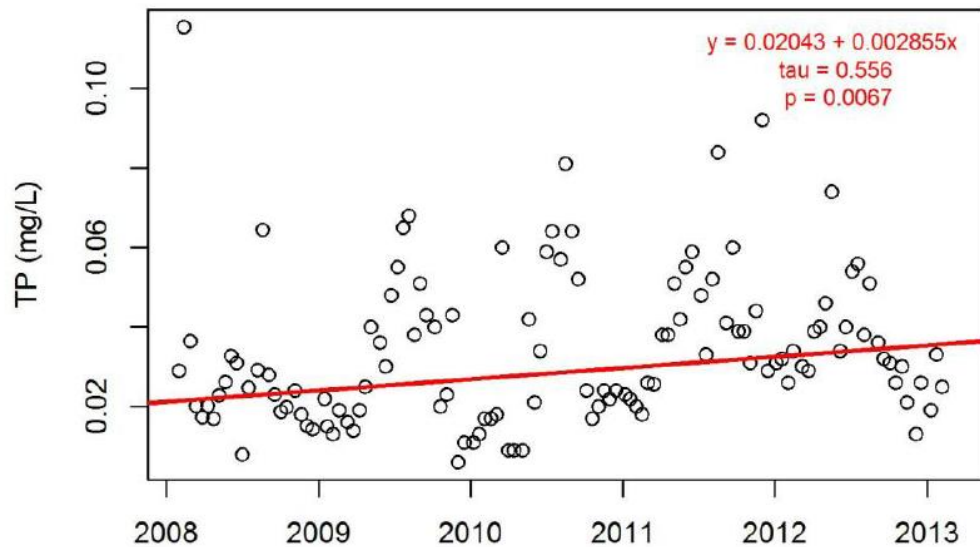
Bucksport ↑

Increasing total phosphorus from 2008 to 2013

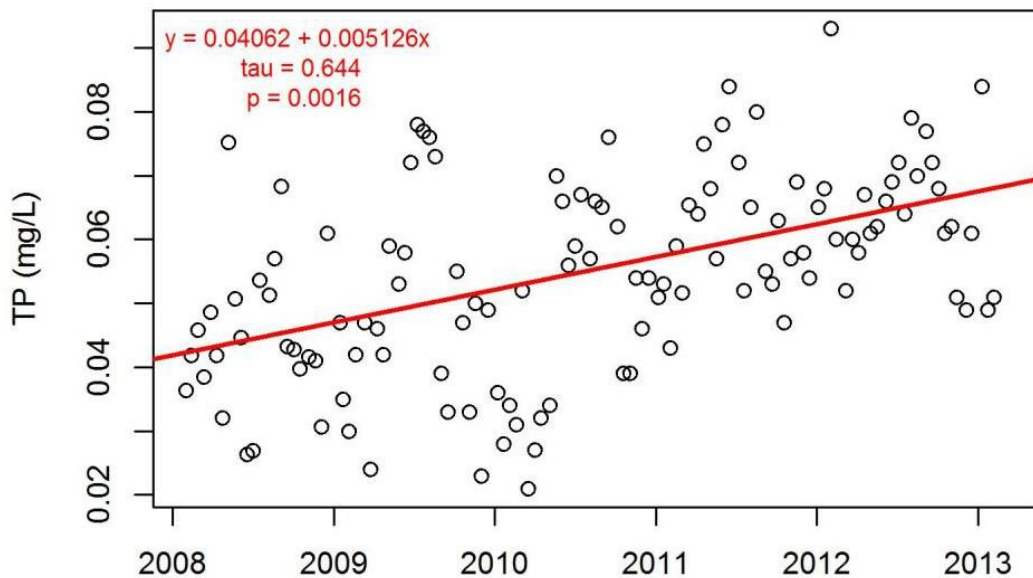
Hagley ↑



Highway 9: TP

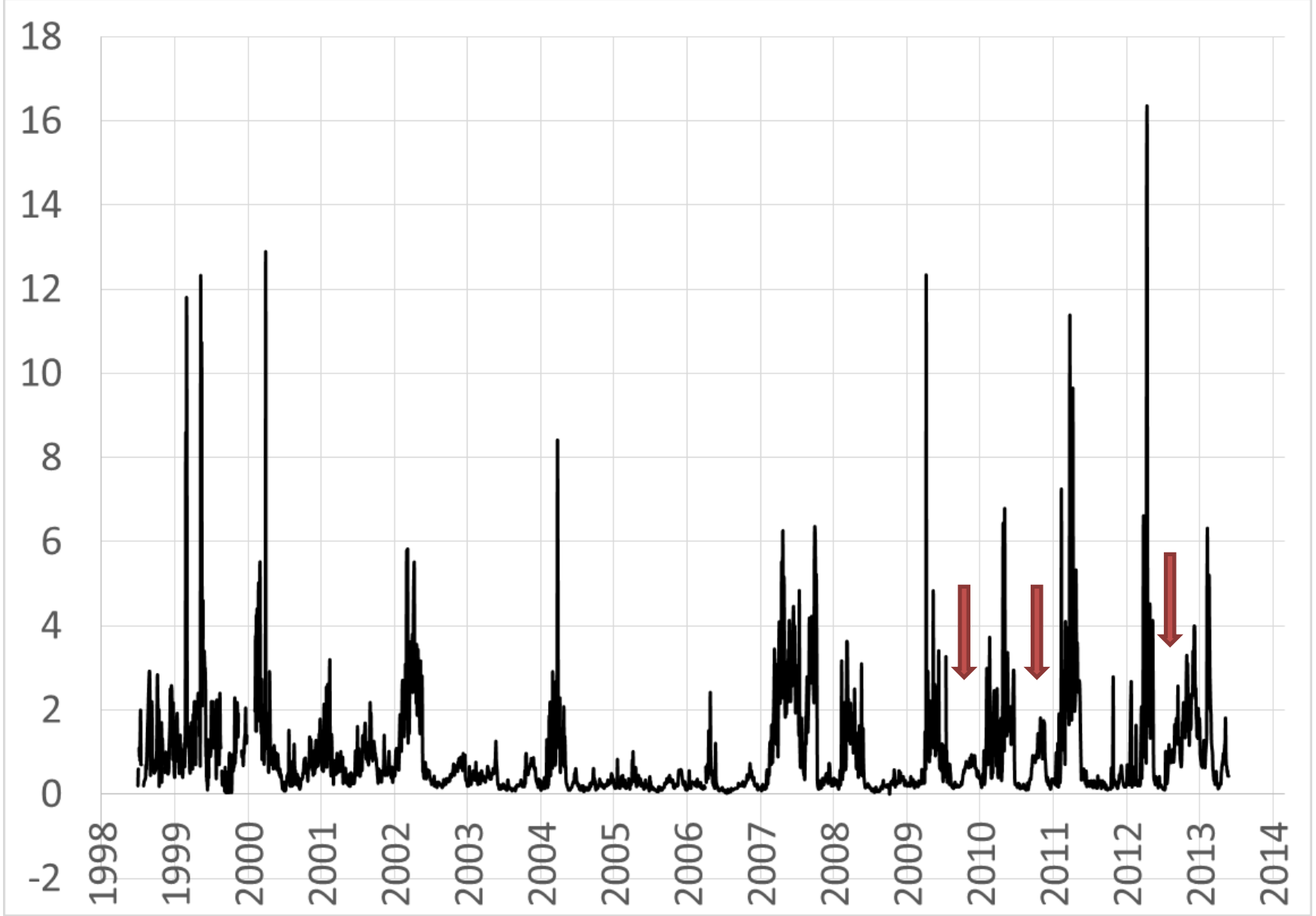


Hagley: Total Phosphorus



Site	Annual increase (mg/L)	y intercept (mg/L)
H9	0.003	0.020
CT	0.004	0.017
CW	0.003	0.023
BS	0.002	0.031
HG	0.005	0.041
CN	0.006	0.011

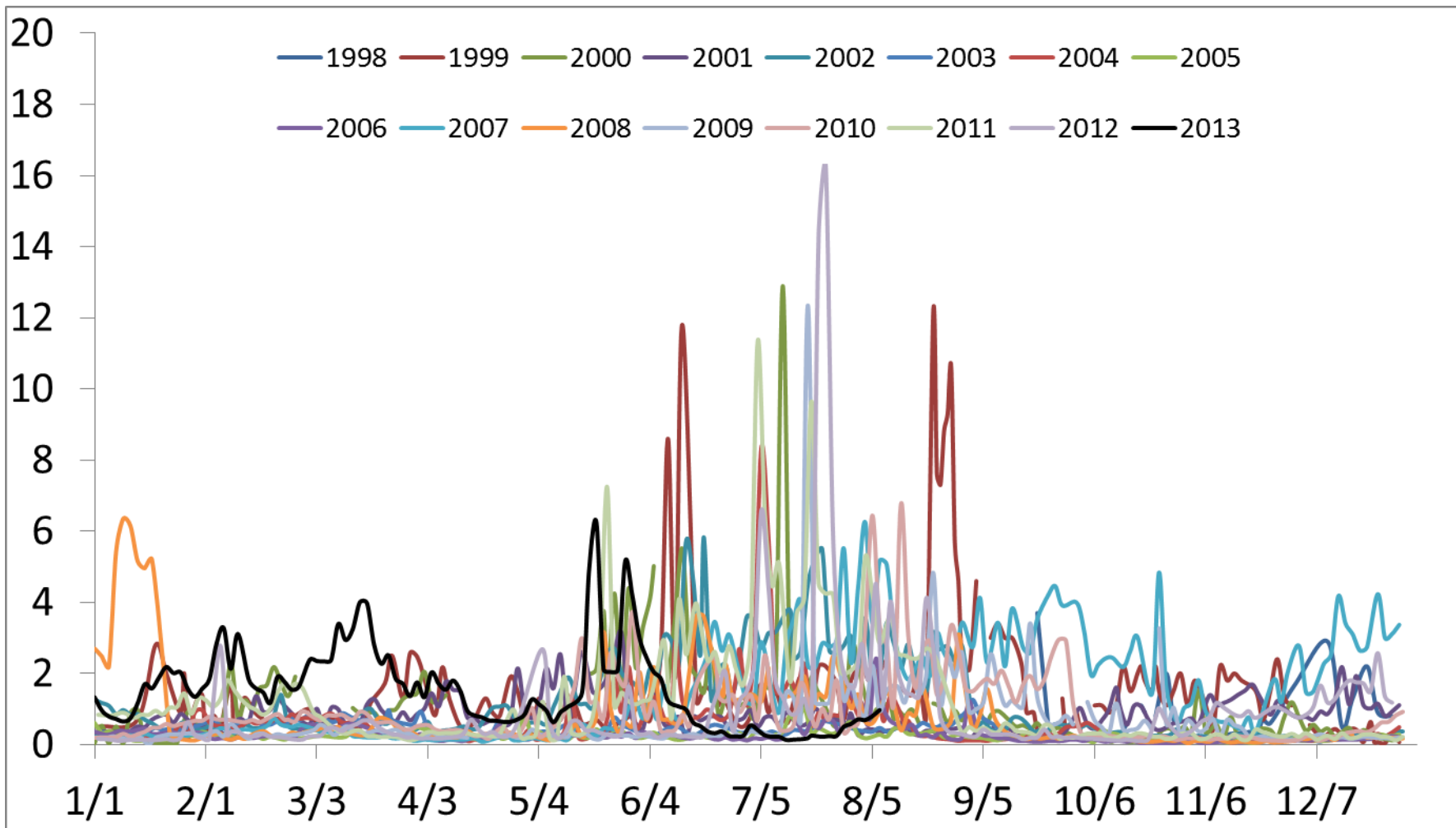
Chlorophyll at Murrells Landing



Hogchoker



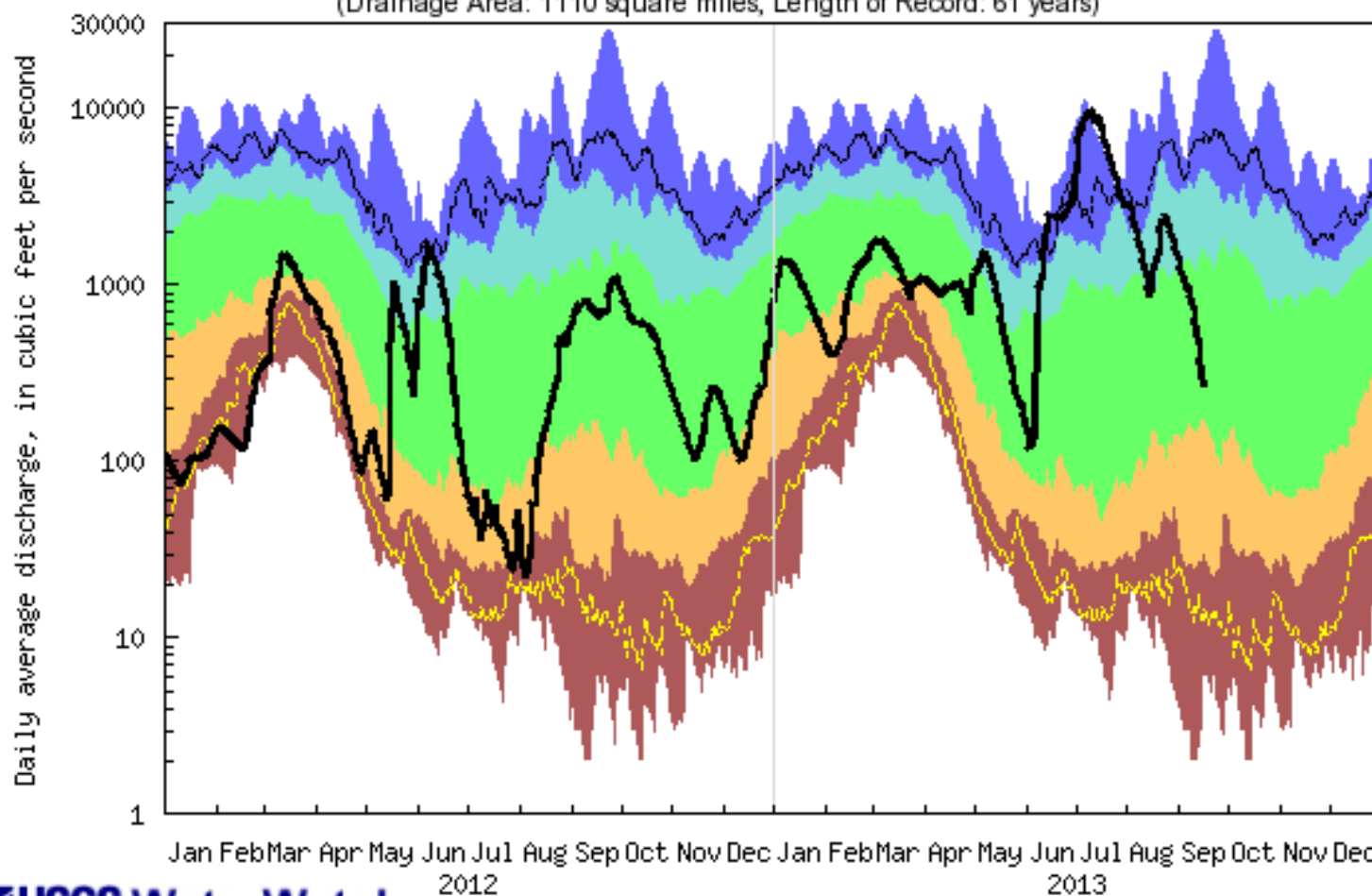
Chlorophyll at Murrells Landing










Flood

- Record flood for time of year.
- Record duration of low DO and pH across whole river.
- Low temperatures this summer. High winter temps

USGS 02110500 WACCAMAW RIVER NEAR LONGS, SC
 (Drainage Area: 1110 square miles, Length of Record: 61 years)

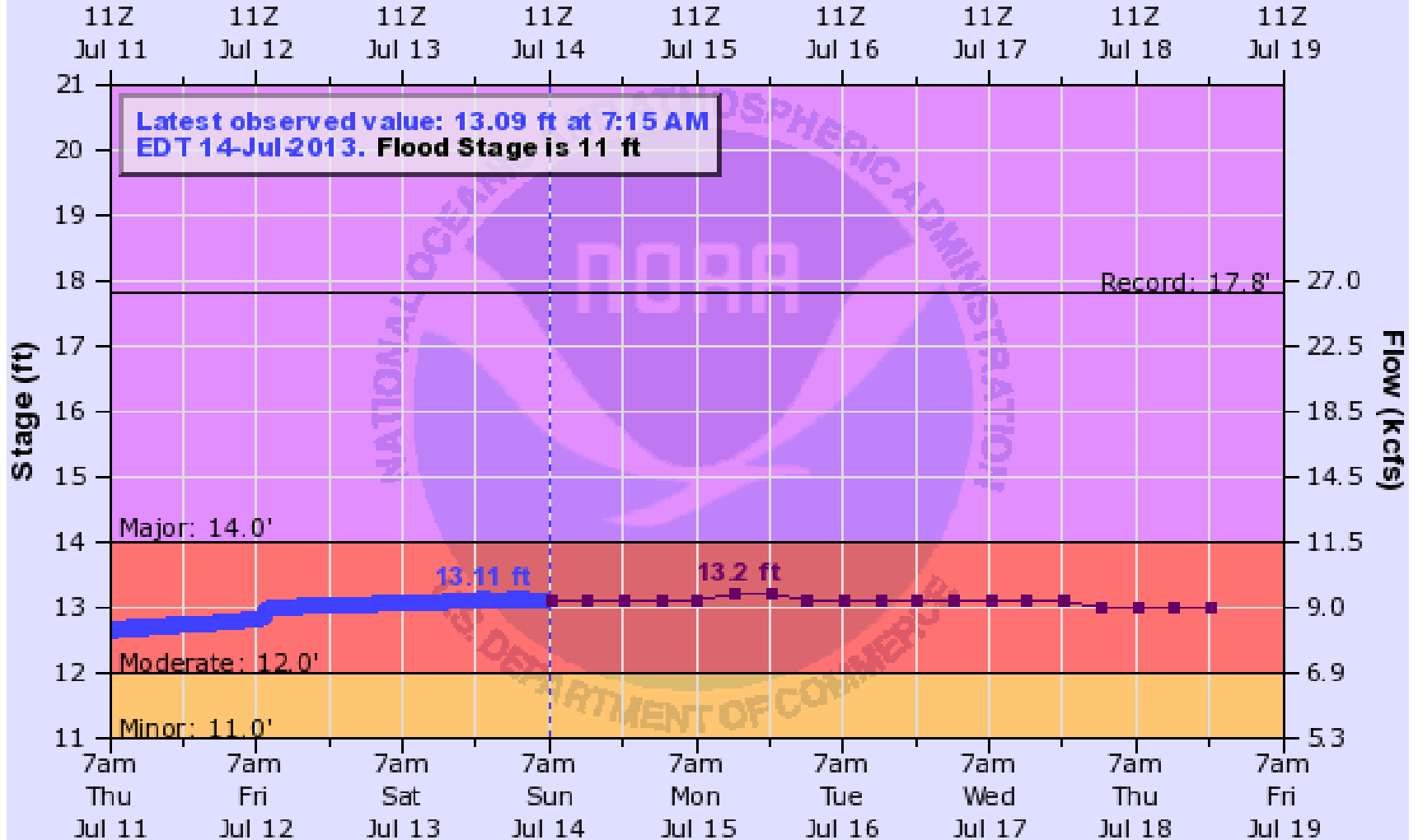


Last updated: 2013-09-16

Explanation - Percentile classes						
						
lowest-10th percentile	5	10-24	25-75	76-90	95	90th percentile-highest
Much below Normal	Below normal	Normal	Above normal	Much above normal		Flow

WACCAMAW RIVER NEAR CONWAY

Universal Time (UTC)



--- Graph Created (7:53AM Jul 14, 2013) ● Observed ■ Forecast (issued 8:48PM Jul 13)



CAROLINA COCORAHS



COCORAHS SOUTH CAROLINA



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Carolina CoCoRaHS 2013

Our Wettest Summer

Your outdoor plans, your garden or your creek may have taken notice — South Carolina has definitely seen its share of rainfall this summer! The statewide average precipitation total of 26.26" resulted in our wettest summer on record since 1895!

Highlights:

- There were no rain-free days in SC from May 29 to August 25 – meaning there was measurable precipitation recorded somewhere in the state every single day for almost three months
- Statewide year-to-date (January 1 - August 31) second wettest on record
- Highest CoCoRaHS reported daily precipitation total — 8.96" in Clemson on July 13 (Station SC-PC-13)
- River flooding occurred on many of South Carolina's waterways. In fact, this is only the second time in its 50-year history that Hartwell Dam opened all 12 of its flood gates

The rain also kept the temperatures down.

For the first time in 40 years, no 100°F days reported in the entire state so far this year!

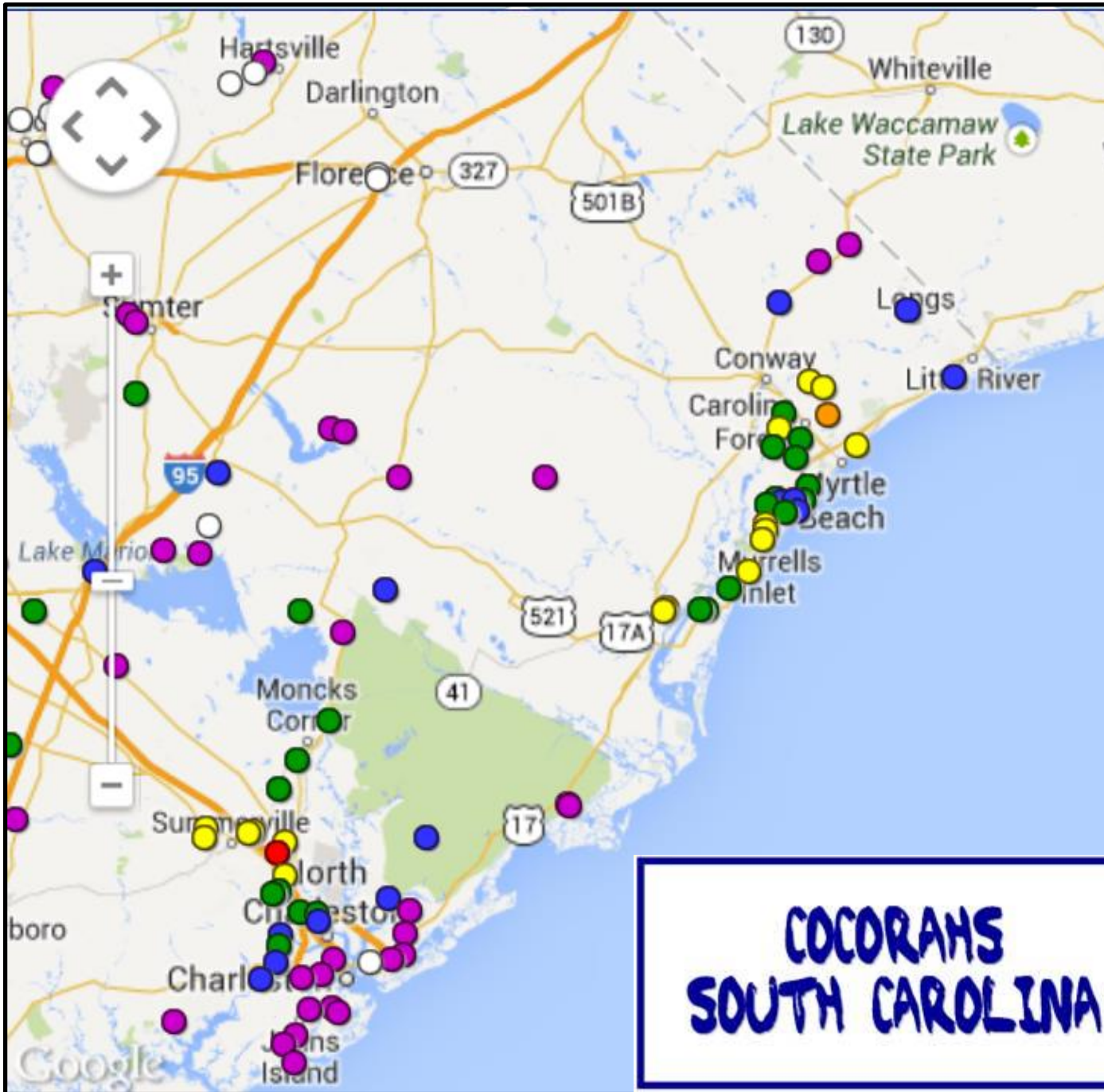
Despite the inconvenience, abundant rainfall does have its share of benefits. It replenished some of our state's water supply that was negatively affected by years of drought.




Hartwell Dam, July 9, 2013. Photo Credit: Doug Young











Congaree River Flooding, May 7, 2013. Photo Credit: Wes Tyler



CoCoRaHS 
Precipitation Map

Date: 07/30/2013
Country: USA
State: SC

-  Zero
-  Trace
-  0.01 - 0.33"
-  0.34 - 0.66"
-  0.67 - 1.64"
-  1.65 - 3.93"
-  3.94 - 5.89"
-  5.90 - 6.53"

Show US Active Fire Perimeter

Source: [GEOMAC](#). GEOMAC wildfire data layer courtesy of the [U.S. Geological Survey](#).

COCORANS SOUTH CAROLINA



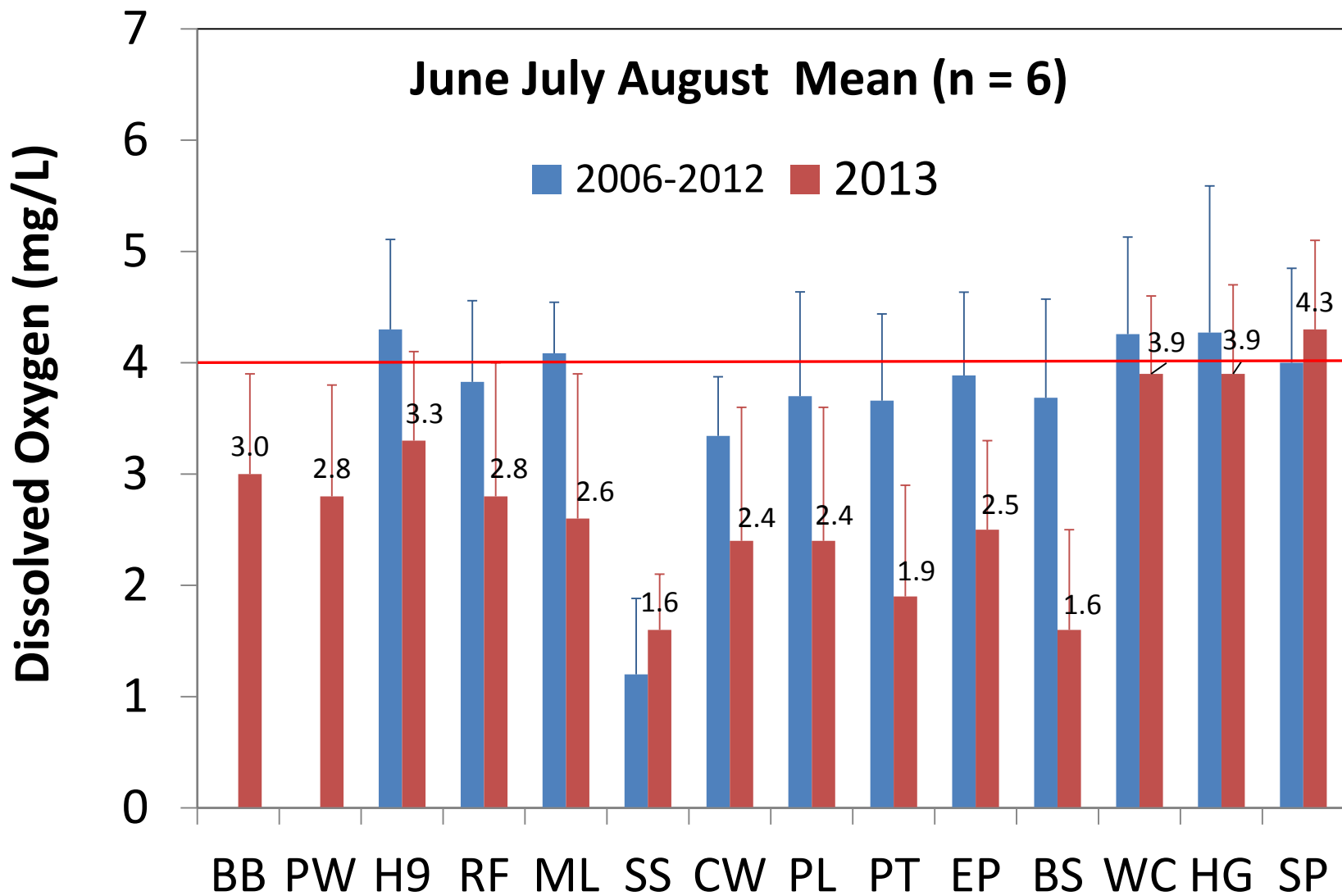




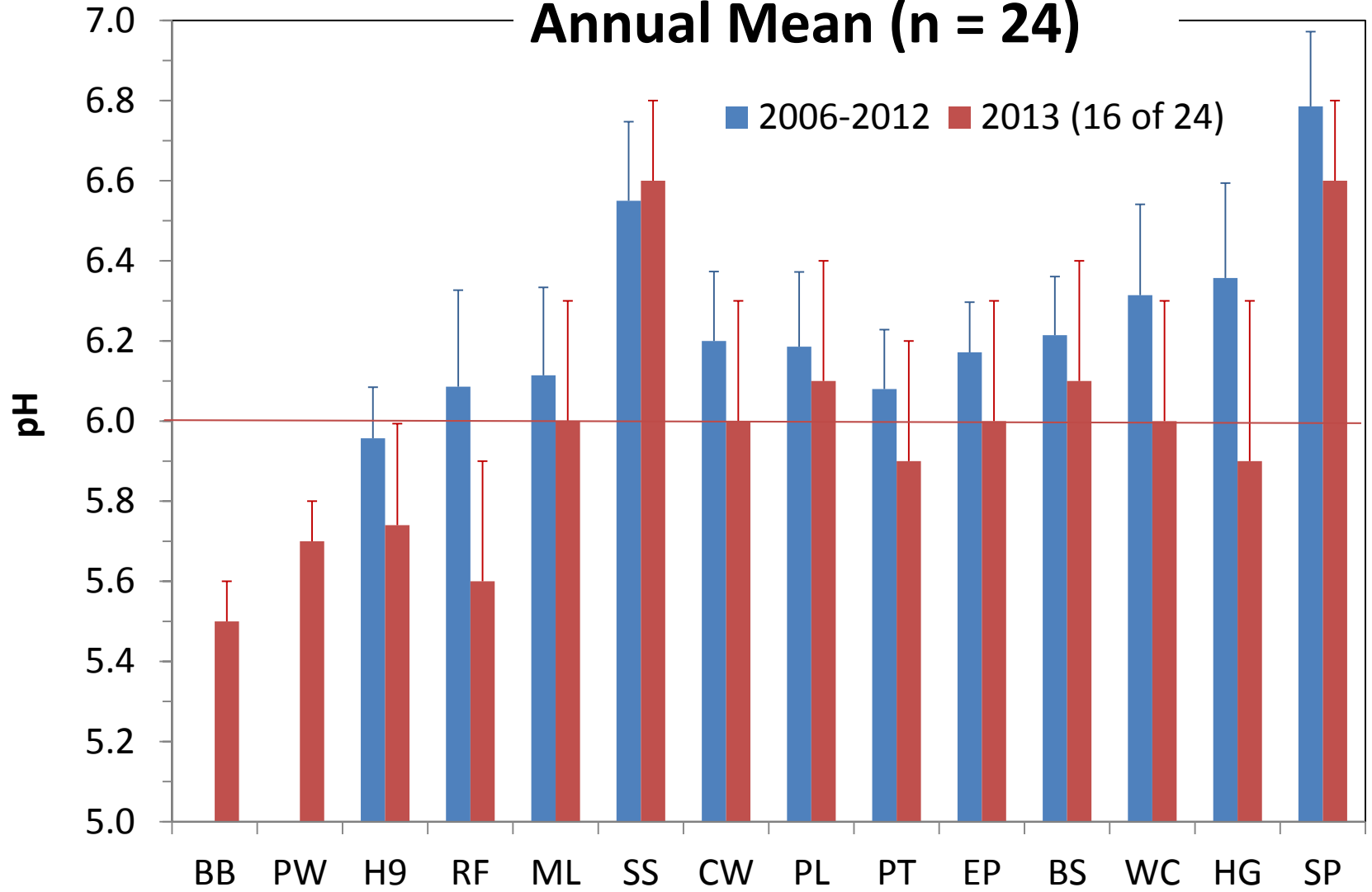
RIVER FRONT
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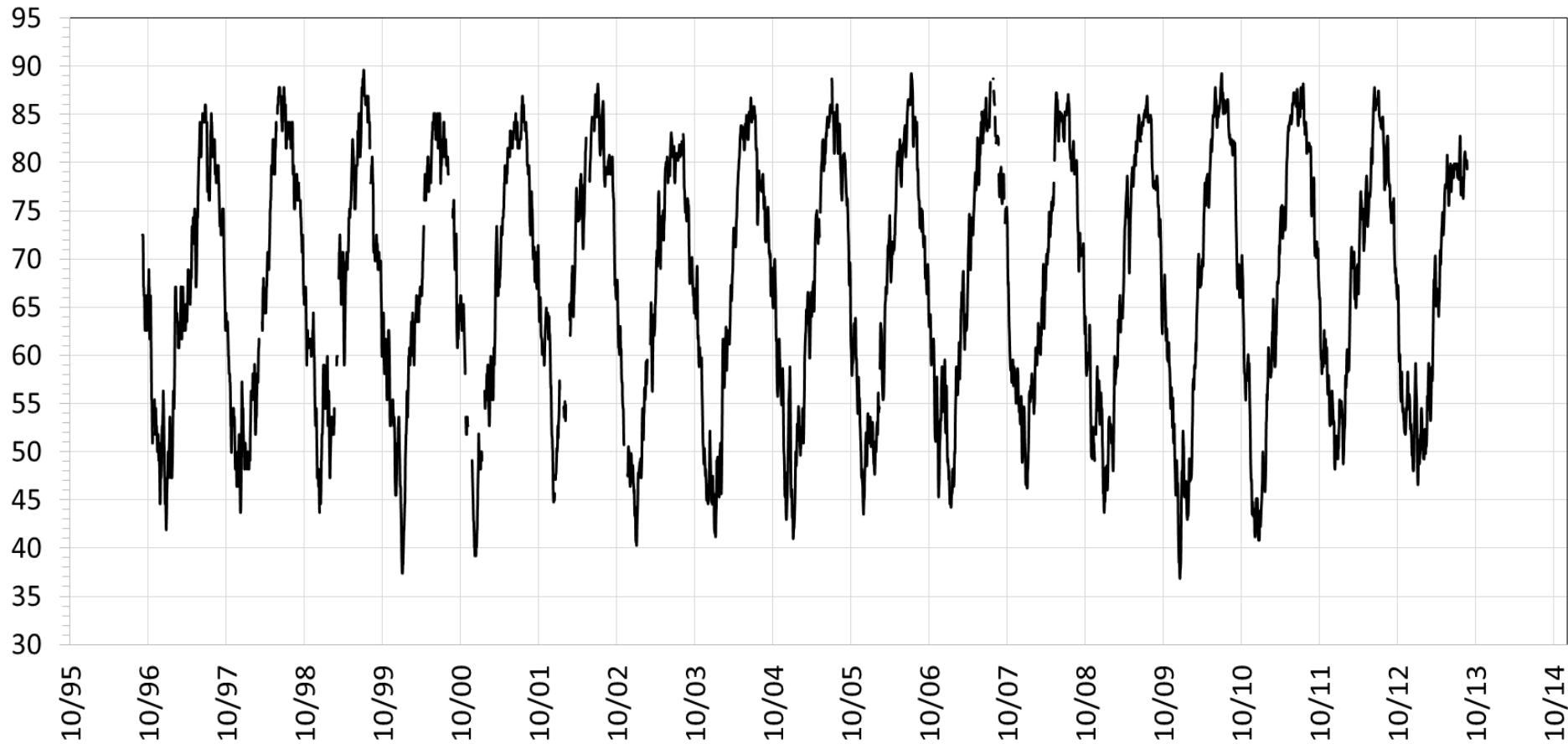


Annual Mean (n = 24)



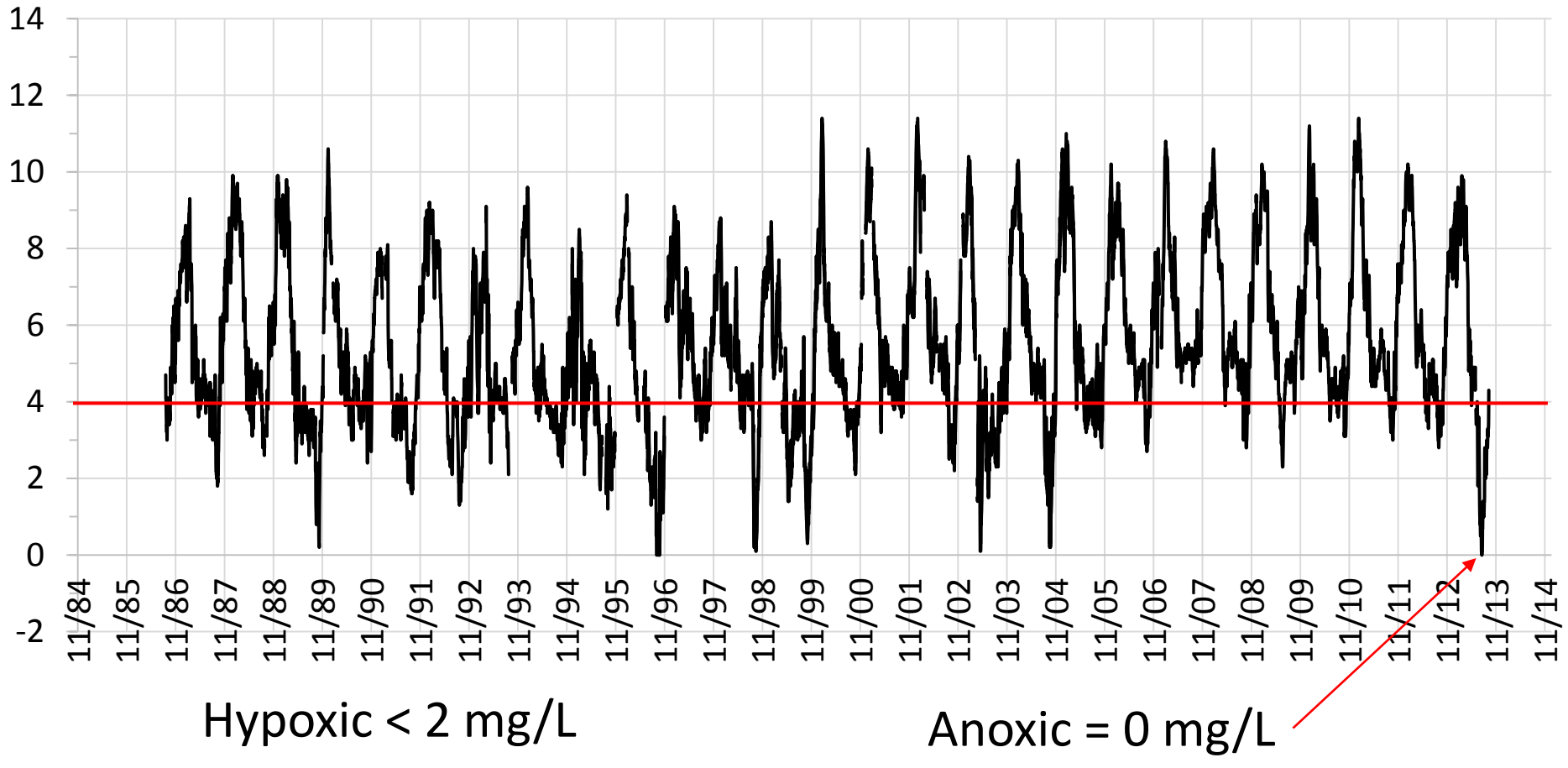
Warm winter & cool summer

Bucksport Mean Daily Temp (F)



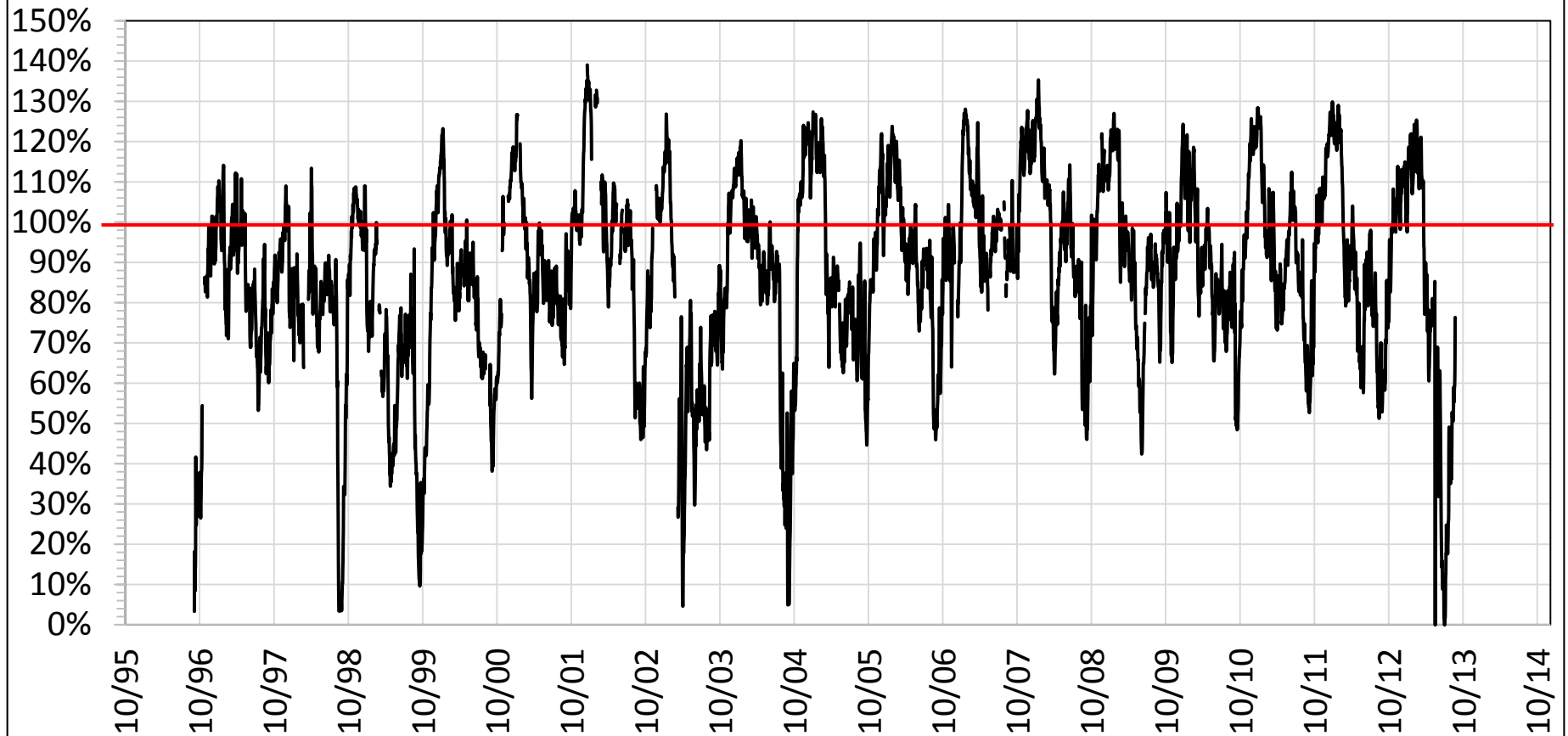
Dissolved Oxygen got really low!

Bucksport Mean Daily DO (mg/L)



Oxygen Saturation was even lower due to low temperatures.

Bucksport Mean Daily DO Saturation



Note supersaturation in summer from photosynthesis

Nutrients

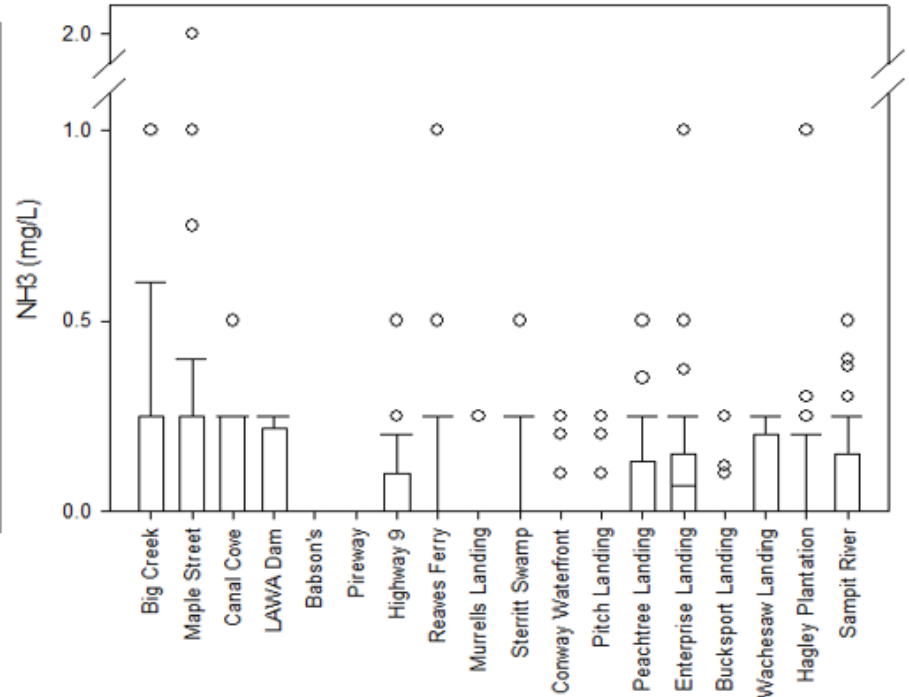
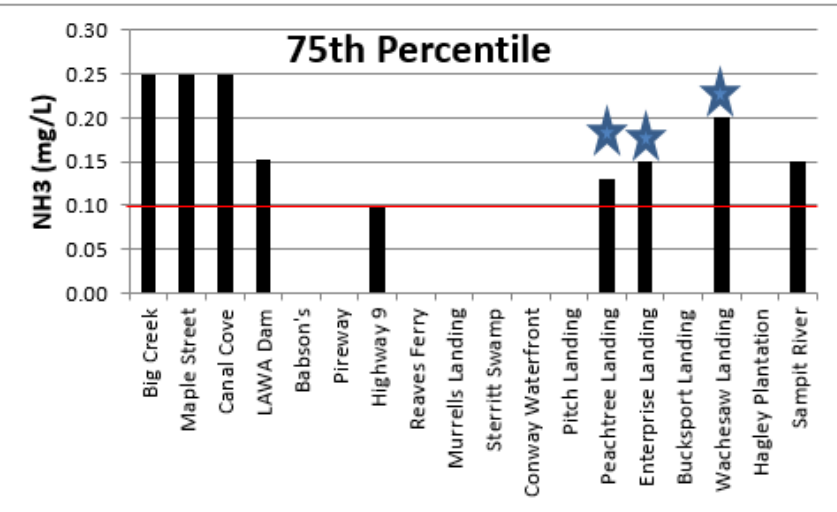
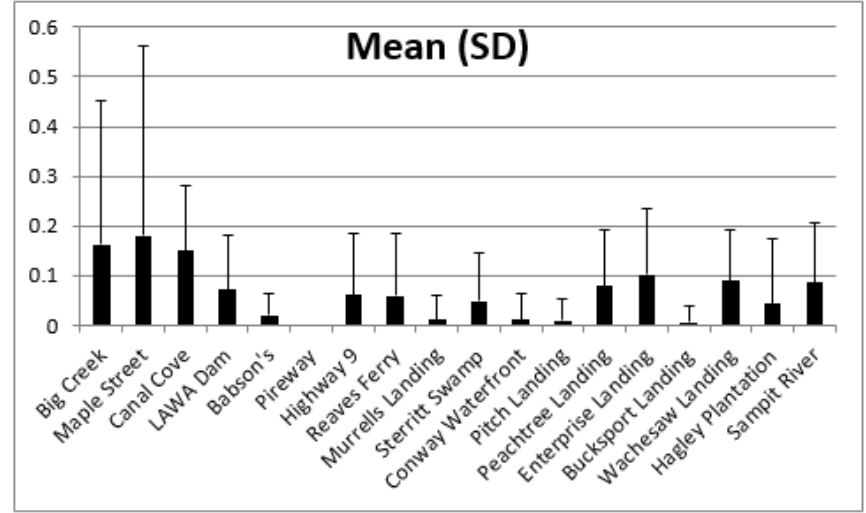
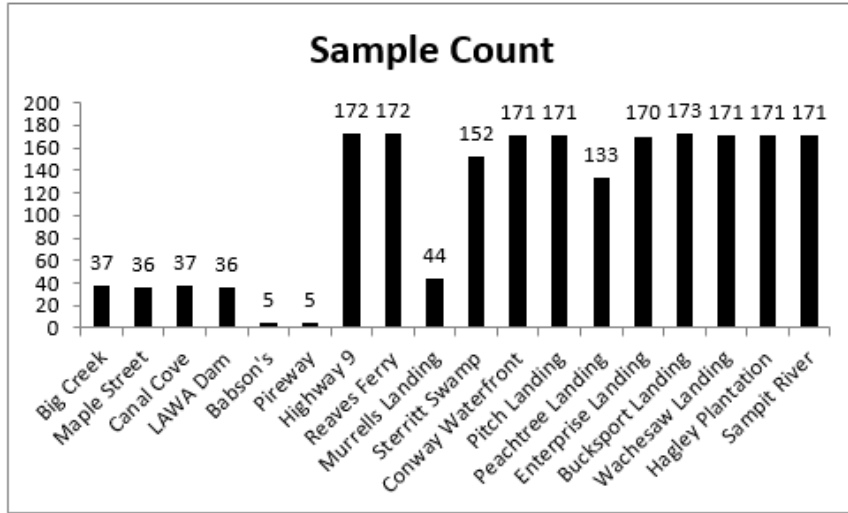
We measure

- Ammonia
- Nitrate
- Nitrite

Trends

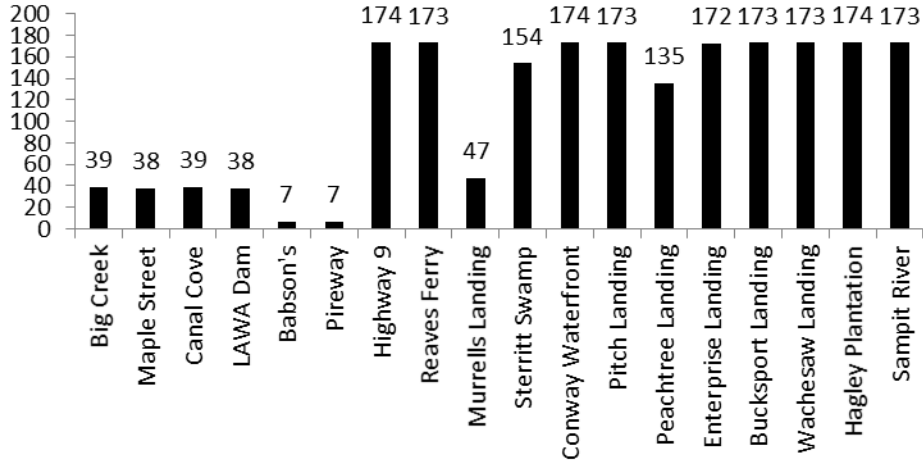
- Ammonia elevated downstream
- Nitrate detections are rare

Ammonia(mg/L)

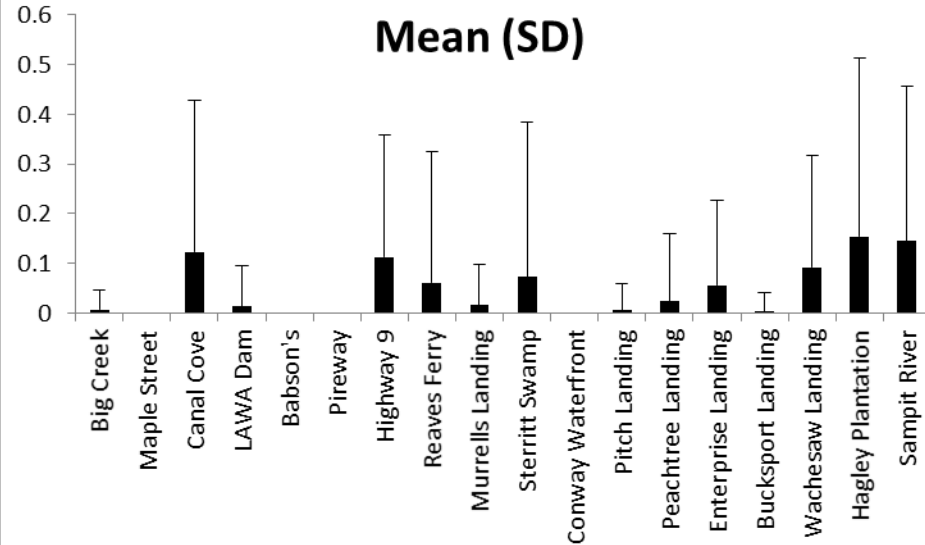


Nitrate + Nitrate

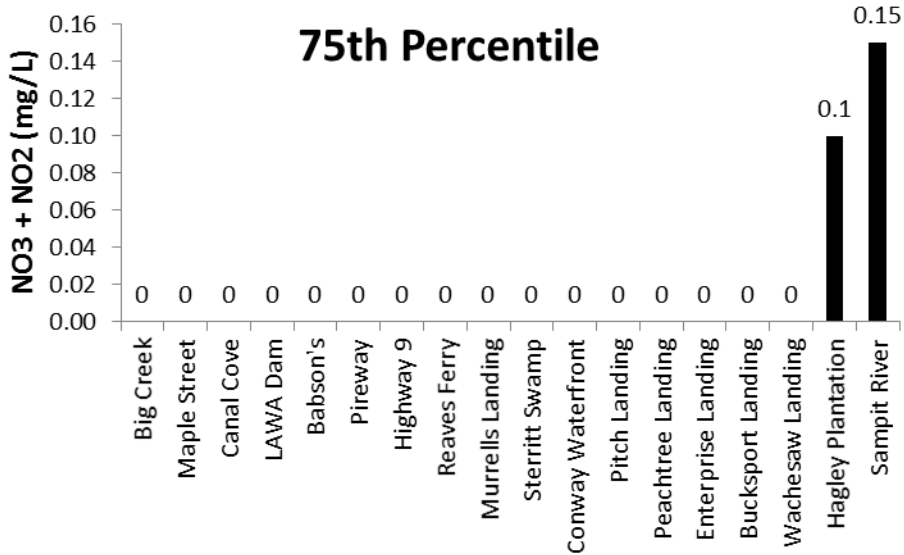
Sample Count



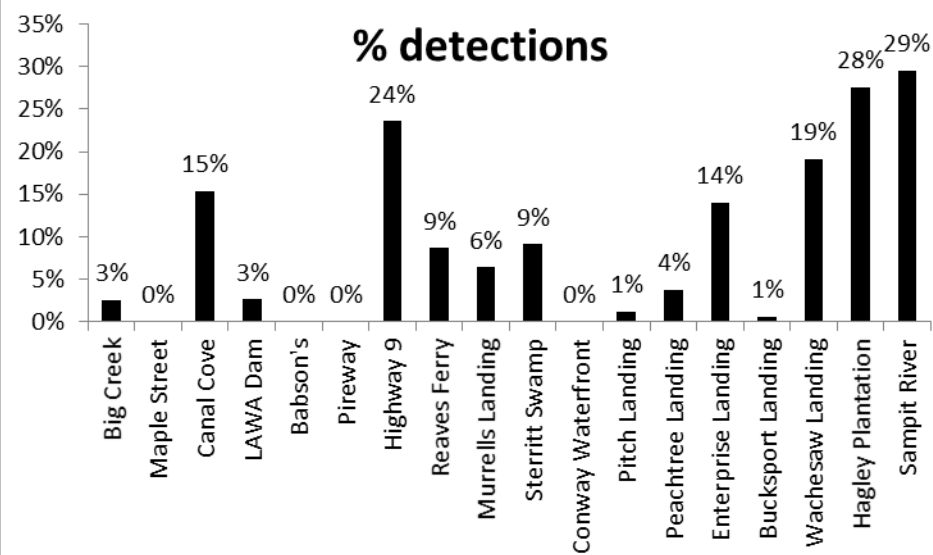
Mean (SD)



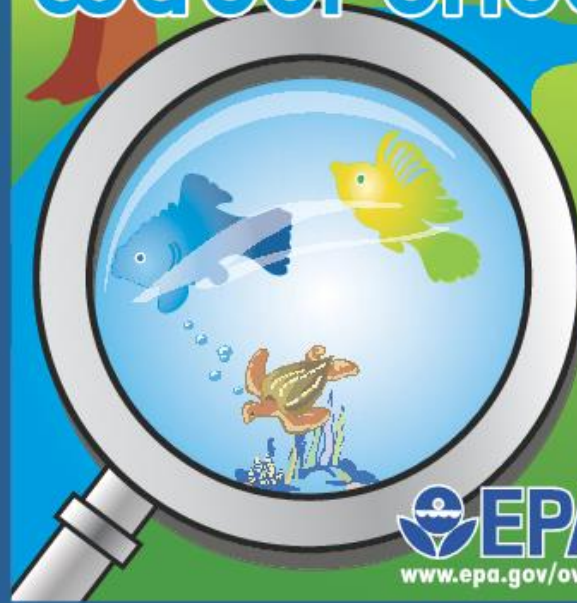
75th Percentile



% detections



mōnitōr your watershed



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