

Temporal and spatial variability of limnological properties in a central Oklahoma reservoir: observations from a first year of sampling

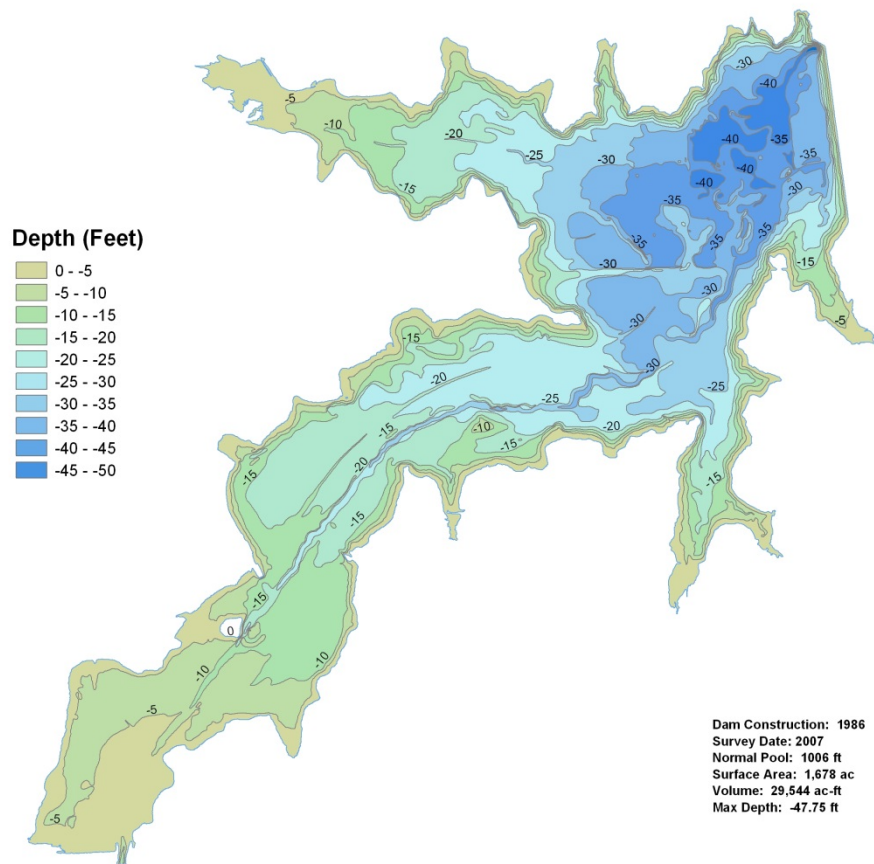
By Jonathan West, Zach McKinney, and Julie Chambers



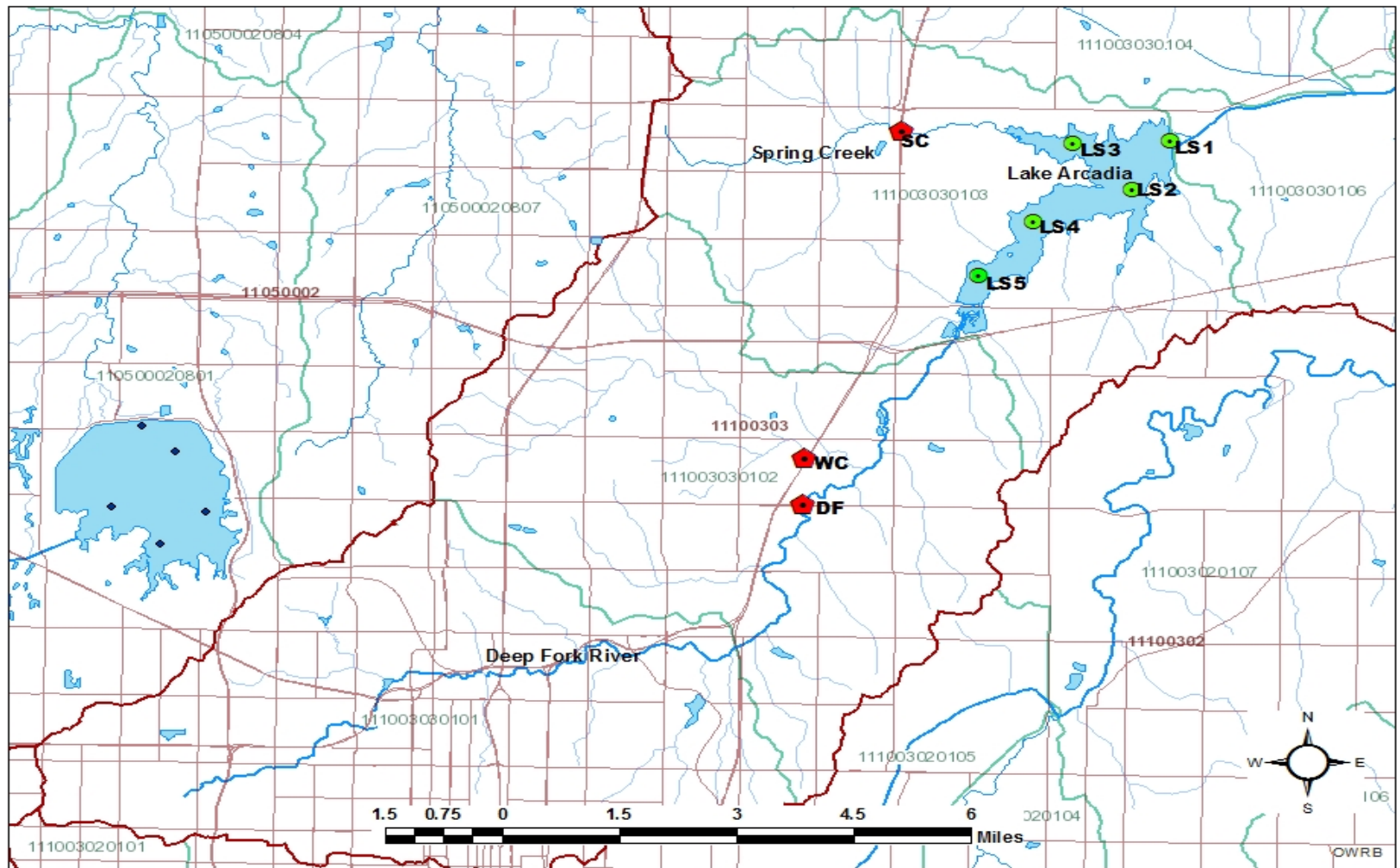
Lake Arcadia

5-Foot Depth Contours

CAUTION - The intention of this map is to give a generalized overview of the lake depths. There may be shallow underwater hazards such as rocks, shoals, and vegetation that do not appear on this map. THIS MAP SHOULD NOT BE USED FOR NAVIGATION PURPOSES.

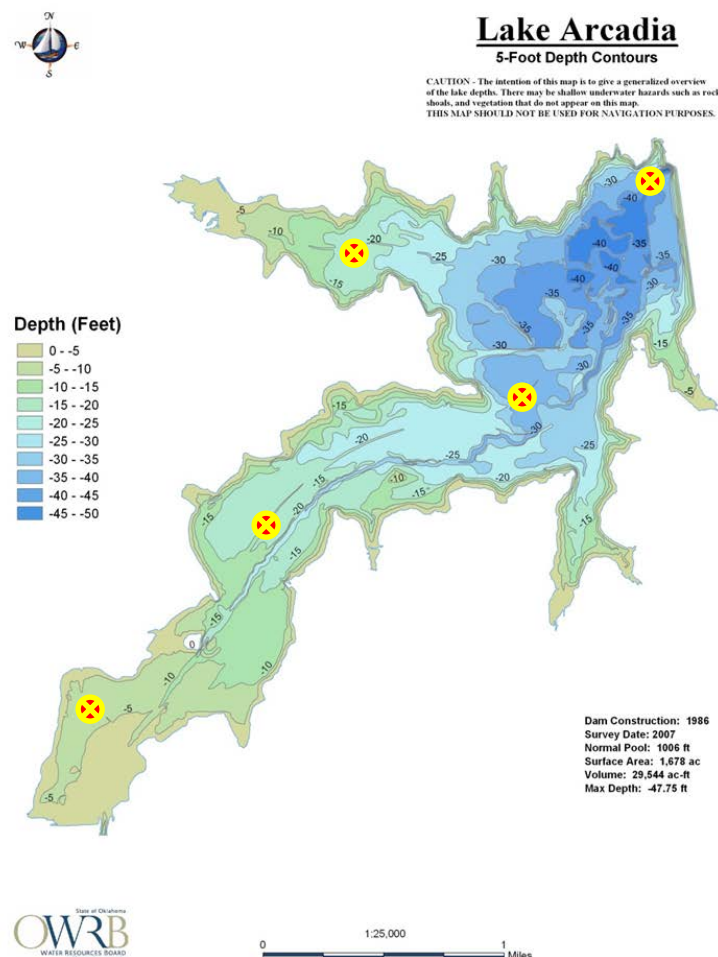


- Built In 1986, the lake is located just East of I-35 in Edmond, Oklahoma
- Lake Arcadia is the water supply for the City of Edmond and also provides recreational opportunities for the community
- Currently listed on the state's impaired list for both chlorophyll-a and turbidity
- Data collection was designed to identify the source(s) and extent of impairment
 - Is the lake currently meeting its assigned beneficial uses
 - To provide data for TMDL development
 - To gather and characterize watershed data



LAKE SAMPLING

- Samples are collected at the 5 historical BUMP sites with bottom samples collected at sites 1 & 2 during each sampling event.
 - Site 1 is nearest to the dam at the deepest part of the lake (about 12 m deep)
 - Site 5 in the shallowest depth, averaging 1.5 m in depth. This site is the most turbid, influenced by wind mixing and re-suspension
- Arcadia Lake has been sampled monthly since March and twice per month during the growing season (May-September), for a total of 16 sampling events in 2018.



EQUIPMENT



Multi-parameter
instrument in data buoy



Temperature String

0.5 – 11.5 m

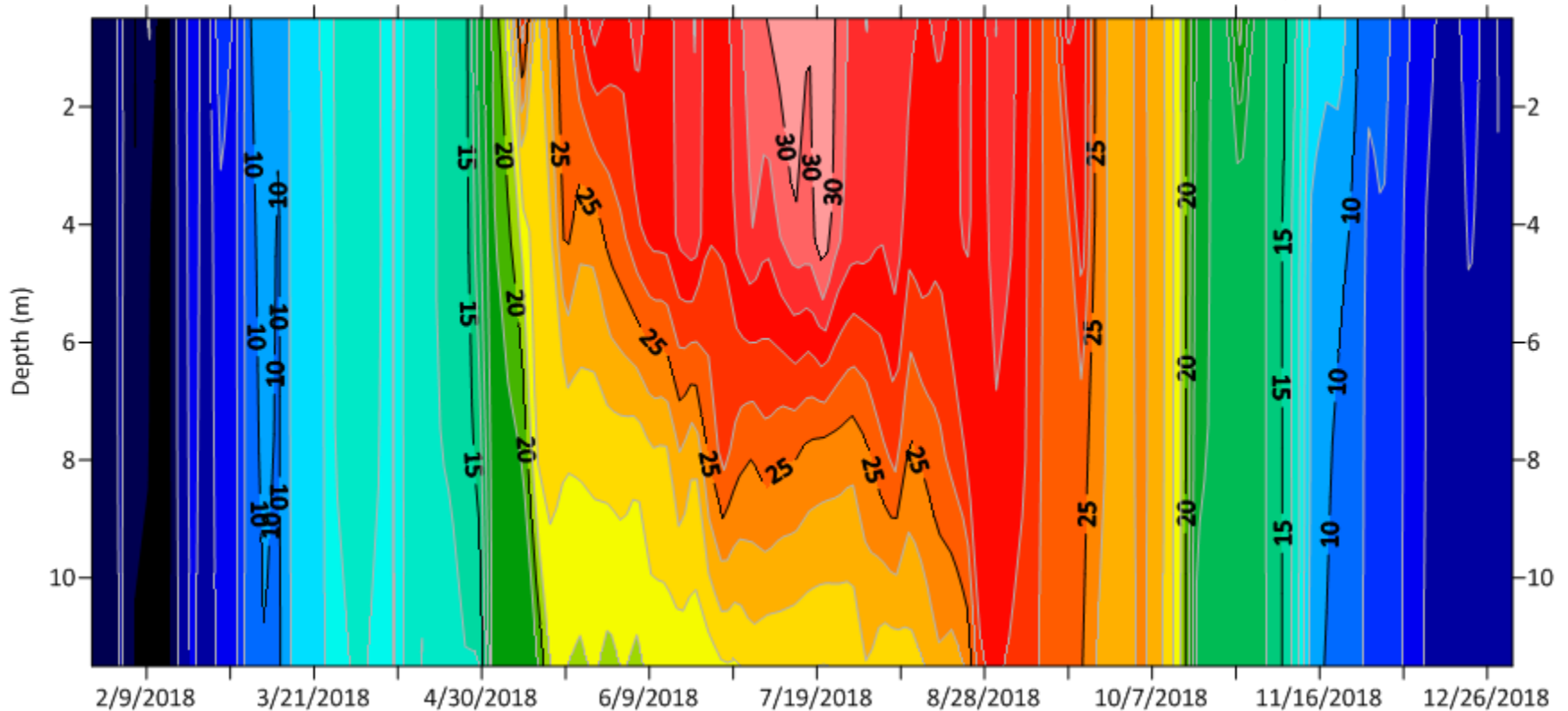


METHODS

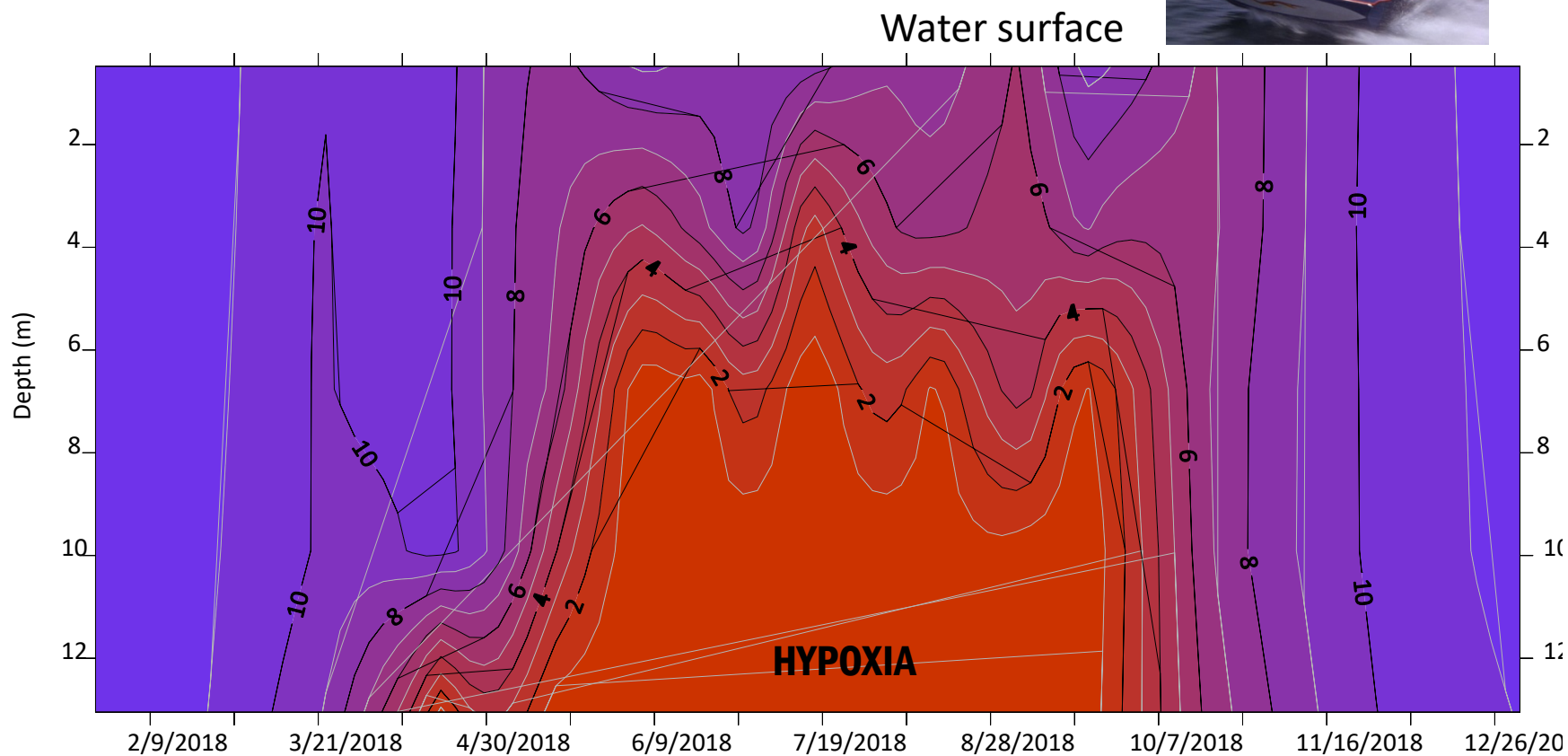


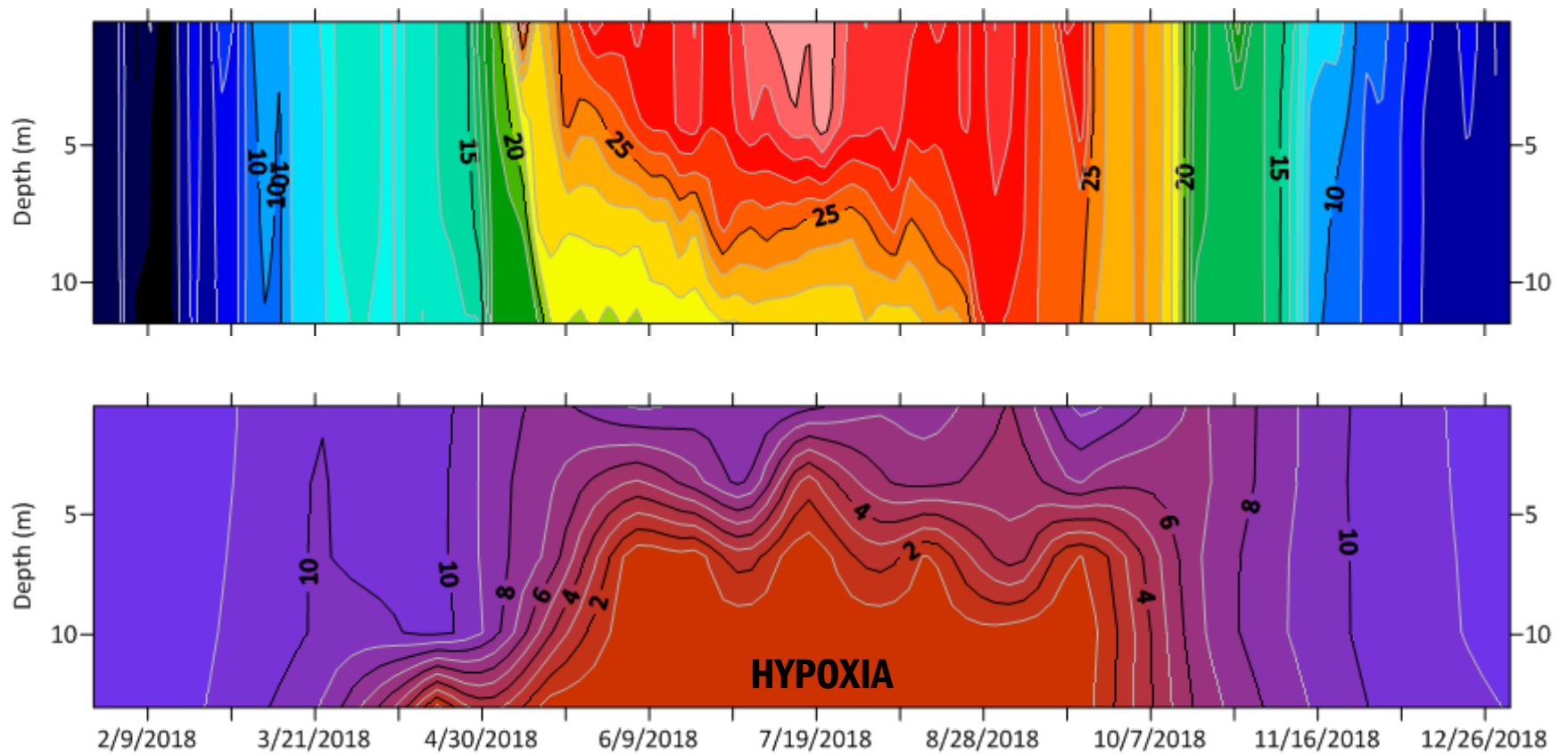
- At each site we took a depth profile for temperature, dissolved oxygen, etc
- Secchi depth
- Surface water samples were collected using a depth integrated sampler and analyzed for nutrients, total suspended solids, and chlorophyll
- At sites 1 and 2, water samples from about 0.5 meters from the bottom were collected in a Van Dorn sampler





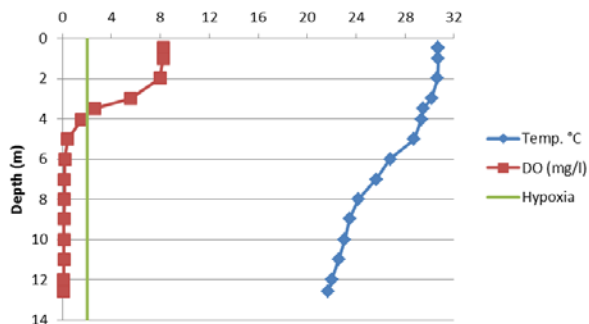
DISSOLVED OXYGEN



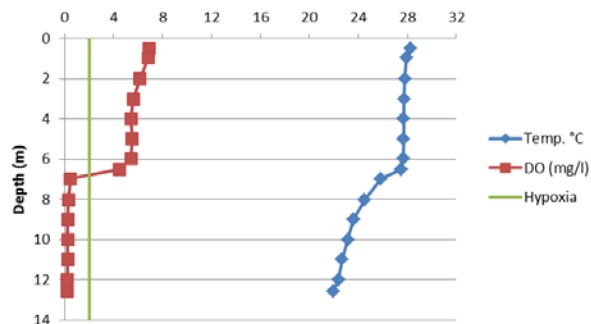


DISSOLVED OXYGEN-TEMP PROFILES

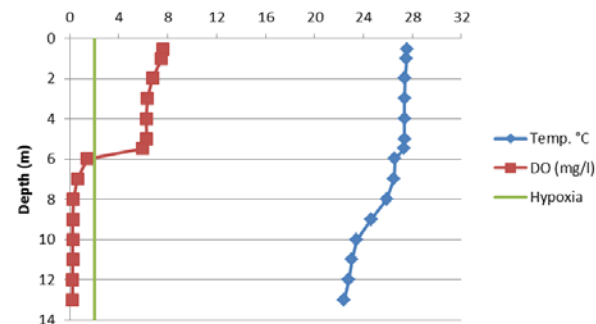
7/16/2018



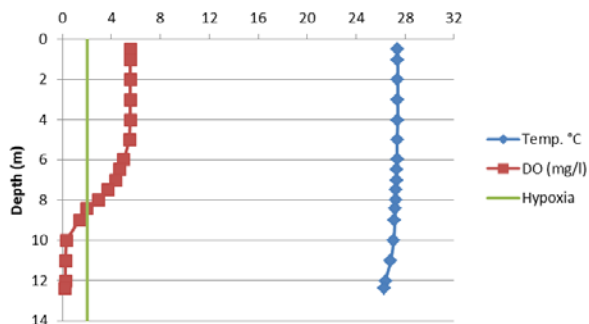
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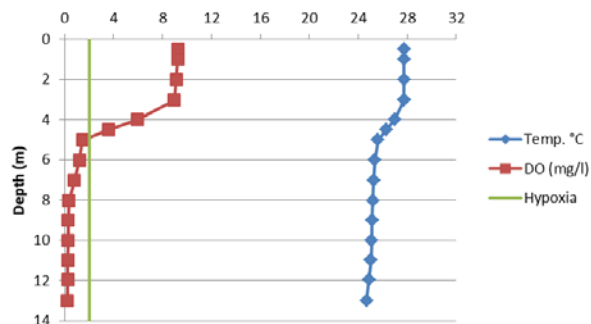
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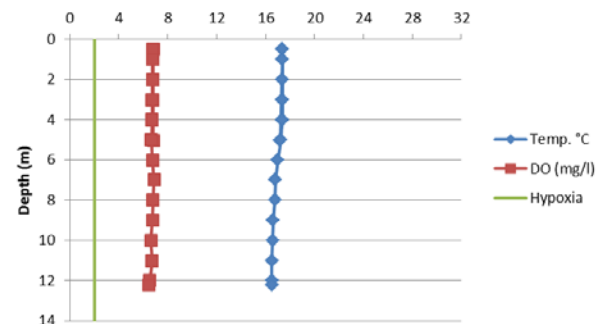
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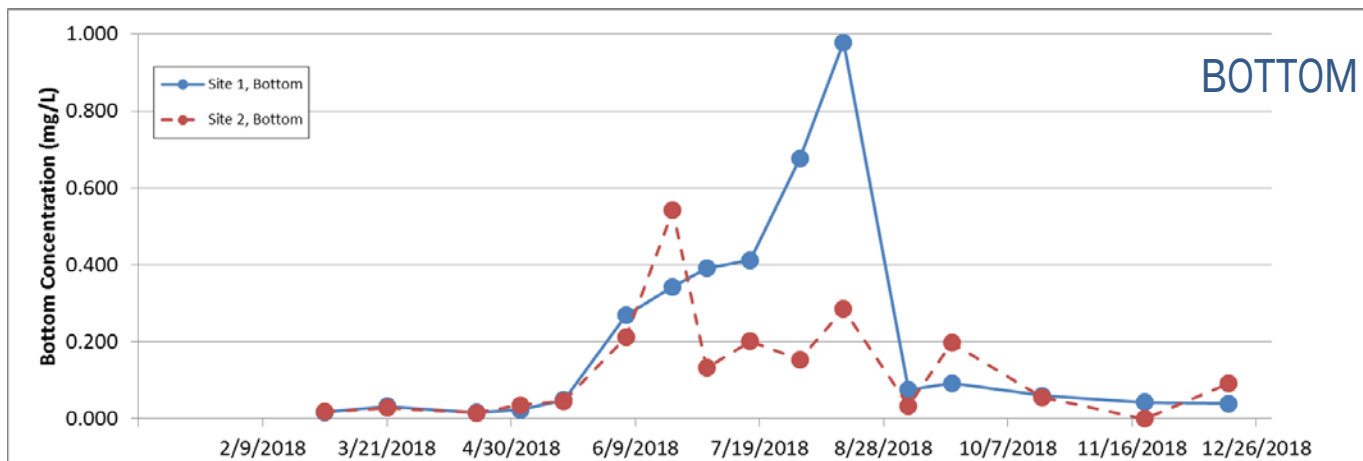
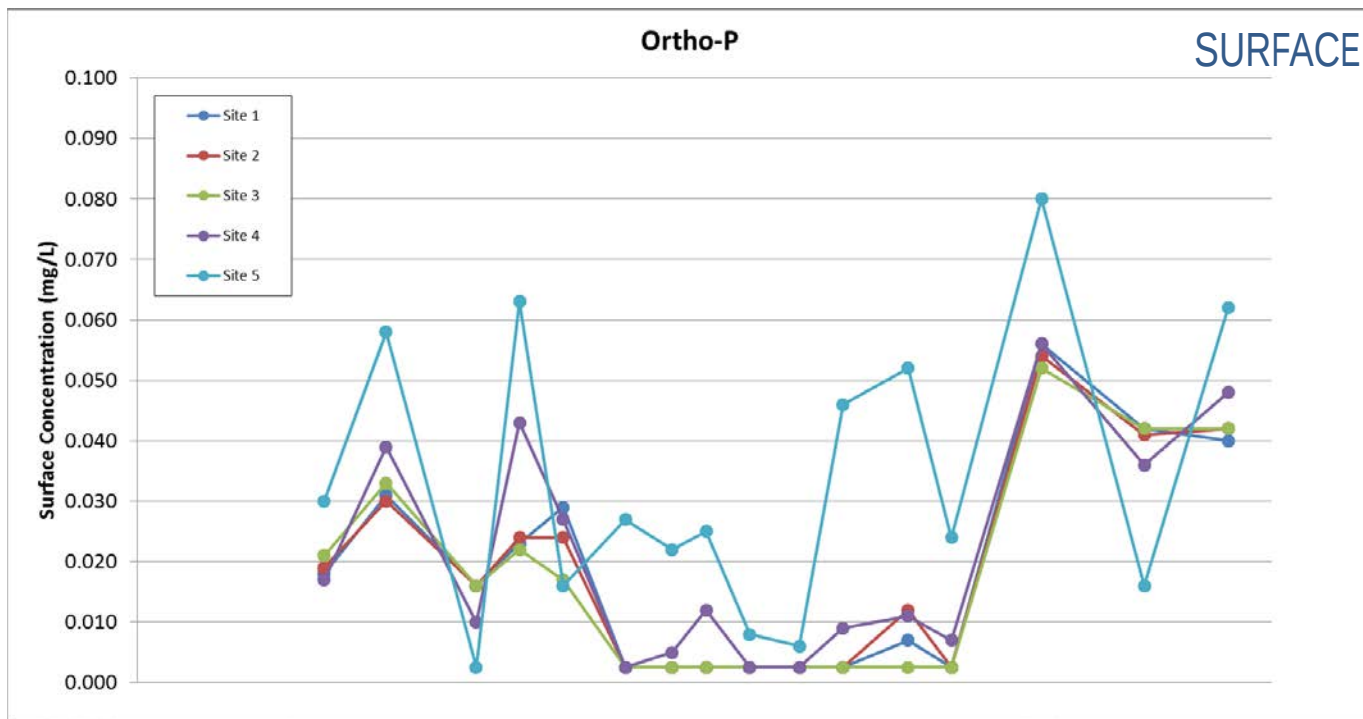


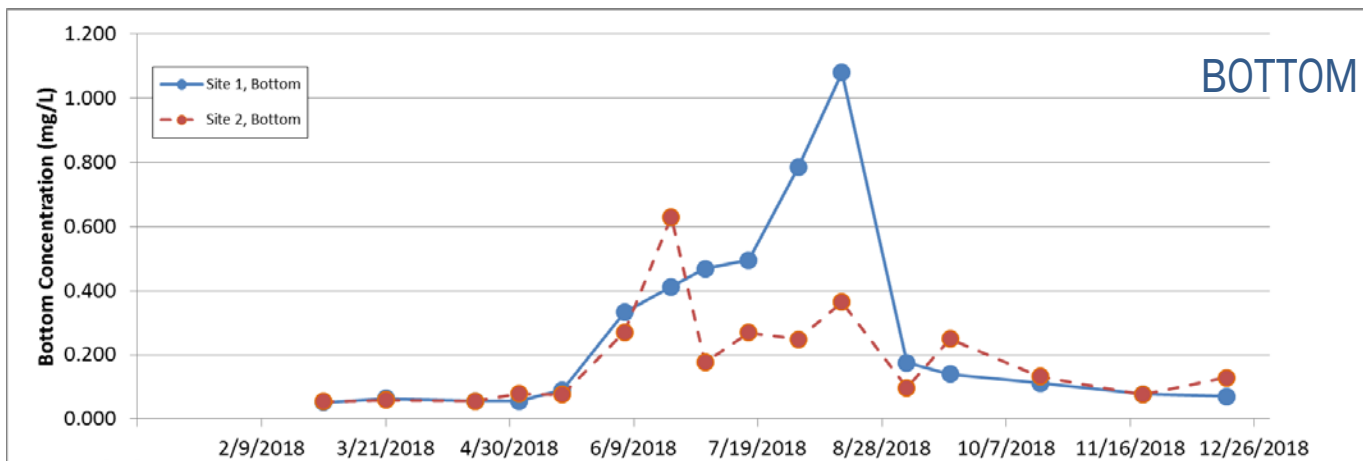
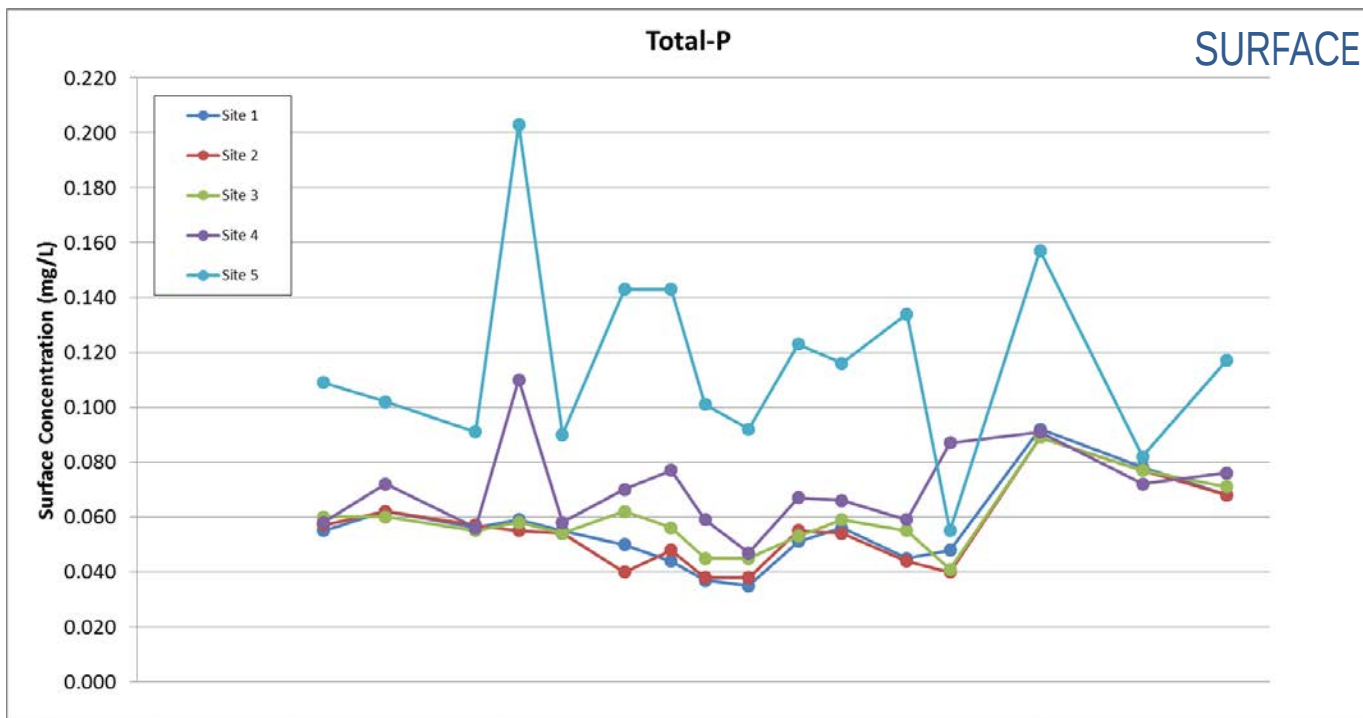
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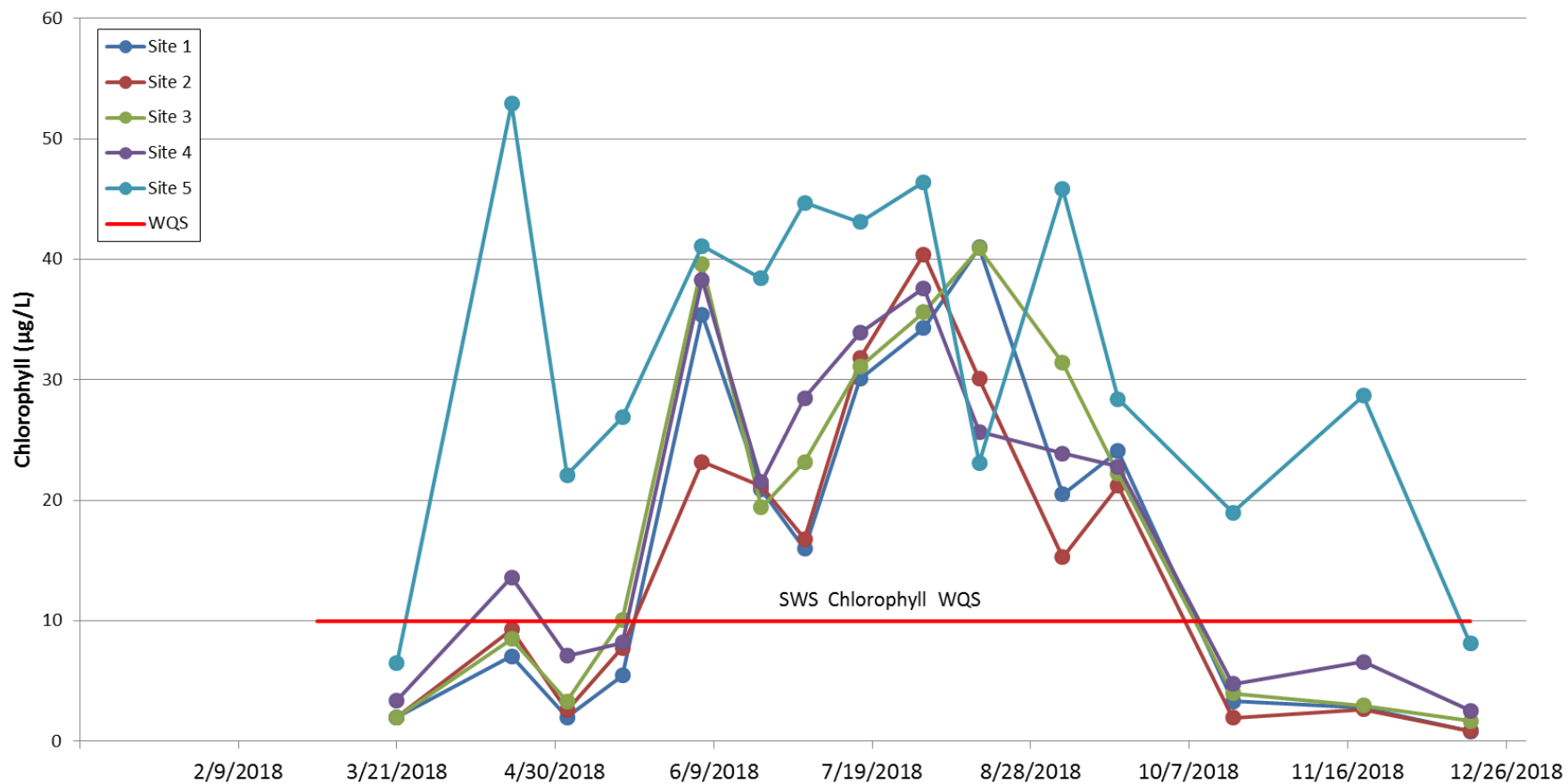
10/18/2018





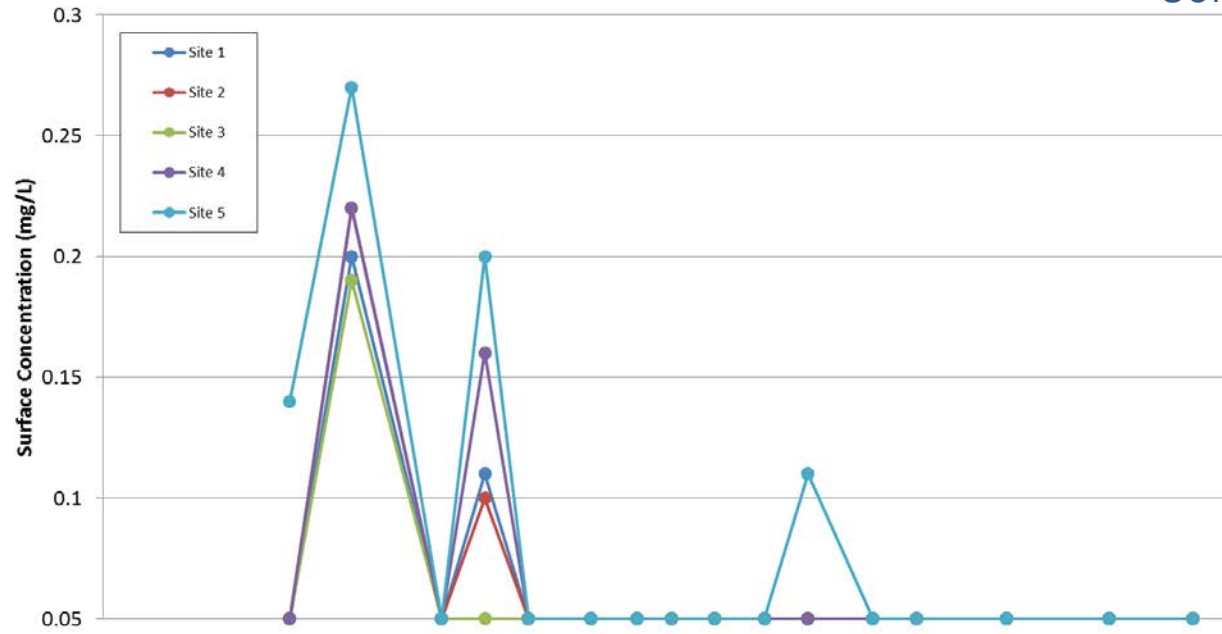


Chlorophyll

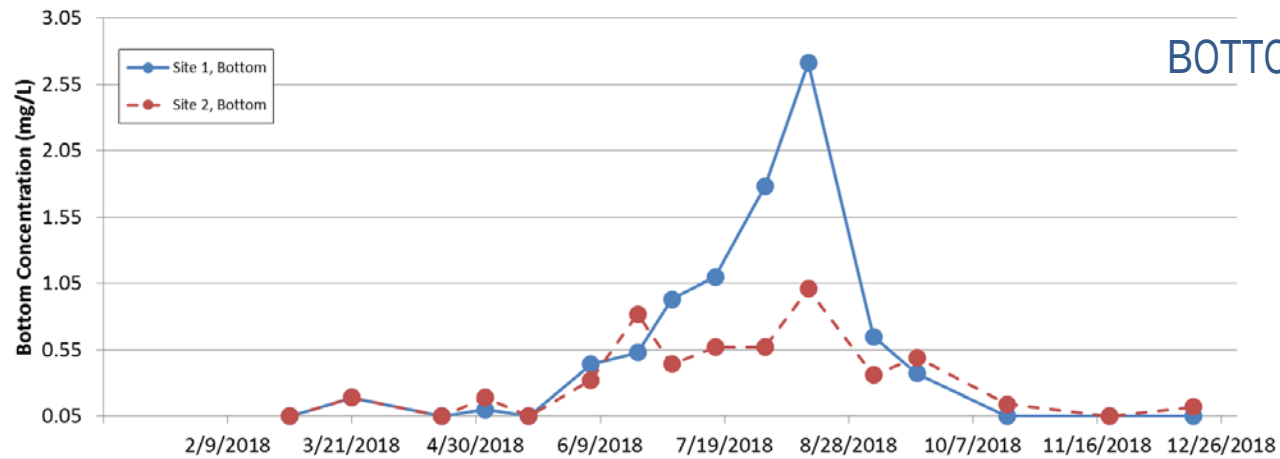


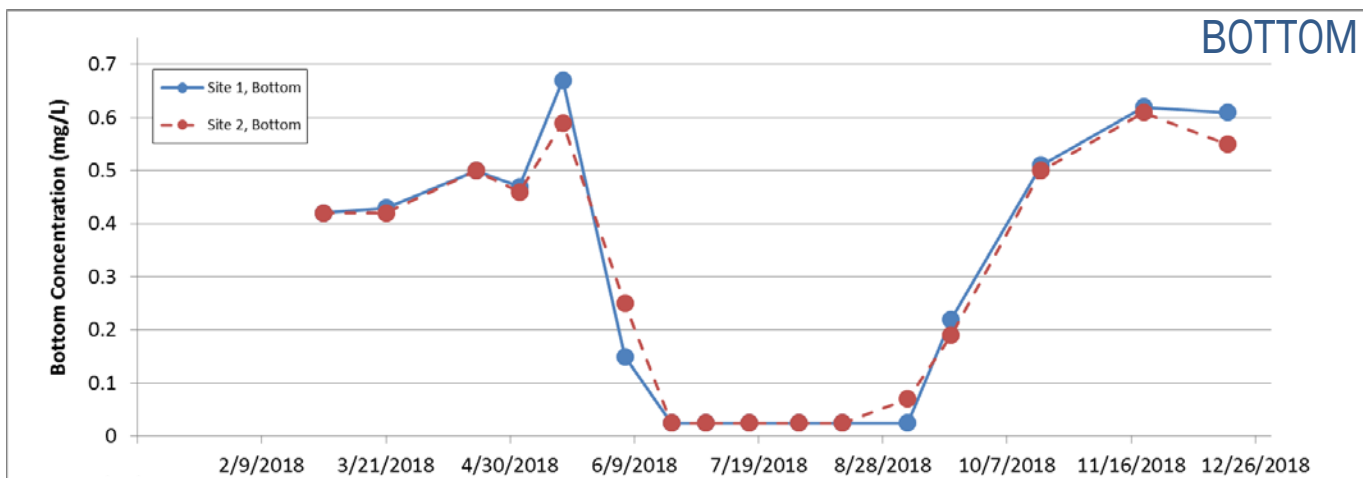
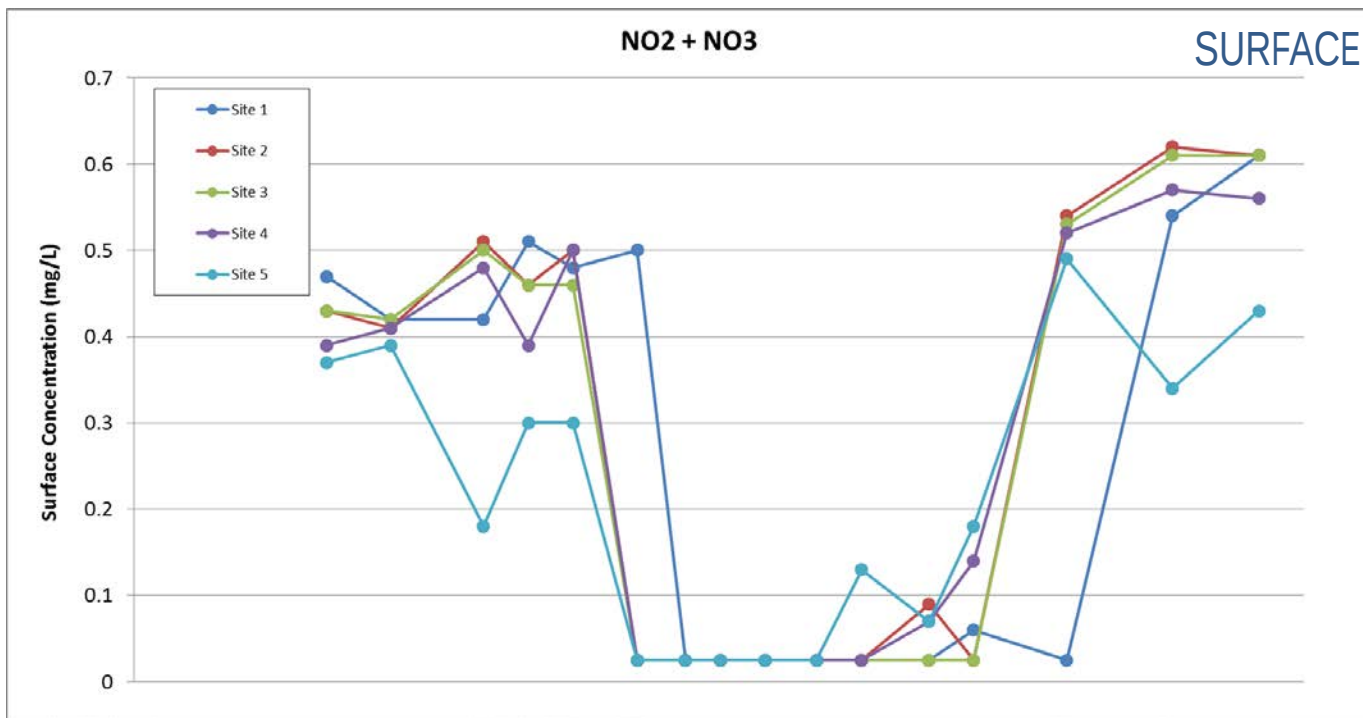
Ammonia-N

SURFACE



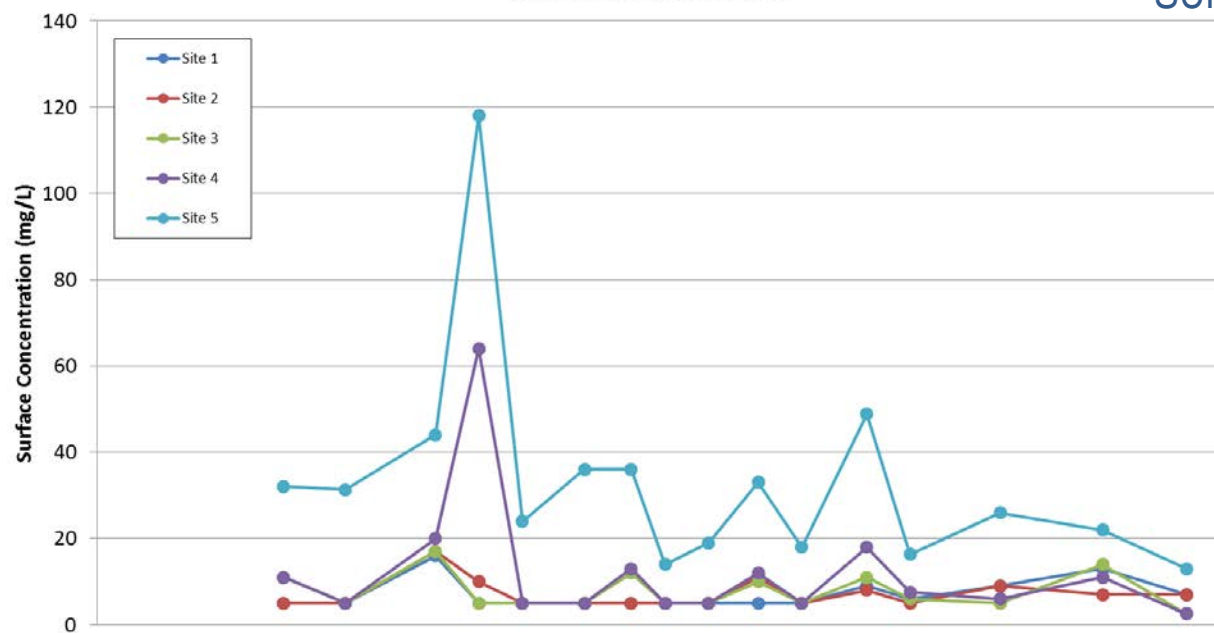
BOTTOM



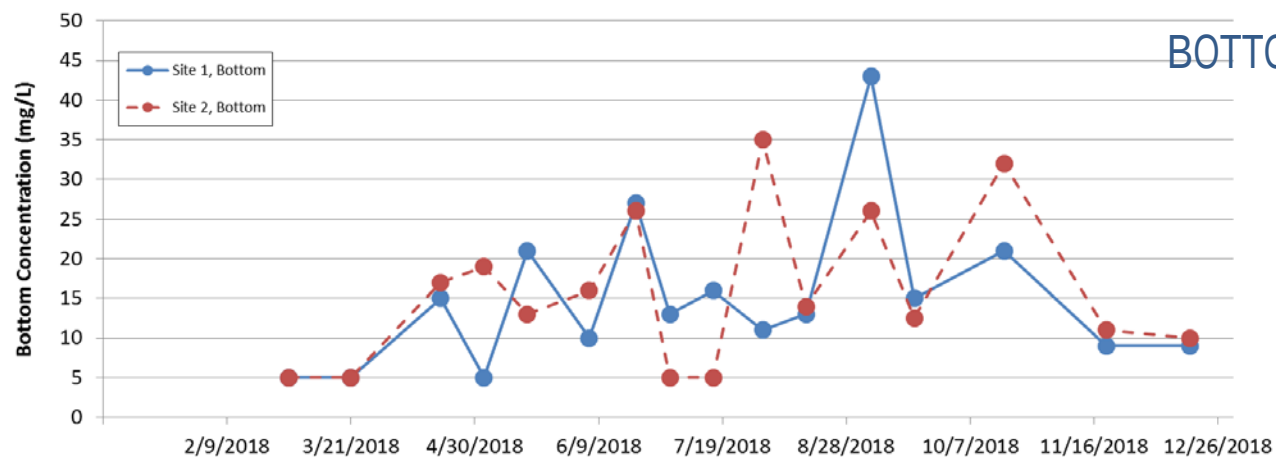


Total Suspended Solids

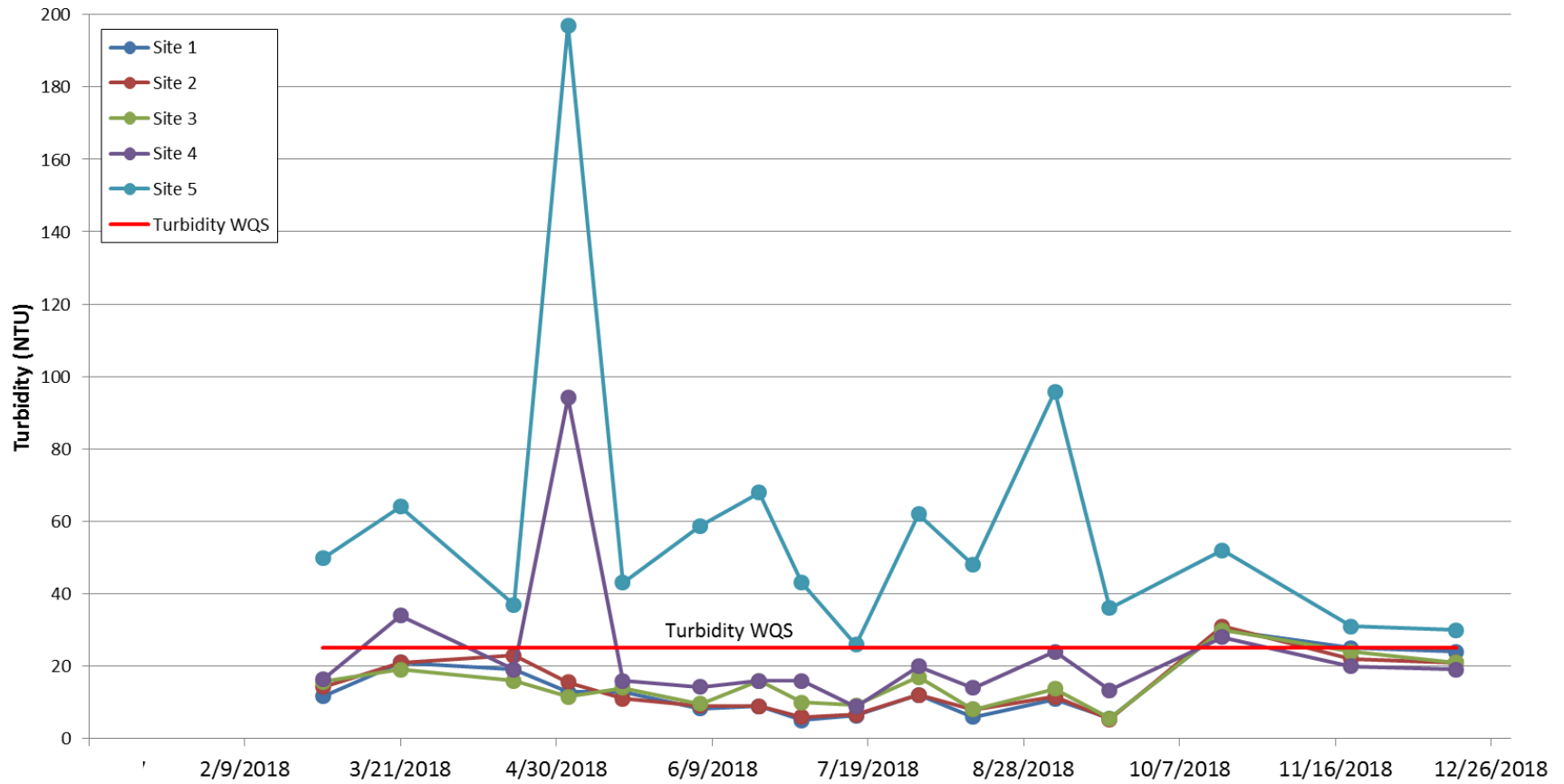
SURFACE



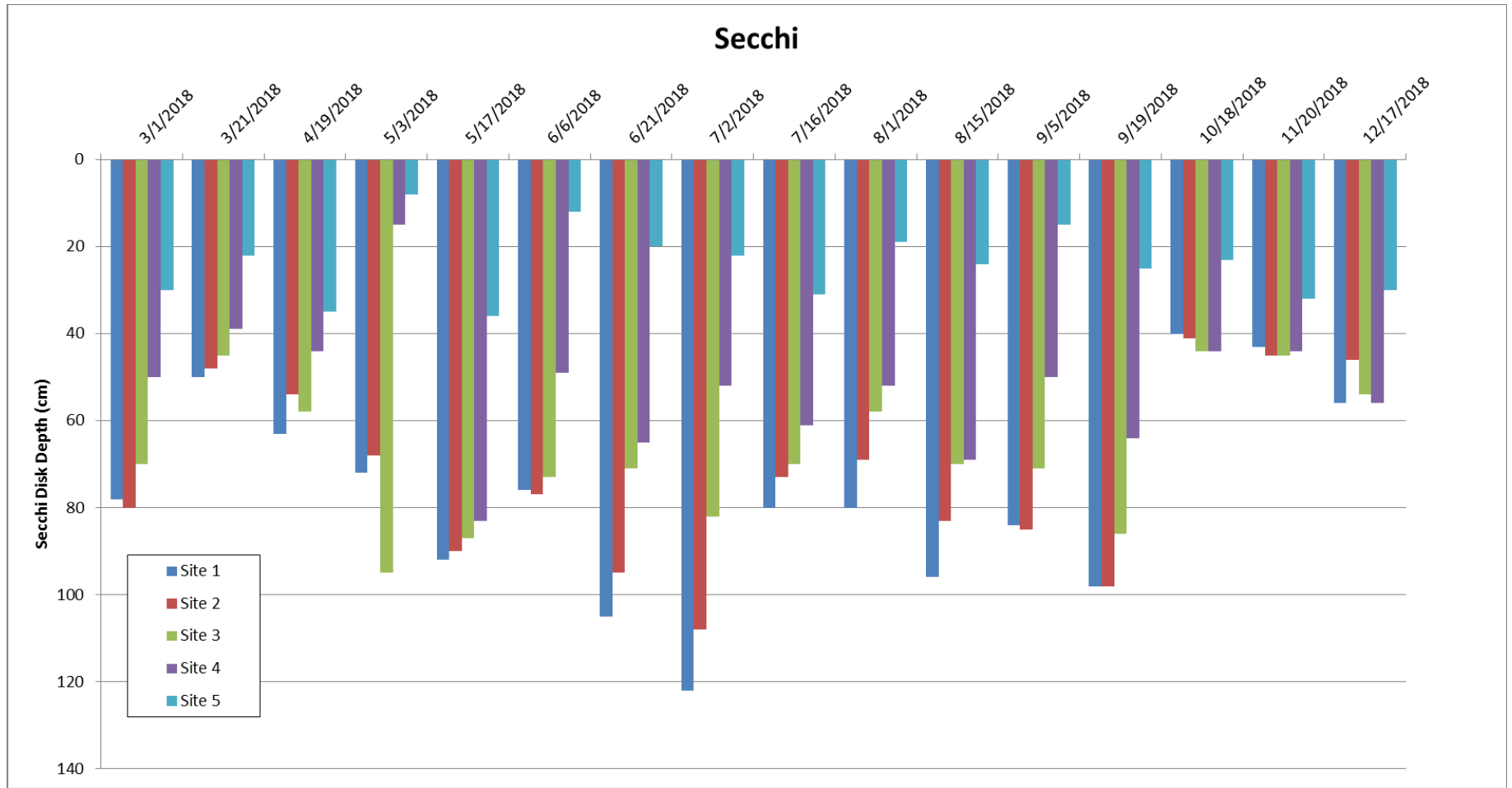
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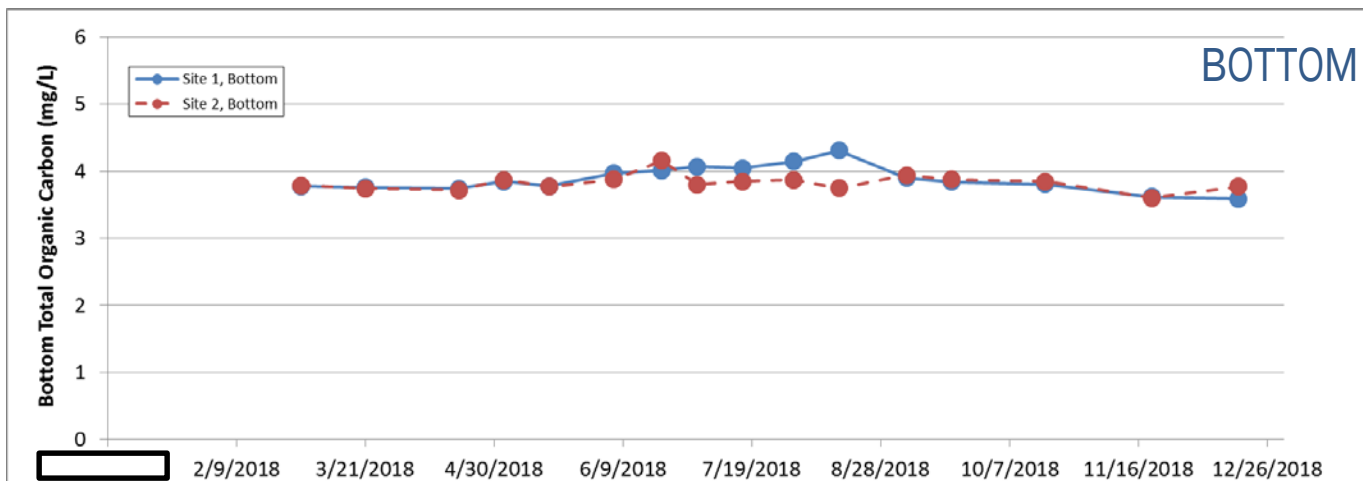
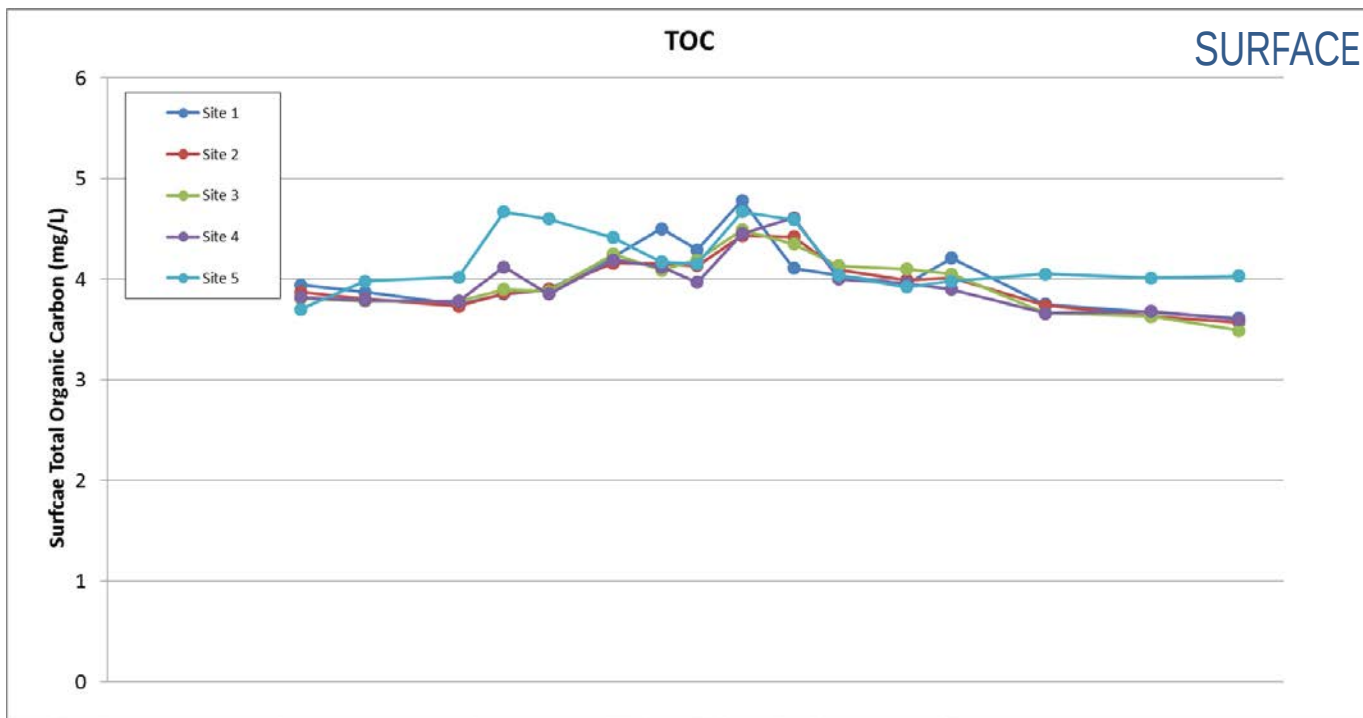


Turbidity









SUMMARY

- Thermocline set up around early June and broke down in late August
- Hypolimnion remained hypoxic through mid-September
- Ortho-P and ammonium was highly variable in the surface samples but built up in the hypoxic zone during stratification
 - Resuspension?
- Chlorophyll highly variable throughout the year but tended to be higher at ALL sites during the summer
- Highest TSS and turbidity at site 5 after big storm

FUTURE DIRECTIONS

- We will sample the lake 8 more times between January-June of 2019 with possible extension forthcoming
 - We are meeting with partners for another phase of monitoring
- Find out where the nutrients (e.g., phosphorus) go...
 - Was there a chlorophyll bloom that we missed?
- Mictic status?
- Stay tuned for another presentation combining both lakes and stream data collection efforts

QUESTIONS

