



Spatial Assessments of Milford Reservoir During Summer 2015



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2016 HAB Stakeholder Meeting

Topeka, Kansas

January 7, 2016

**U.S. Department of the Interior
U.S. Geological Survey**

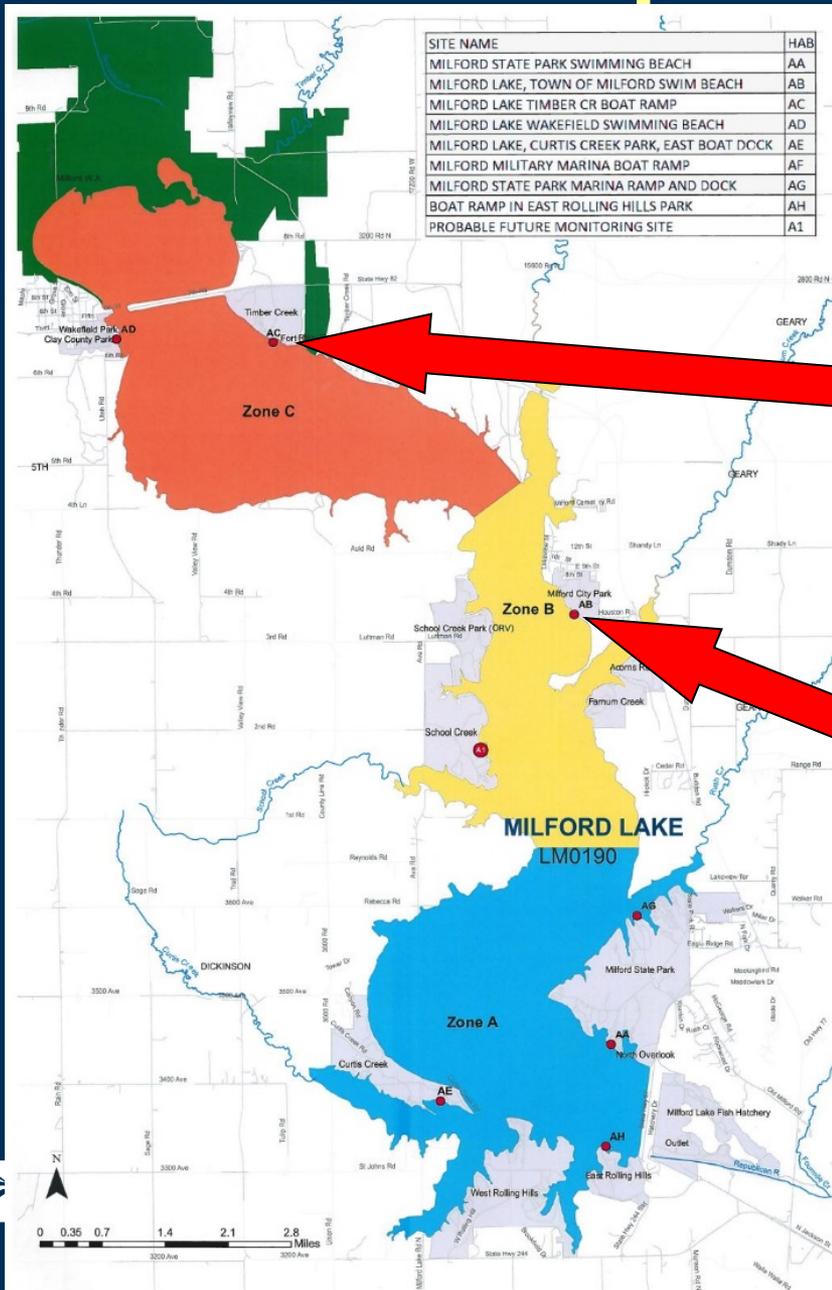
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January 2016

Study Objectives

- Characterize the spatial variability of cyanobacteria and microcystin in Milford Reservoir during summer 2015
 - Collection of spatially-dense near-surface data
- Describe representative sample collection approaches through synthesis of sample results collected by three agencies (USGS, KDHE, and U.S. Army Corps of Engineers)

What is a Representative Sample?



- Sample results from October 5, 2015
 - Cell count: 804,667,500
 - Microcystin Concentration: 30,000 $\mu\text{g/L}$
 - Cell count: 7,371
 - Microcystin Concentration: $< 1 \mu\text{g/L}$

Source- Kansas Department of Health and Environment



Two data collection runs

July 27, 2015

- Fixed site in zone C
- Continuous data over lake surface
- Surface grab microcystin and chlorophyll

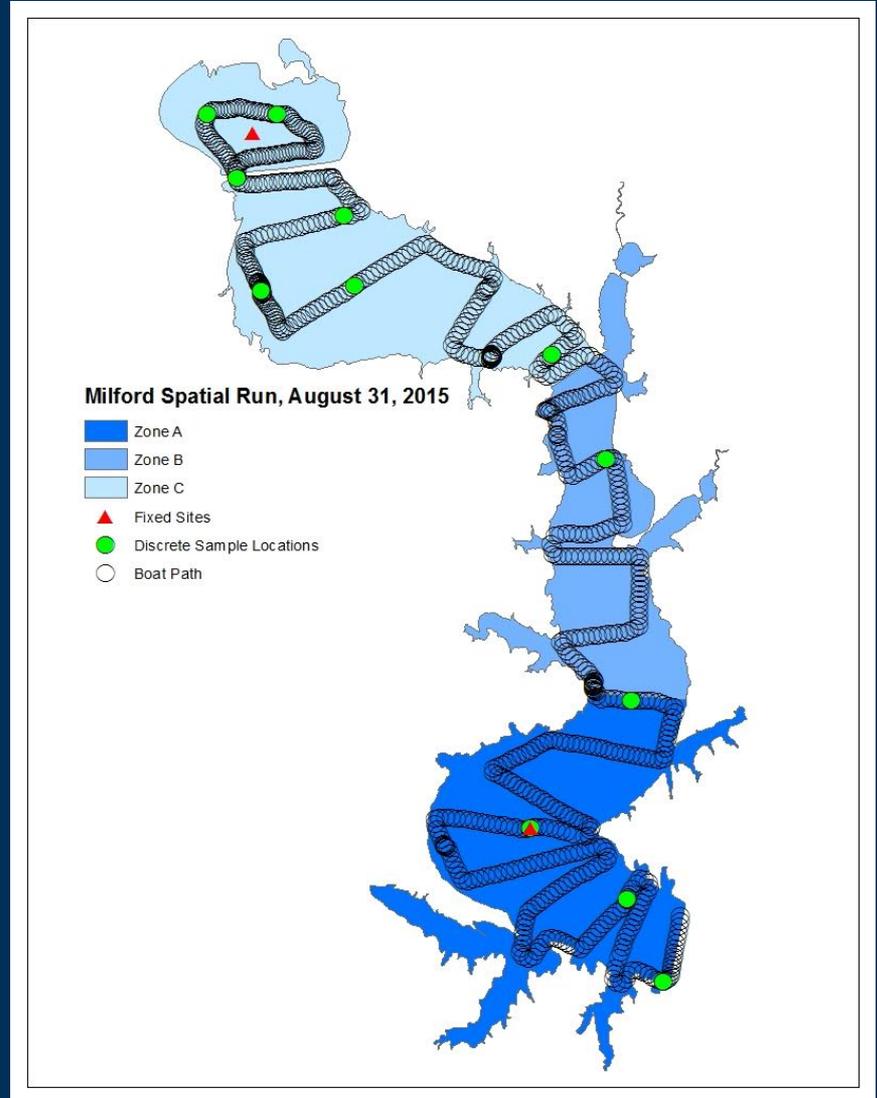
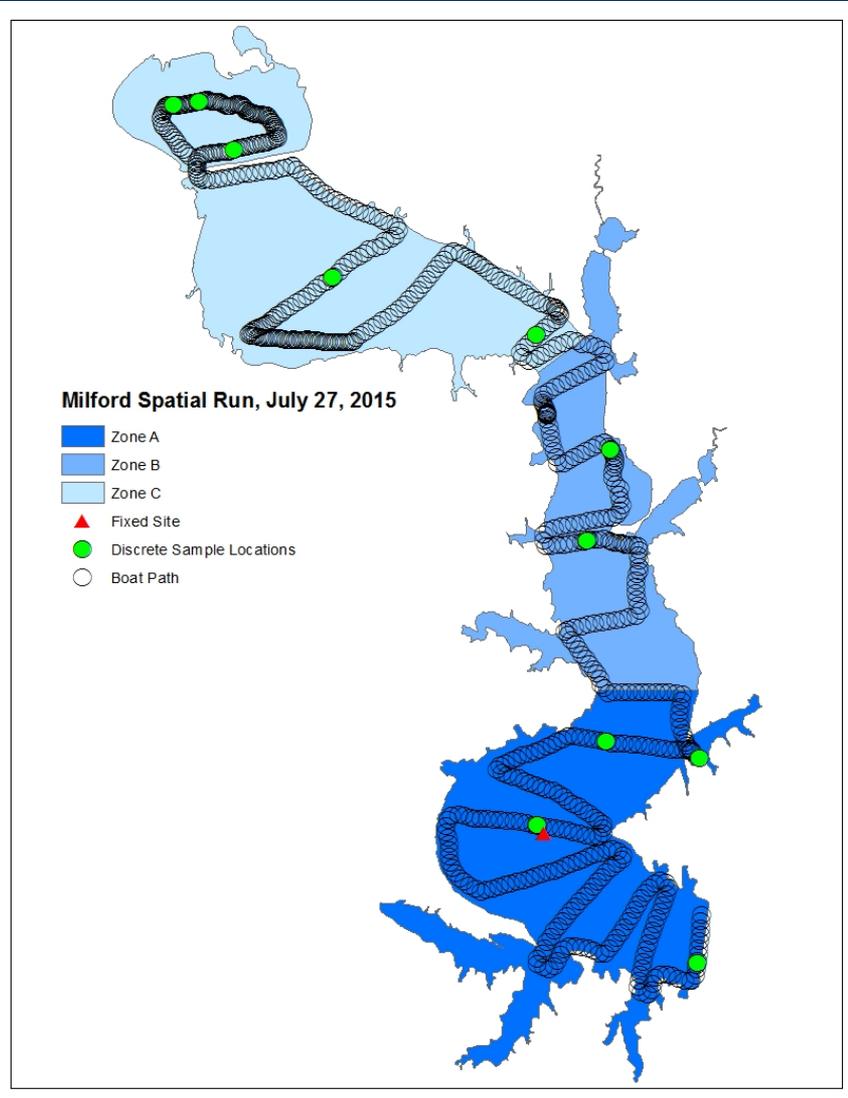
August 31, 2015

- Fixed sites in zones A & C
- Continuous data over lake surface
- Surface grab microcystin and chlorophyll

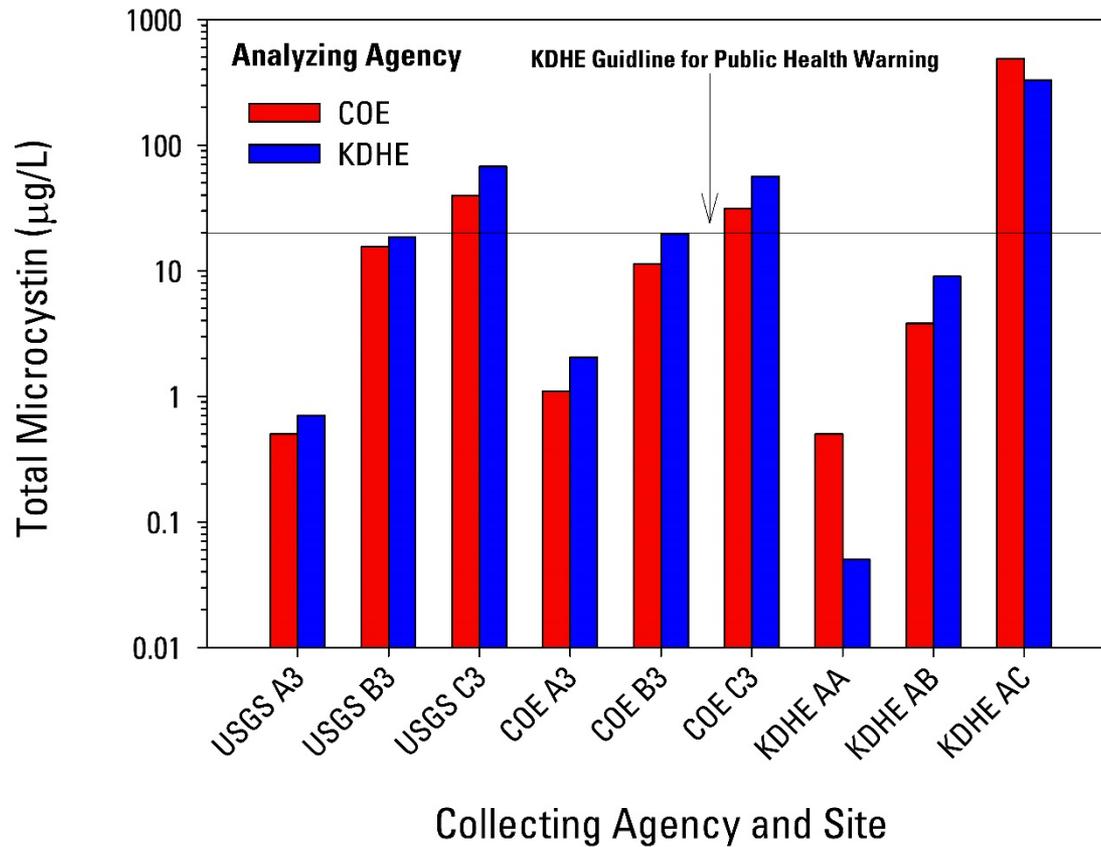
Two data collection runs

July 27, 2015

August 31, 2015

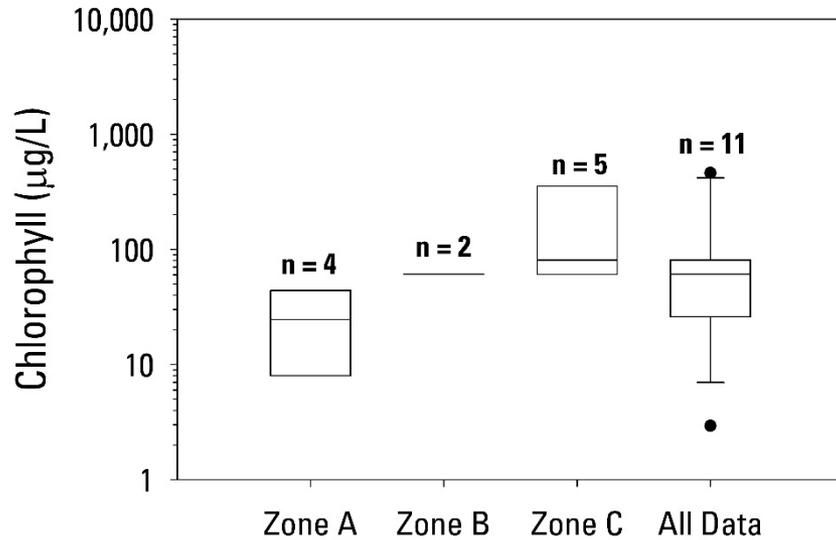


Microcystin QA/QC Samples

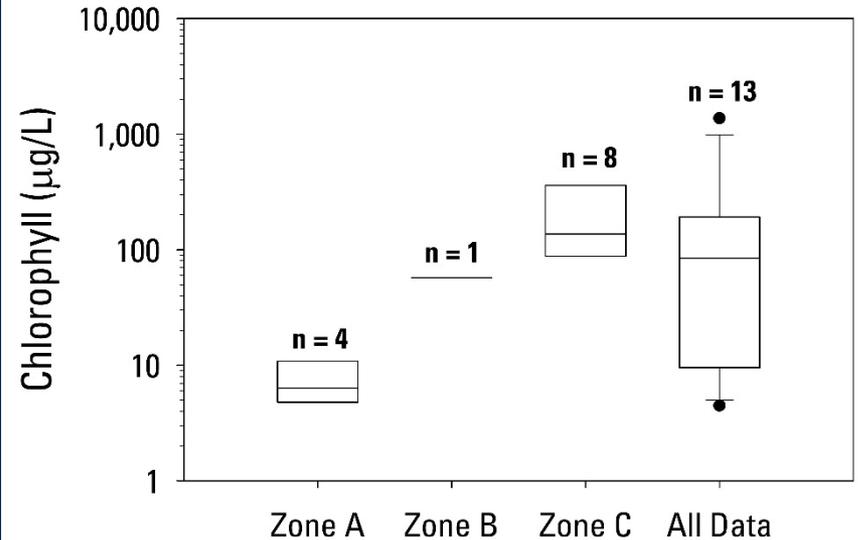


Chlorophyll Sample Summary Stats

July 27, 2015

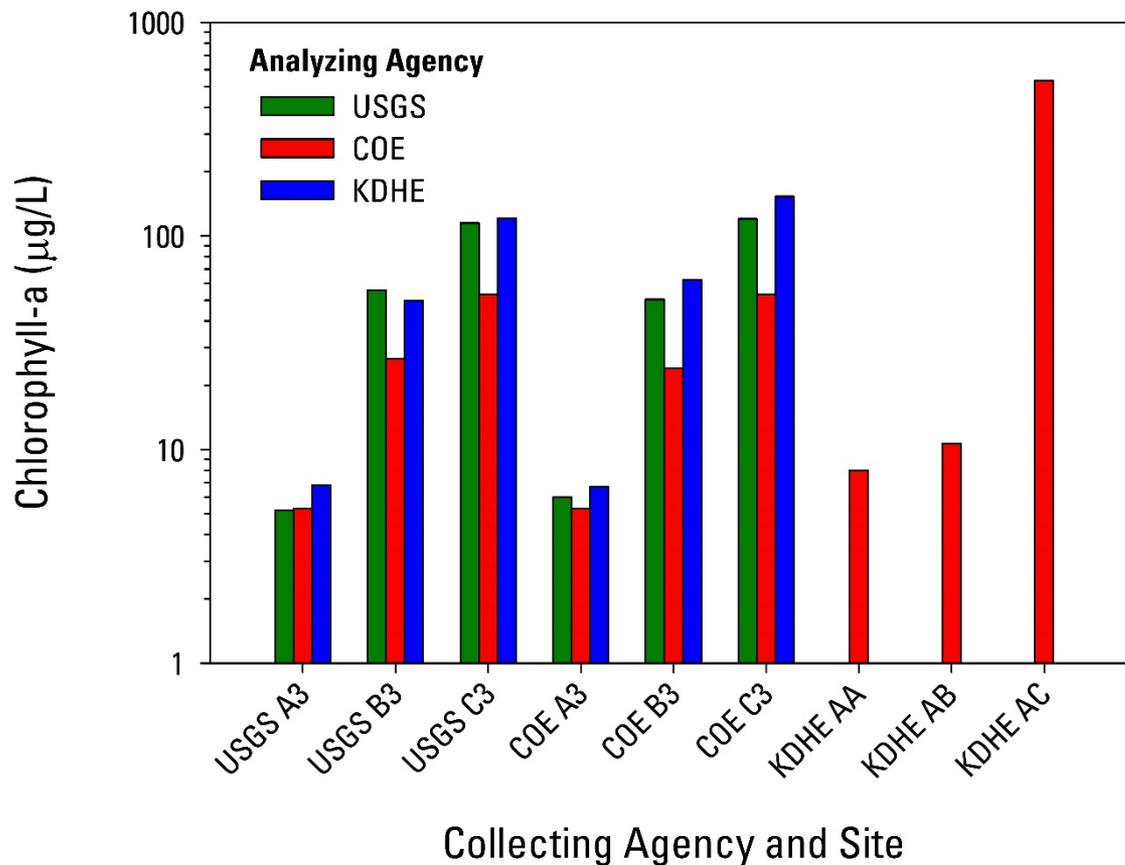


August 31, 2015



- (Lab measured)
- Order of magnitude difference A \rightarrow C

Chlorophyll QA/QC Samples

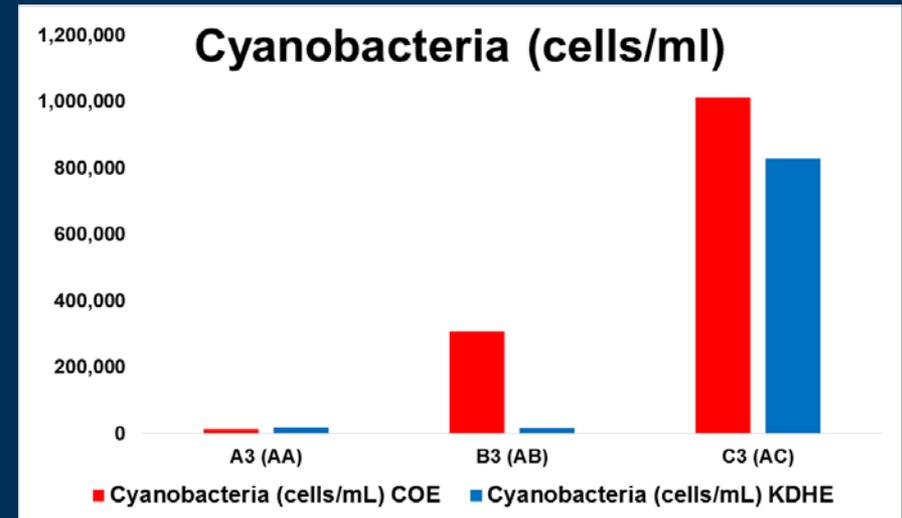
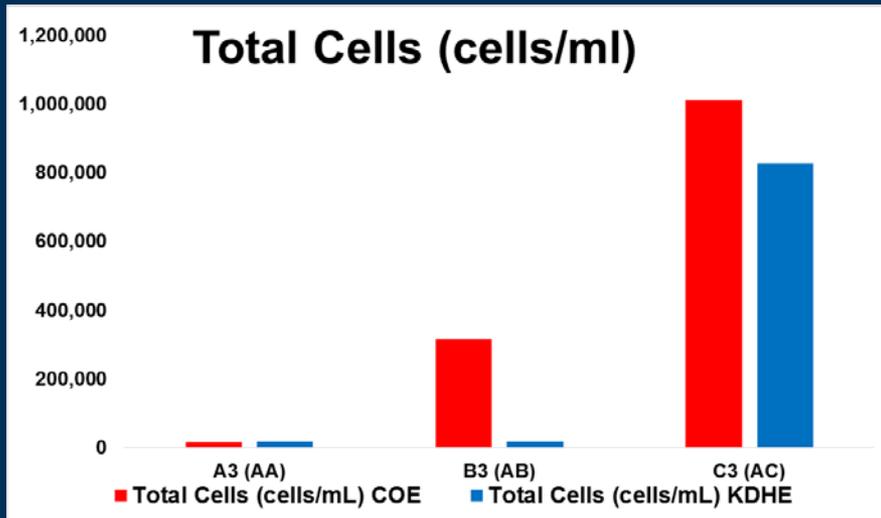


COE and KDHE use spectrophotometric analysis, USGS uses fluorometric analysis



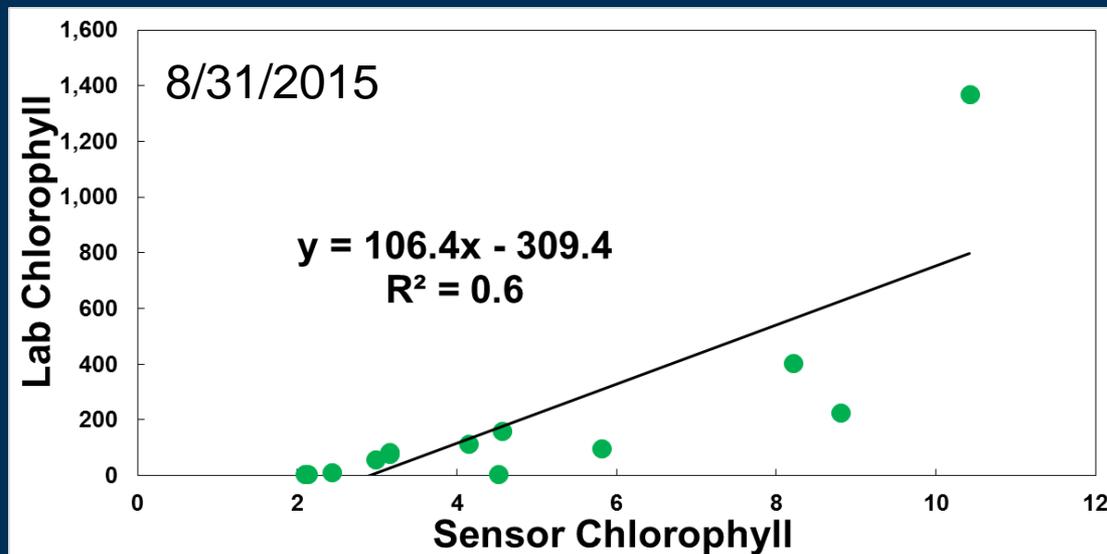
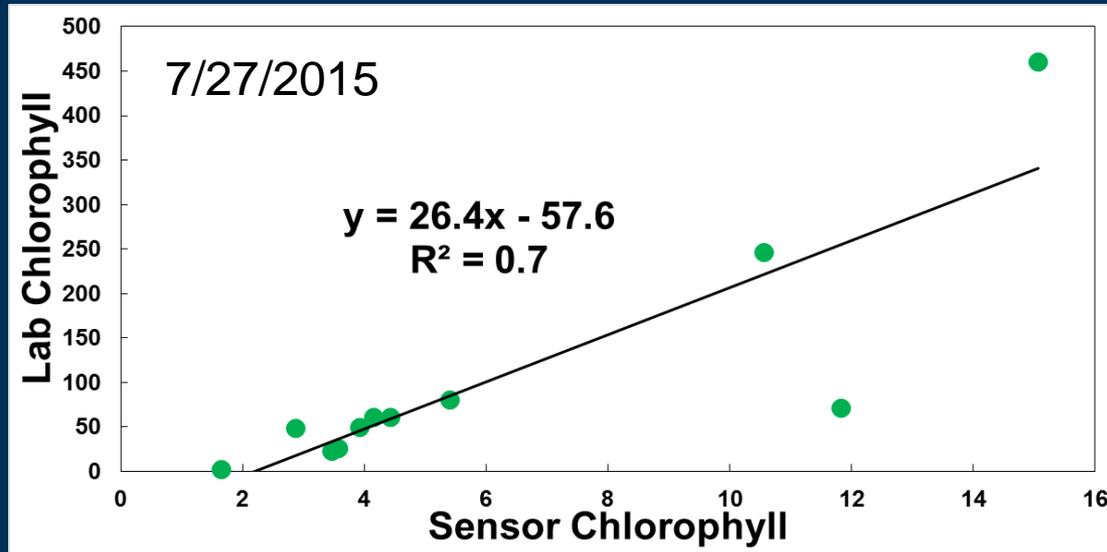
Cyanobacterial Community Composition

August 31, 2015

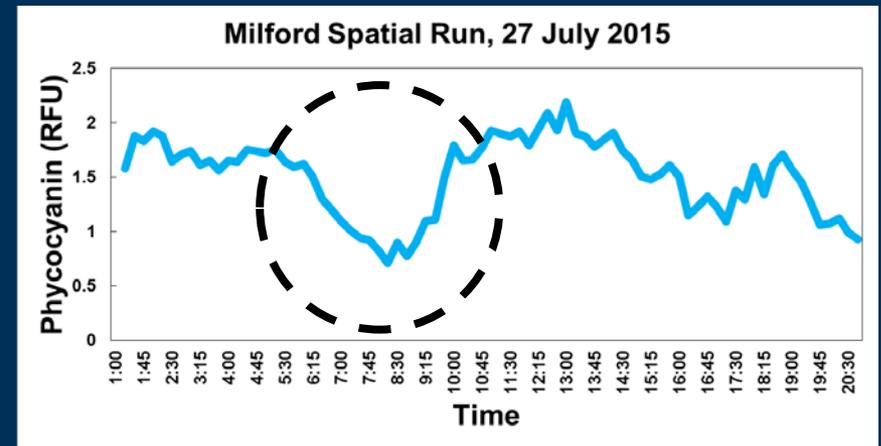
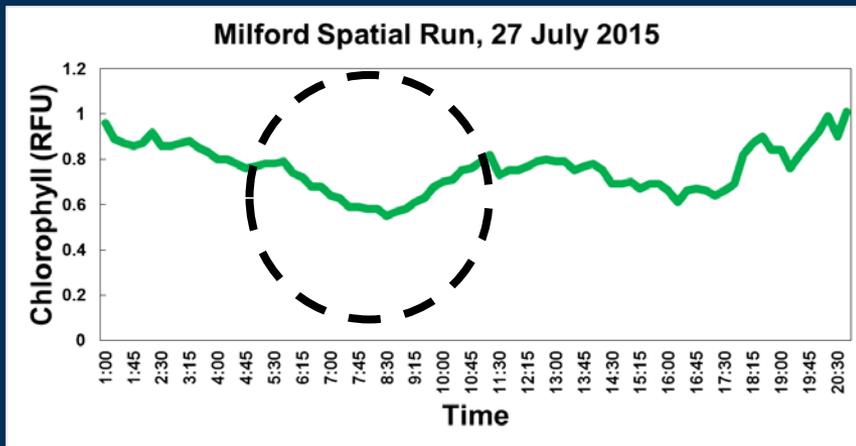


- Cyanobacteria ranged from 94 -100 percent of total cell counts

Sensor/Lab Chlorophyll Relation

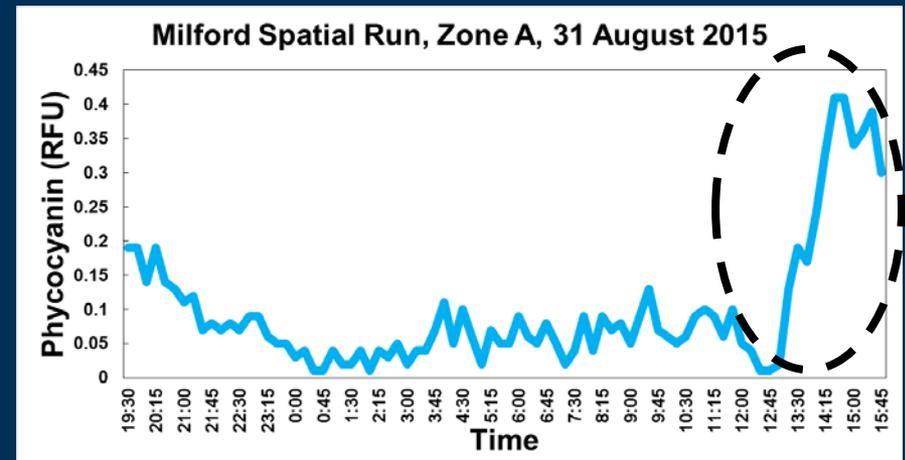
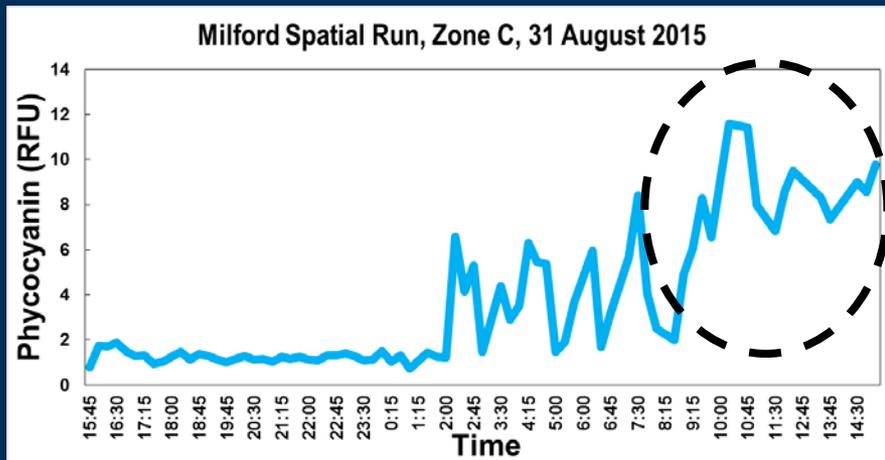
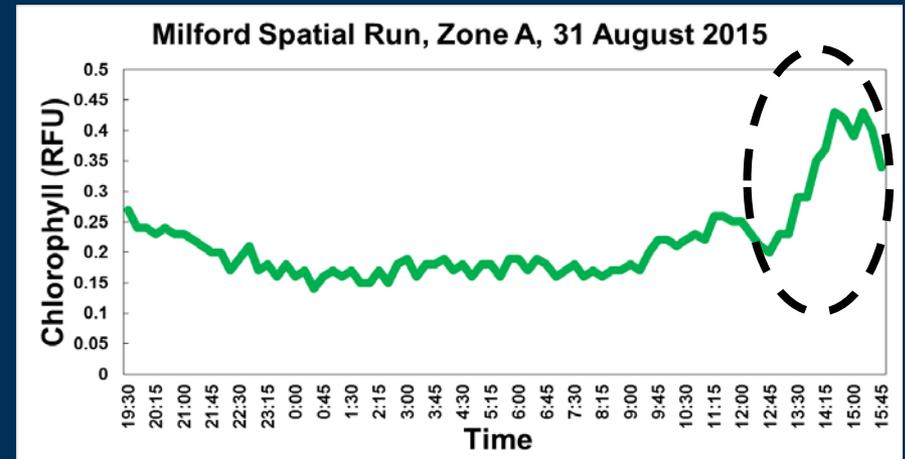
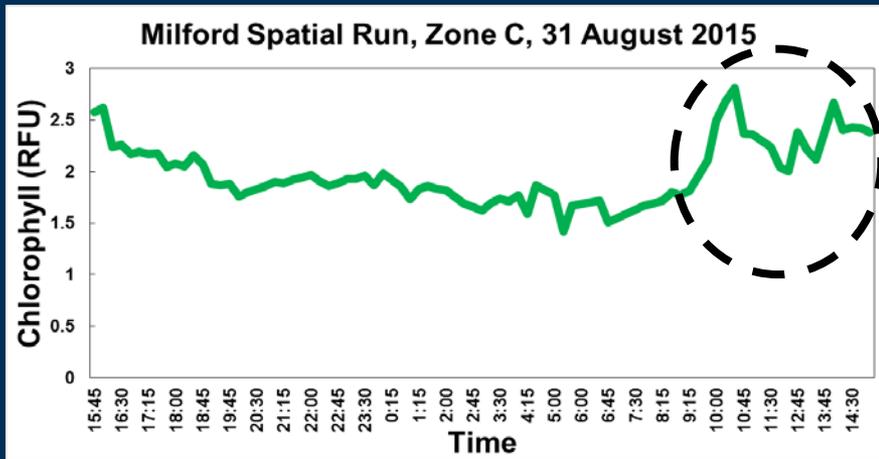


July 27, 2015 Fixed Site in Zone A: Suggest vertical migration of cyanobacteria?

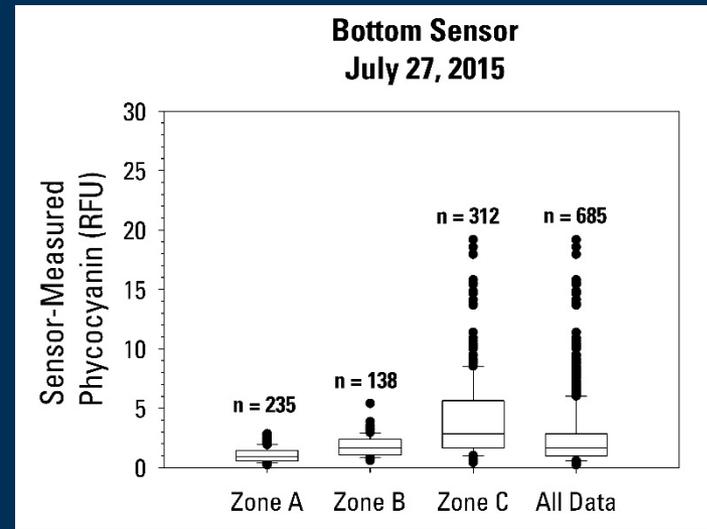
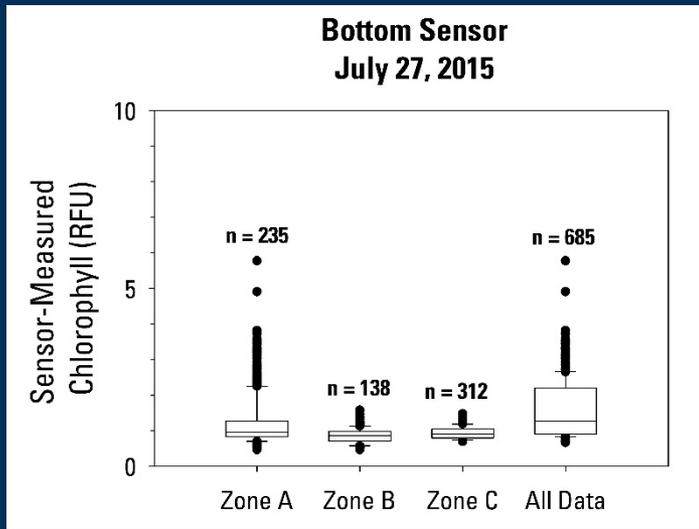
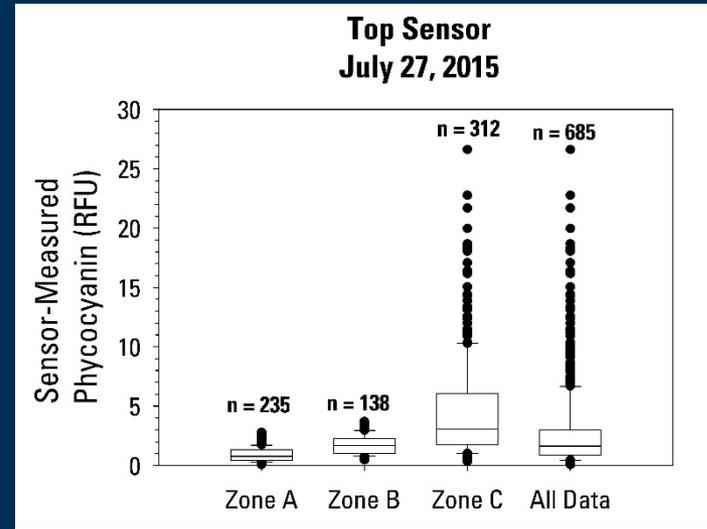
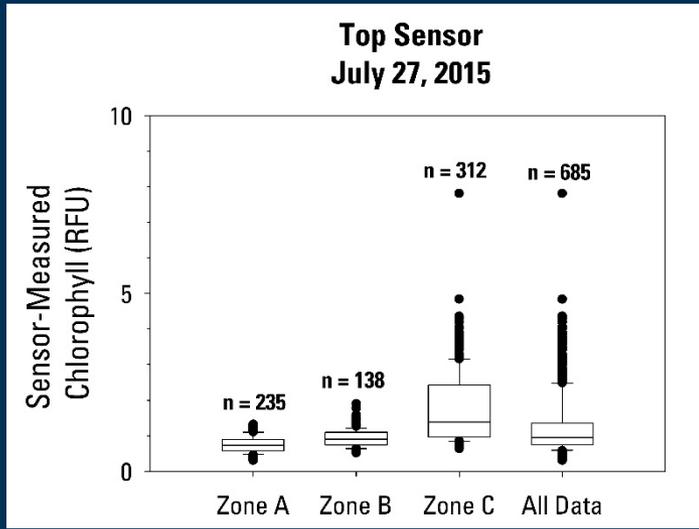


- Fixed site to capture diurnal patterns in lake water quality
 - ~1.0 meter depth, moored to buoy

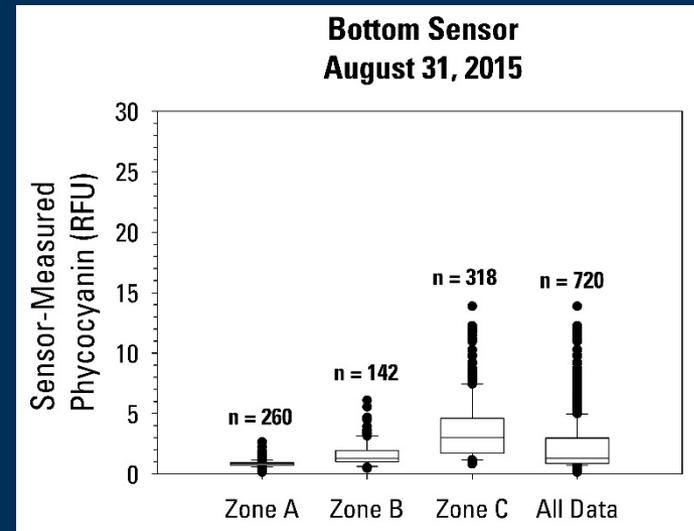
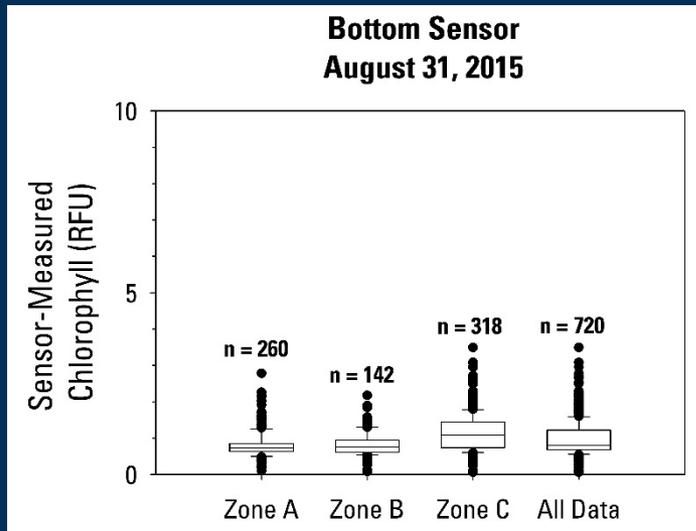
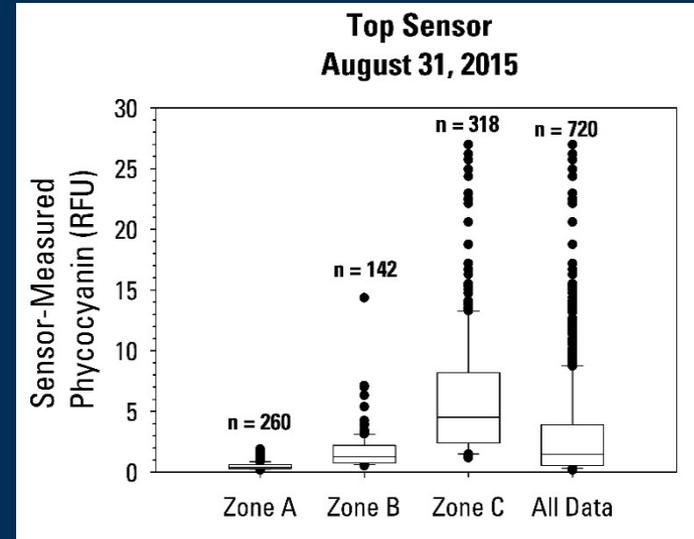
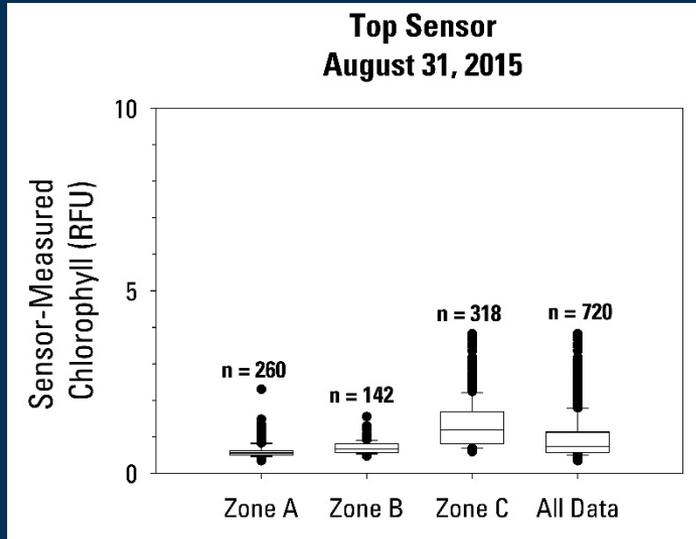
August 31, 2015 Zone C (left) Zone A (right). Conditions changed late in day...



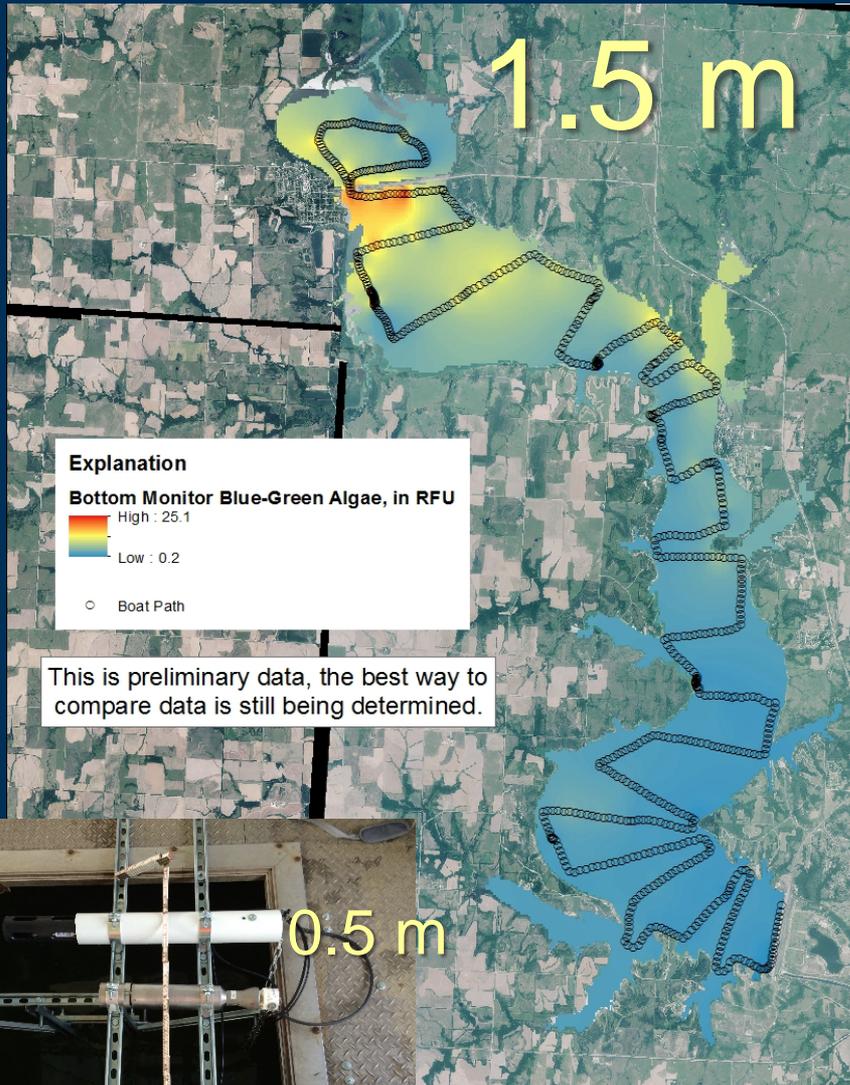
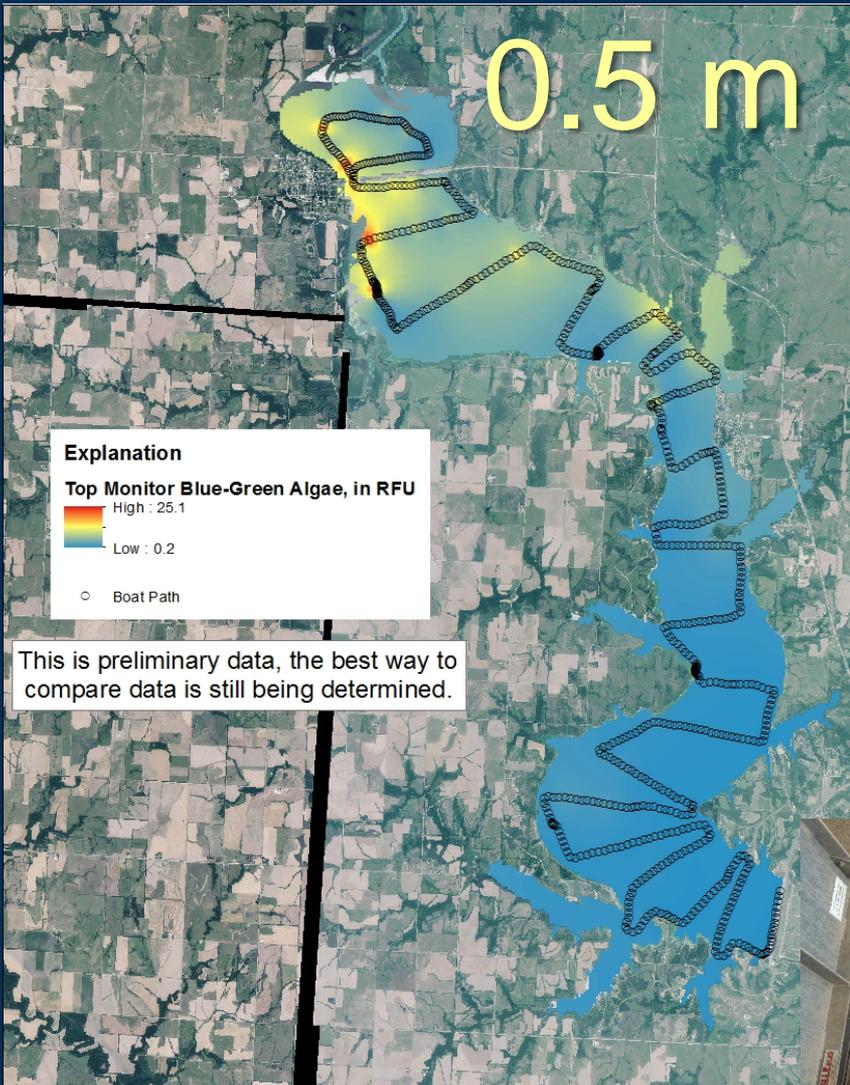
Sensor Variability July 27



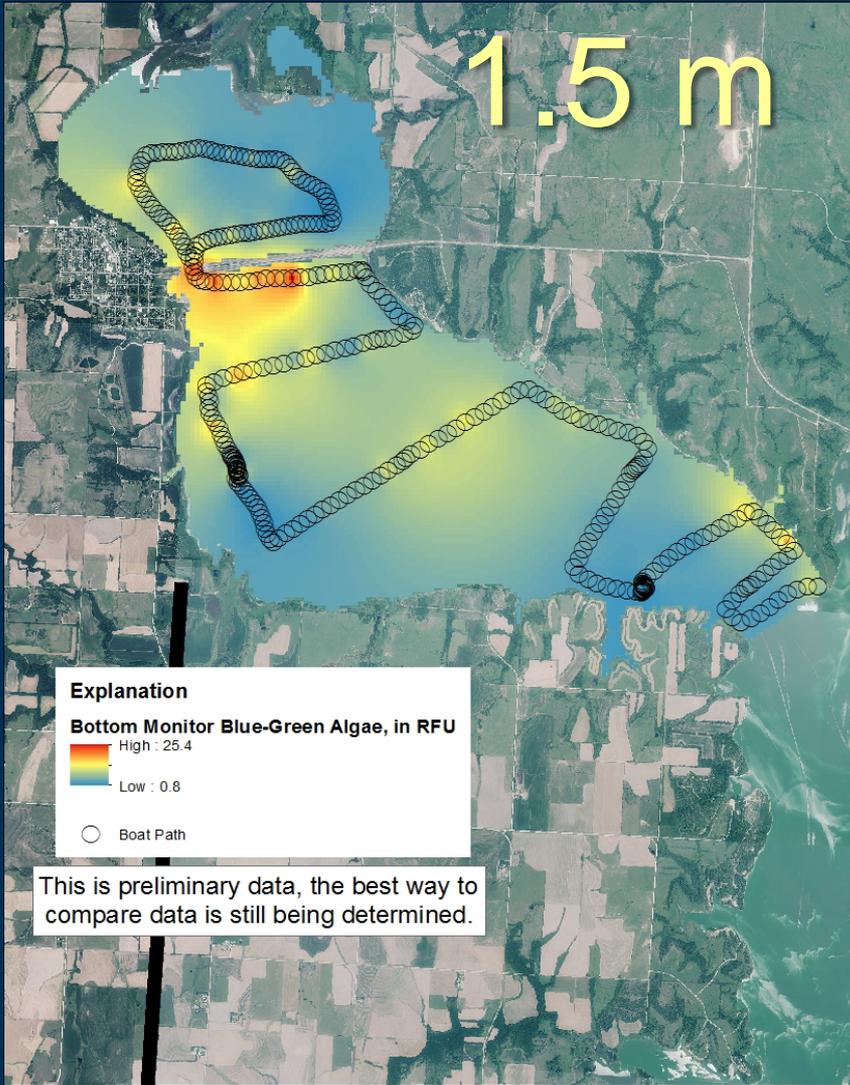
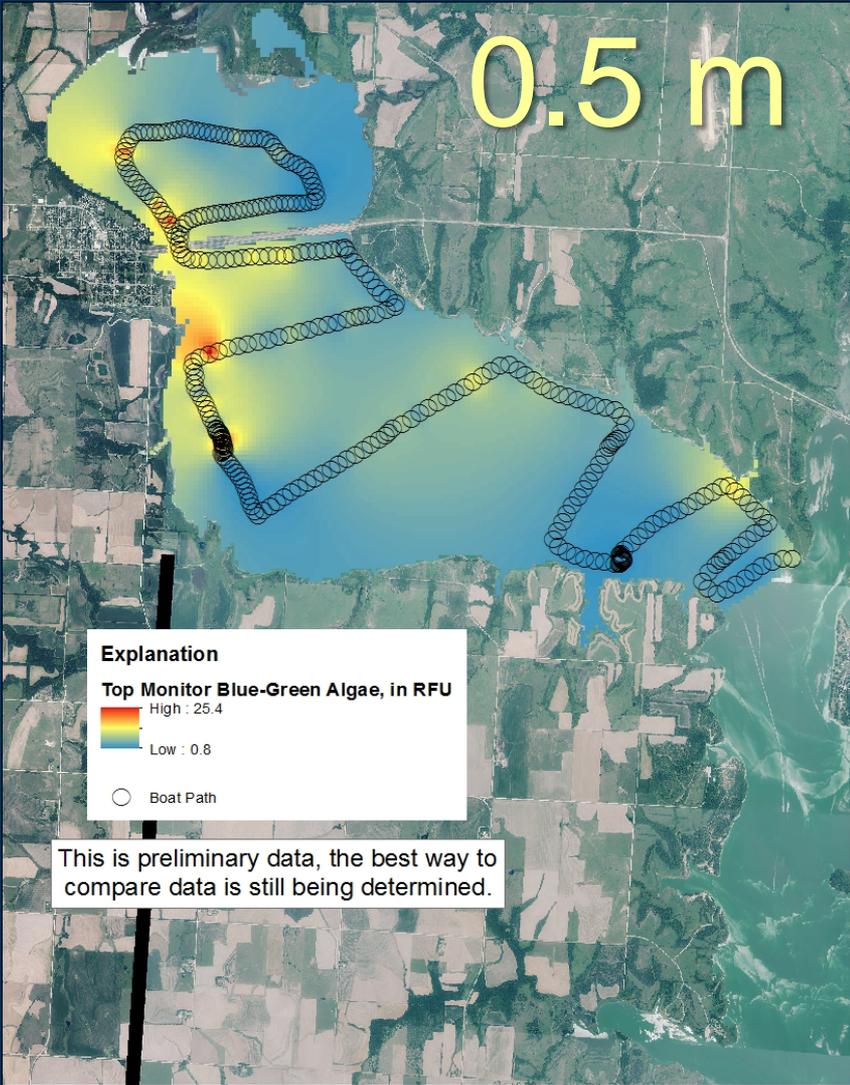
Sensor Variability August 31



Variability Exists in Depth as Well as Across the Surface



Variability Exists in Depth as Well as Across the Surface



Next Steps

- Complete comparison of sampling approaches
 - Publish report by September 30, 2016
- Develop methods for quick data turn-around and release for (near) real-time lake management
- Quantify total algal biomass
- Incorporate spatial patterns into models



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Additional Information:

Cyanobacteria -

<http://ks.water.usgs.gov/cyanobacteria>

