



Lakes After Hours:

Continuous Monitoring Of
Lakes Bloomington and
Evergreen Using Buoys

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CITY OF BLOOMINGTON WATER TREATMENT PLANT

Why Perform Continuous Monitoring?

- ▶ 24 hour coverage
- ▶ Ability to detect changes in water conditions and water quality
- ▶ Measures and reports data regardless of the weather
- ▶ Provides a possibility of detecting trends in time to respond proactively
- ▶ Results are as close as your mobile device
- ▶ Other lake users can benefit from lake data

What is Measured?

- ▶ Temperature
- ▶ Dissolved oxygen
- ▶ Percent saturation of dissolved oxygen
- ▶ Specific Conductance
- ▶ Turbidity
- ▶ “Total” algae concentration through fluorescence
- ▶ Phycocyanin (an accessory pigment in cyanobacteria) through fluorescence



Images from YSI/Xylem

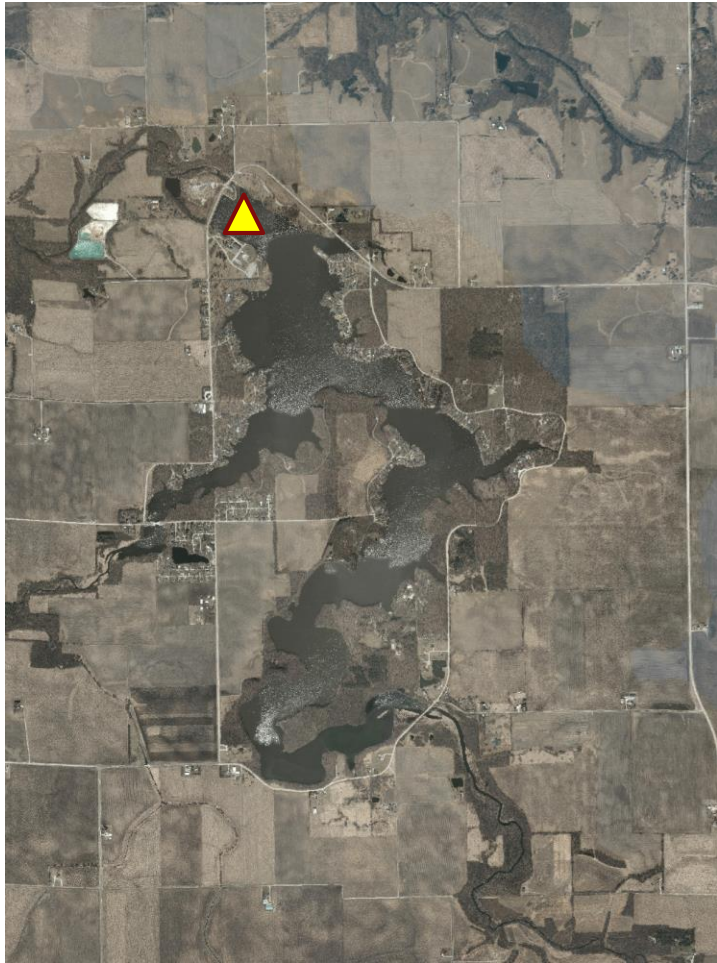








Where the Buoys Are







NETWORKS

[BACK TO MAP](#)

Public Networks Map

Default Network

Evergreen Lake

Lake Bloomington

Site Information



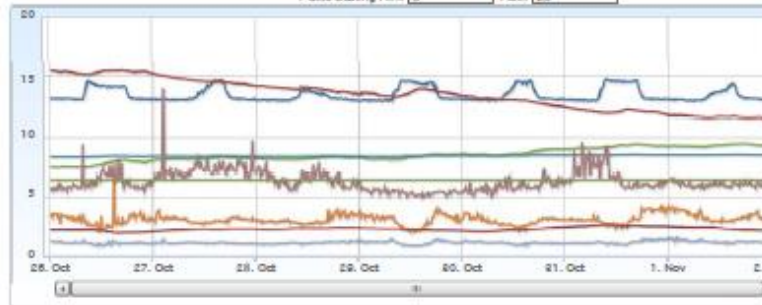
Site Name: Evergreen Lake
 Latitude: 40.64907°
 Longitude: -89.04139°
 Description: (None)

Data History

Data Range from: to:

Click and drag to zoom. Toggle sensors in the legend. single default all

Y-axis Scaling Min: Max:



Showing 1 to 50 of 673 entries

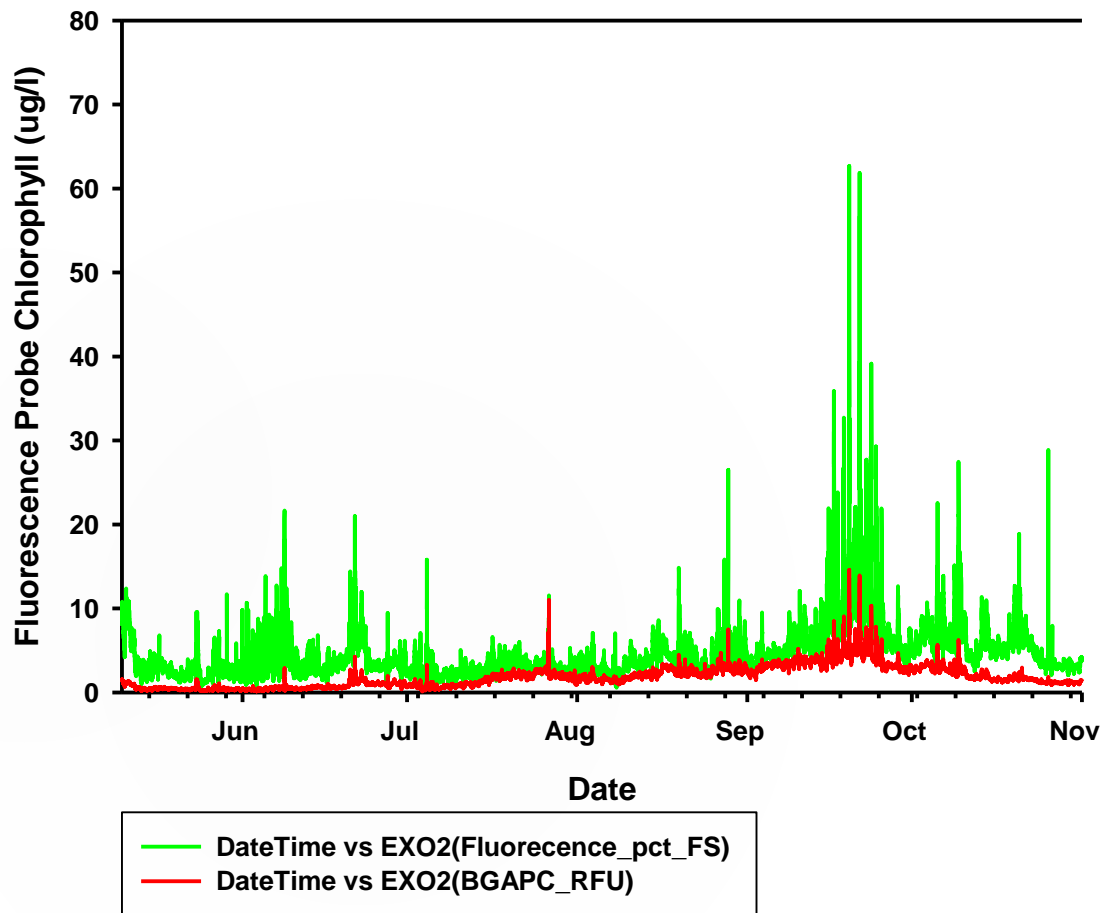
[First](#) [Prev](#)

Date	Time	SystemBattery	EX02 (Temp_C)	EX02 (ODO_Concplus_mg_L)	EX02 (ODO_pctplus_pct)	EX02 (pH) (Fluorec)
11/02/2017	00:00:00	13.09	11.51	9.41	86.43	8.61
11/01/2017	23:45:00	13.01	11.50	9.41	86.44	8.61
11/01/2017	23:30:00	13.09	11.49	9.41	86.39	8.61
11/01/2017	23:15:00	13.01	11.49	9.40	86.36	8.61
11/01/2017	23:00:00	13.04	11.50	9.39	86.29	8.60
11/01/2017	22:45:00	13.12	11.51	9.38	86.21	8.60
11/01/2017	22:30:00	13.12	11.50	9.38	86.16	8.60
11/01/2017	22:15:00	13.07	11.58	9.35	86.07	8.60
11/01/2017	22:00:00	13.11	11.61	9.34	86.04	8.60
11/01/2017	21:45:00	13.14	11.62	9.34	86.00	8.59
11/01/2017	21:30:00	13.15	11.61	9.34	86.00	8.60
11/01/2017	21:15:00	13.06	11.65	9.33	85.97	8.59
11/01/2017	21:00:00	13.15	11.65	9.34	86.08	8.59
11/01/2017	20:45:00	13.15	11.64	9.35	86.16	8.59
11/01/2017	20:30:00	13.17	11.64	9.36	86.28	8.59

Show entries

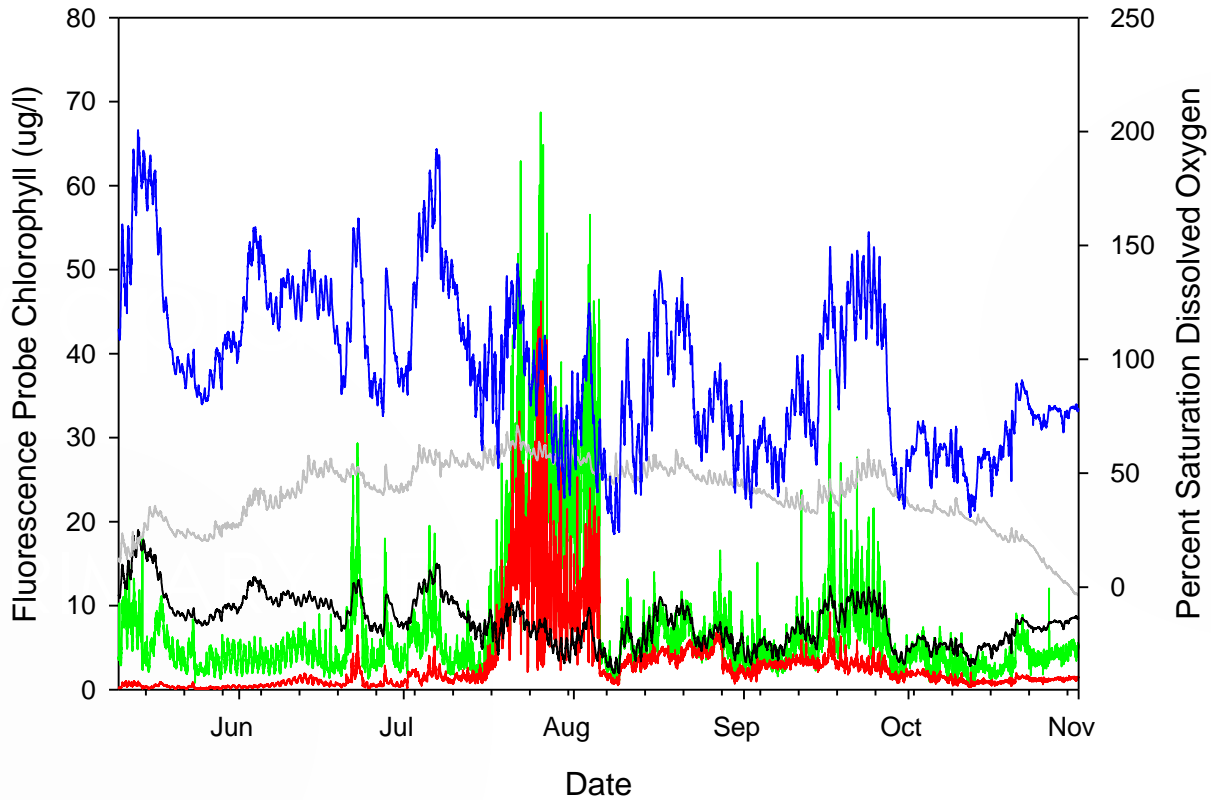
Results are telemetered to a web server. The datalogger can be programmed to send text alerts if certain parameters fall outside acceptable limits.

Evergreen Lake Fluorescence probe Chlorophyll/Phycocyanin



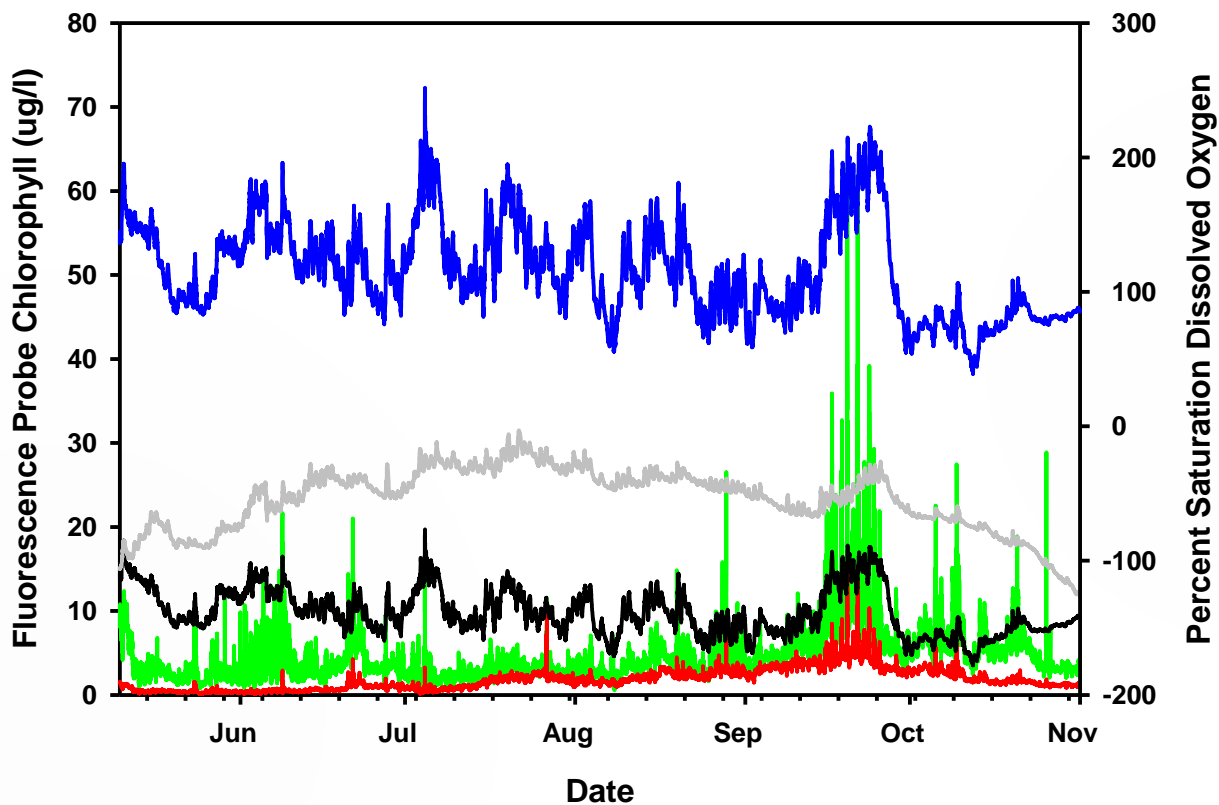
Fluorescence Probes
provide an index of
phytoplankton density
and makeup

Lake Bloomington Fluorescence probe Chlorophyll/Phycocyanin



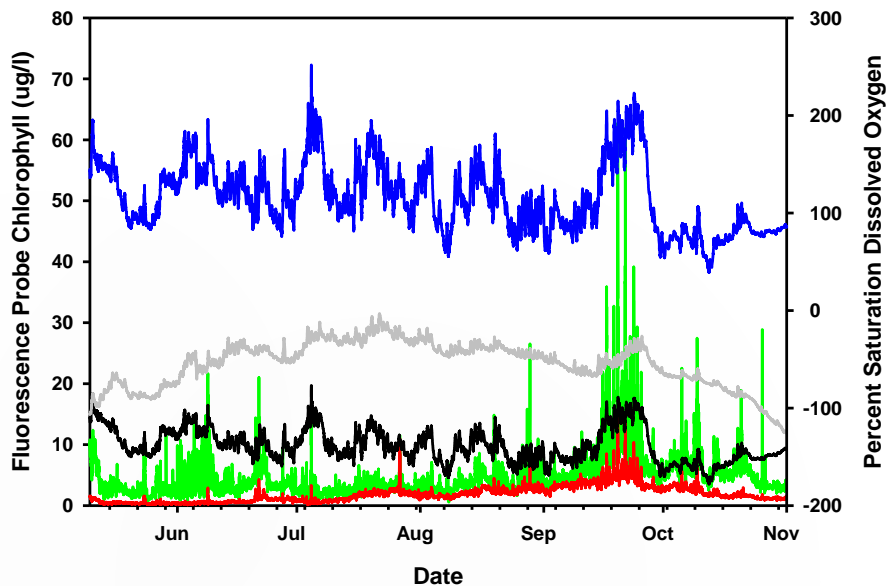
- DateTime vs EXO2(Fluorecence_pct_FS)
- DateTime vs EXO2(BGAPC_RFU)
- DateTime vs EXO2(ODO_Concplus_mg_L)
- DateTime vs EXO2(Temp_C)
- DateTime vs EXO2(ODO_pctplus_pct)

Evergreen Lake Fluorescence probe Chlorophyll/Phycocyanin



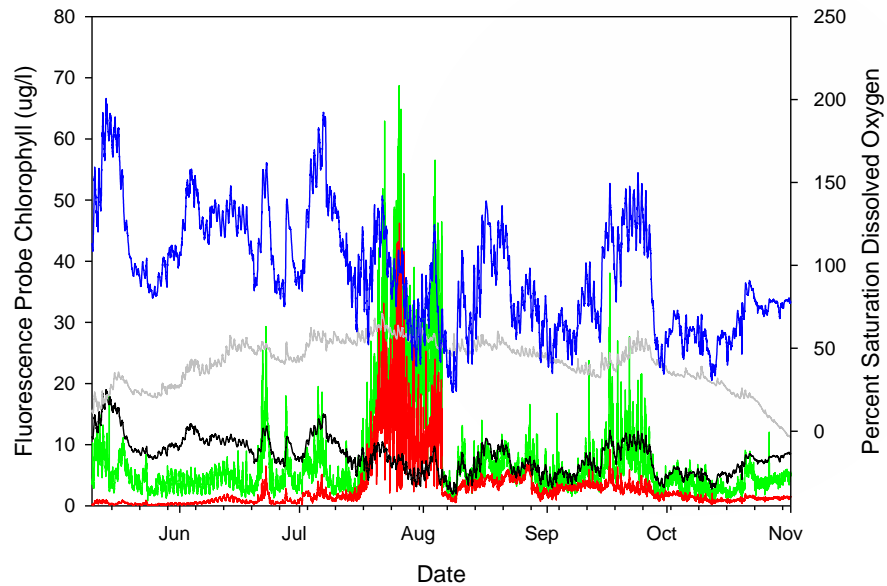
- Green — DateTime vs EXO2(Fluorecence_pct_FS)
- Red — DateTime vs EXO2(BGAPC_RFU)
- Black — DateTime vs EXO2(ODO_Concplus_mg_L)
- Grey — DateTime vs EXO2(Temp_C)
- Blue — DateTime vs EXO2(ODO_pctplus_pct)

Evergreen Lake Fluorescence probe
Chlorophyll/Phycocyanin



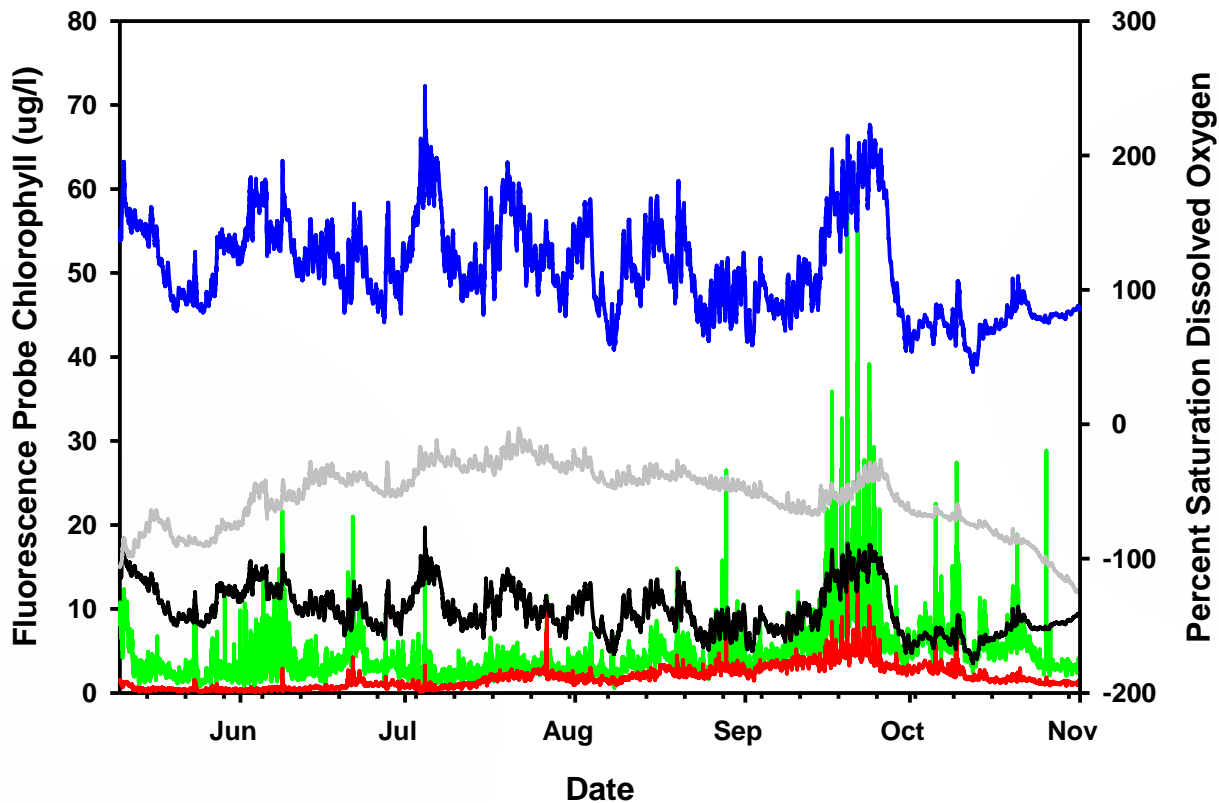
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- DateTime vs EXO2(ODO_Concplus_mg_L)
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- DateTime vs EXO2(ODO_pctplus_pct)

Lake Bloomington Fluorescence probe
Chlorophyll/Phycocyanin



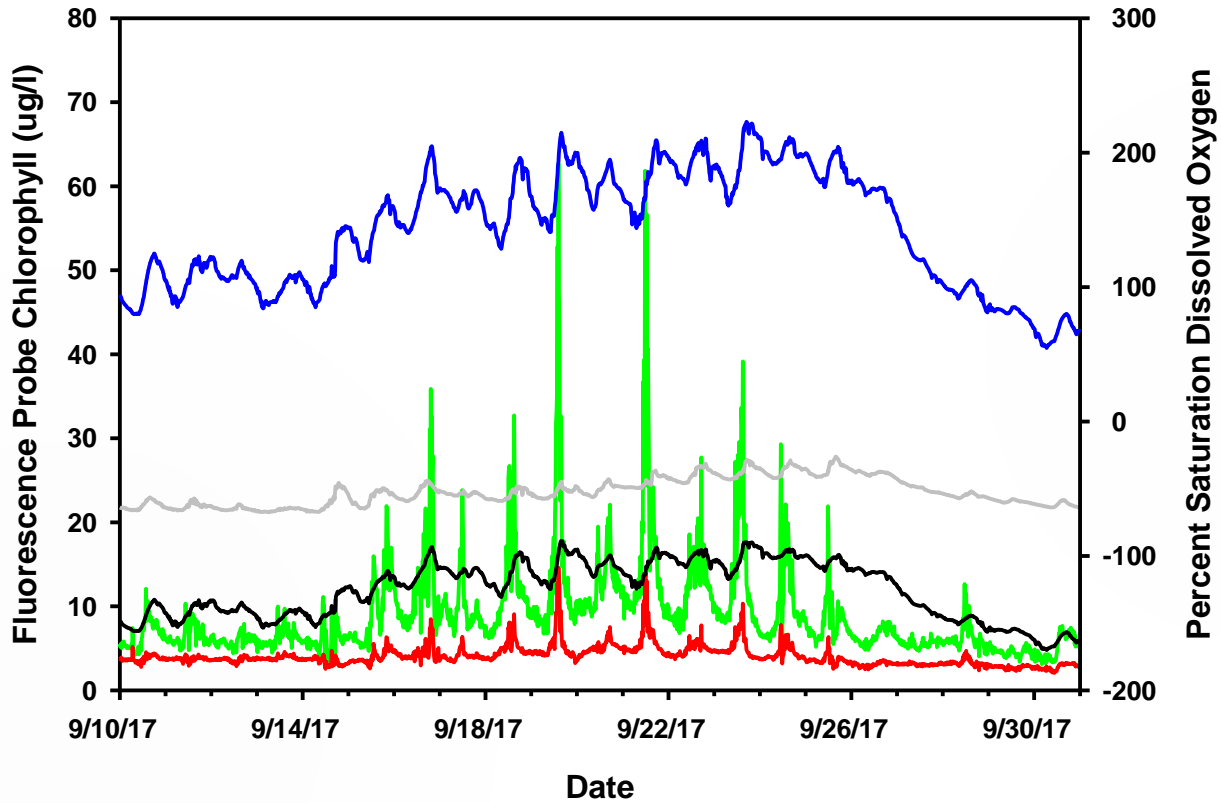
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Evergreen Lake Fluorescence probe Chlorophyll/Phycocyanin

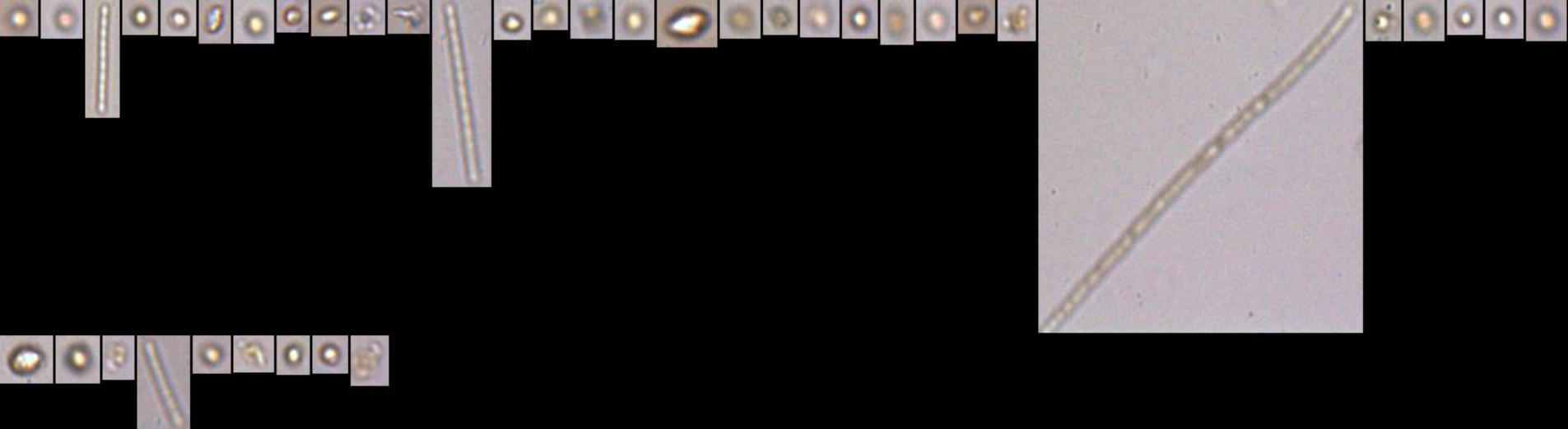


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- DateTime vs EXO2(Temp_C)
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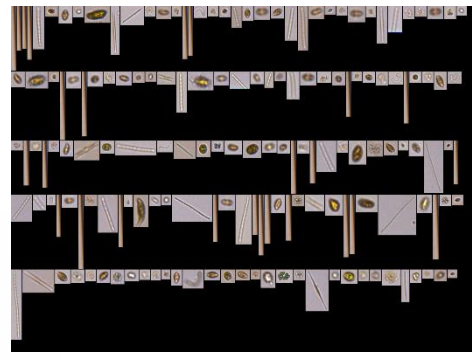
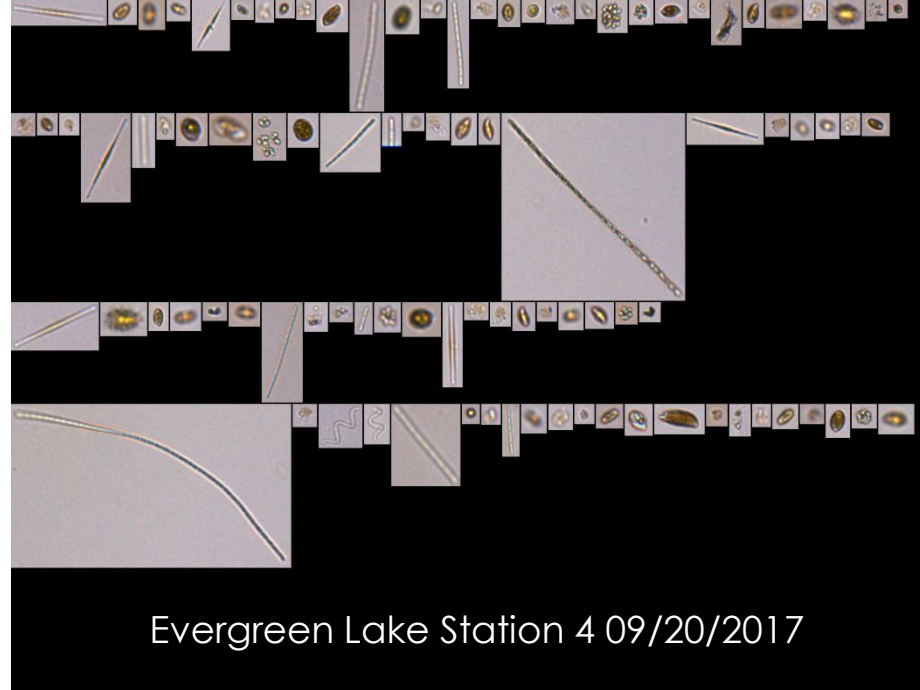
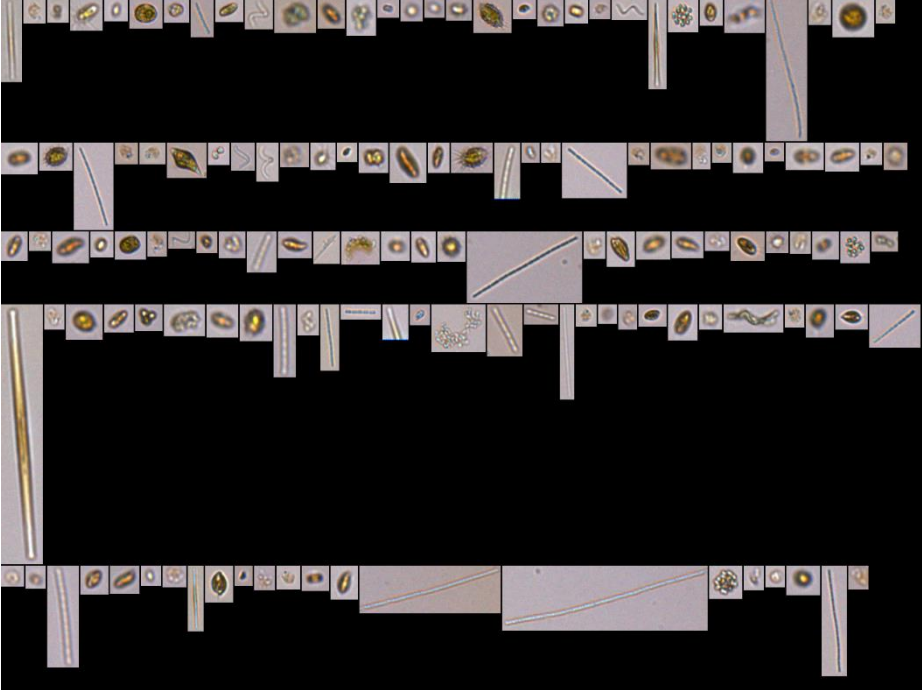
Evergreen Lake Fluorescence probe Chlorophyll/Phycocyanin



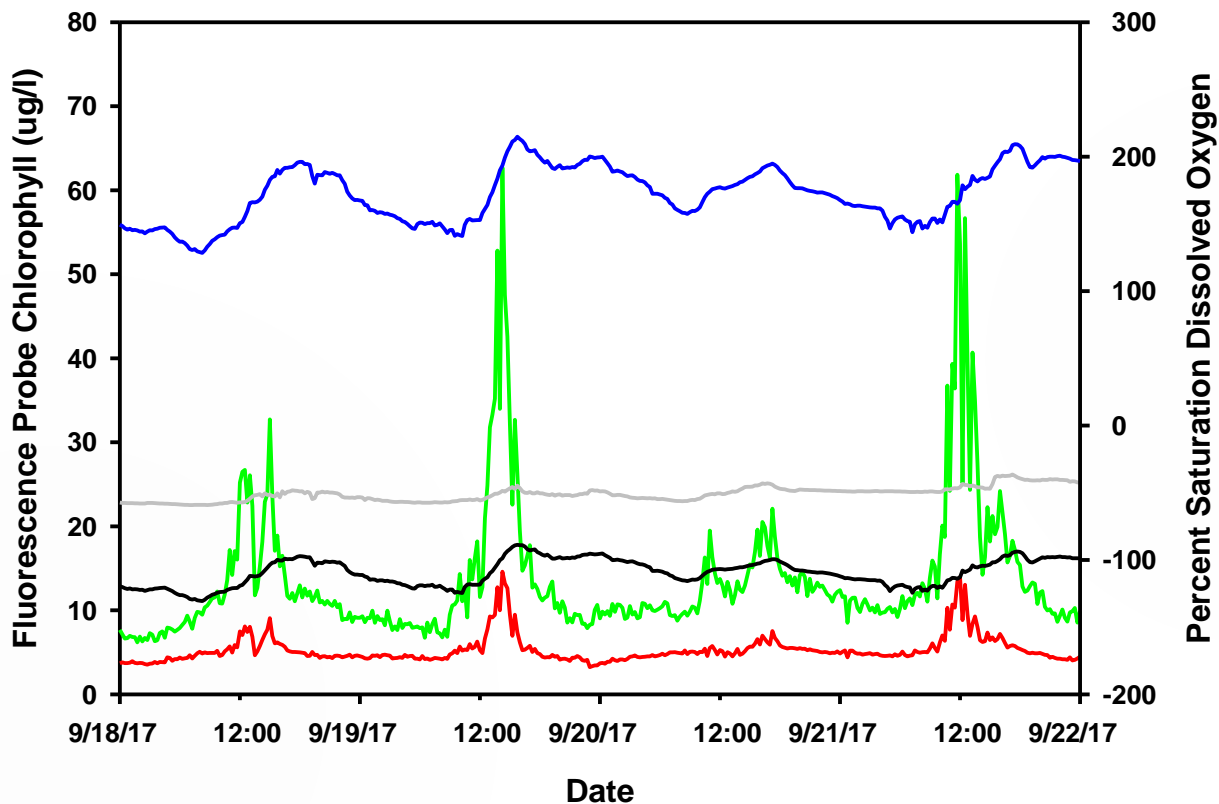
- EXO2(Fluorecence_pct_FS)
- EXO2(BGAPC_RFU)
- EXO2(ODO_Concplus_mg_L)
- EXO2(Temp_C)
- EXO2(ODO_pctplus_pct)



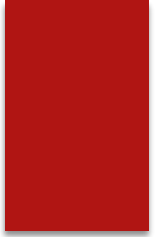
Evergreen Lake Station 4
09/06/2017



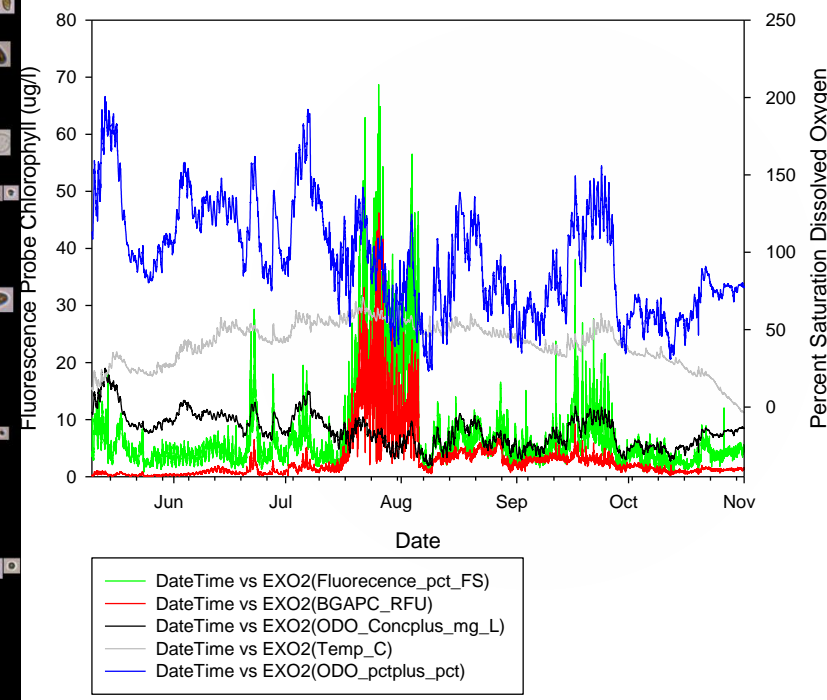
Evergreen Lake Fluorescence probe Chlorophyll/Phycocyanin

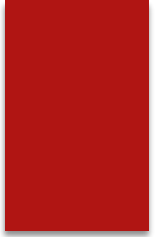
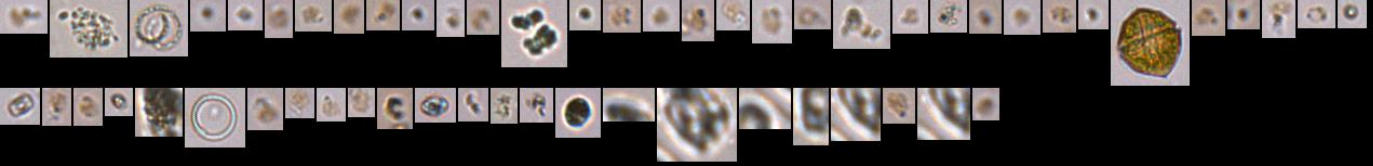


- DateTime vs EXO2(Fluorecence_pct_FS)
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- DateTime vs EXO2(ODO_Concplus_mg_L)
- DateTime vs EXO2(Temp_C)
- DateTime vs EXO2(ODO_pctplus_pct)



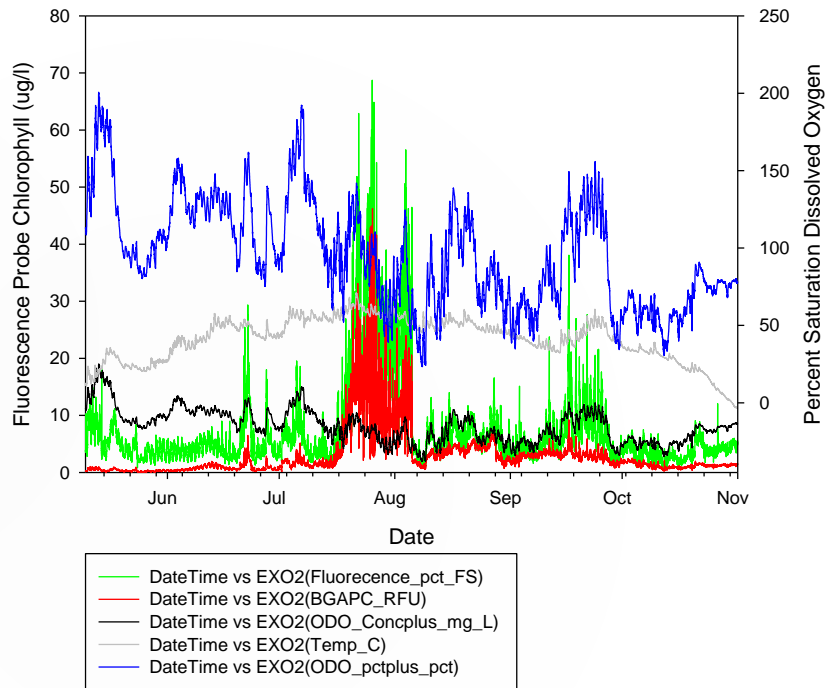
Lake Bloomington Fluorescence probe
Chlorophyll/Phycocyanin



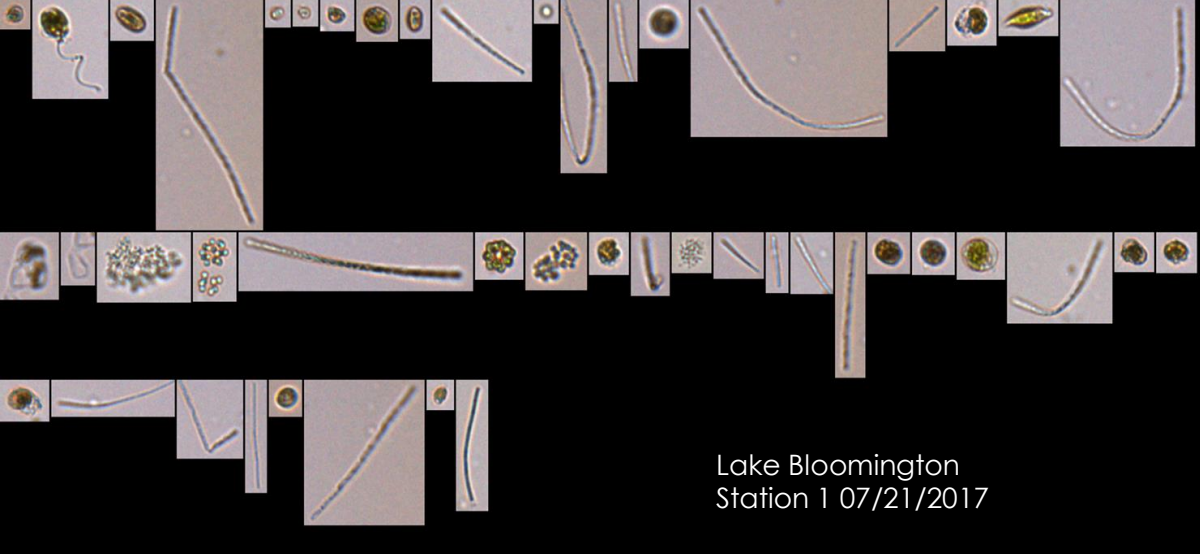


Lake Bloomington Station 1 09062017

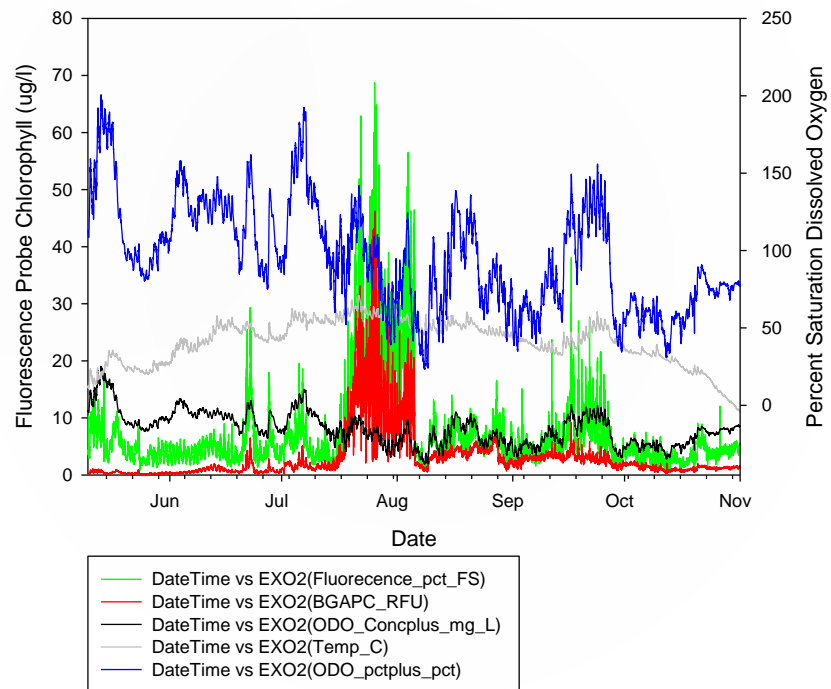
Lake Bloomington Fluorescence probe
Chlorophyll/Phycocyanin



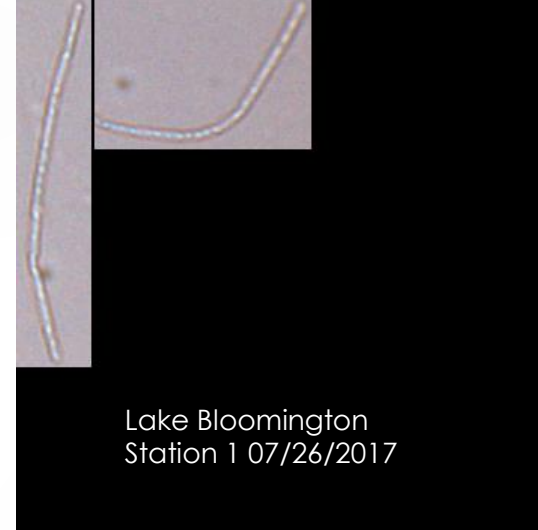
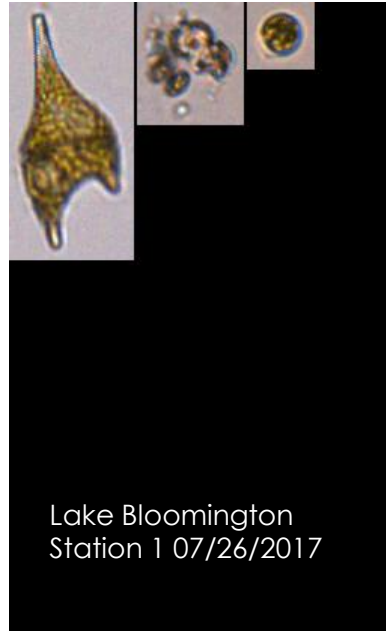
FlowCAM results are used to assess the accuracy of the fluorescence probe estimates of phytoplankton density and population makeup.



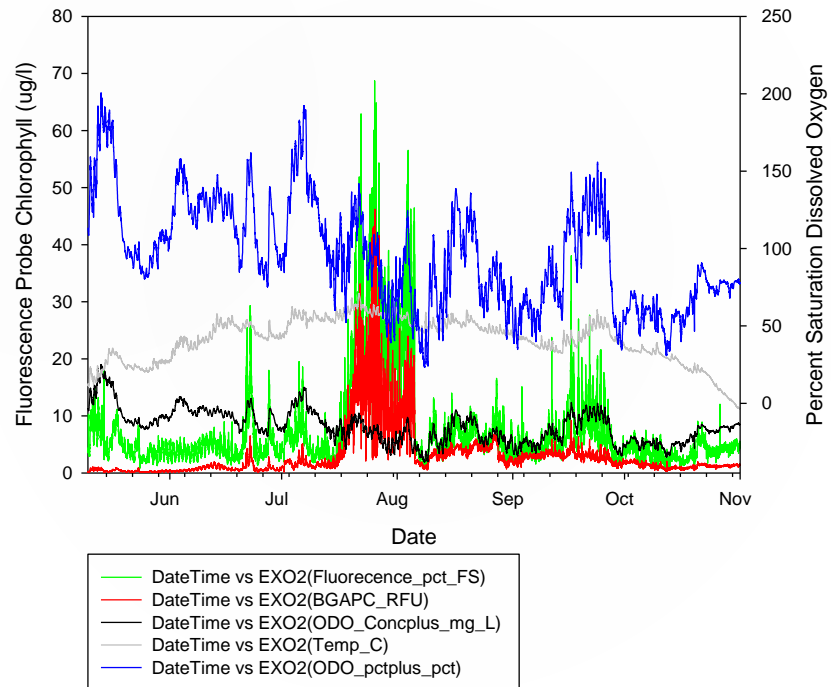
Lake Bloomington Fluorescence probe
Chlorophyll/Phycocyanin



FlowCAM results are used to assess the accuracy of the fluorescence probe estimates of phytoplankton density and population makeup.



Lake Bloomington Fluorescence probe
Chlorophyll/Phycocyanin



FlowCAM results are used to assess the accuracy of the fluorescence probe estimates of phytoplankton density and population makeup.



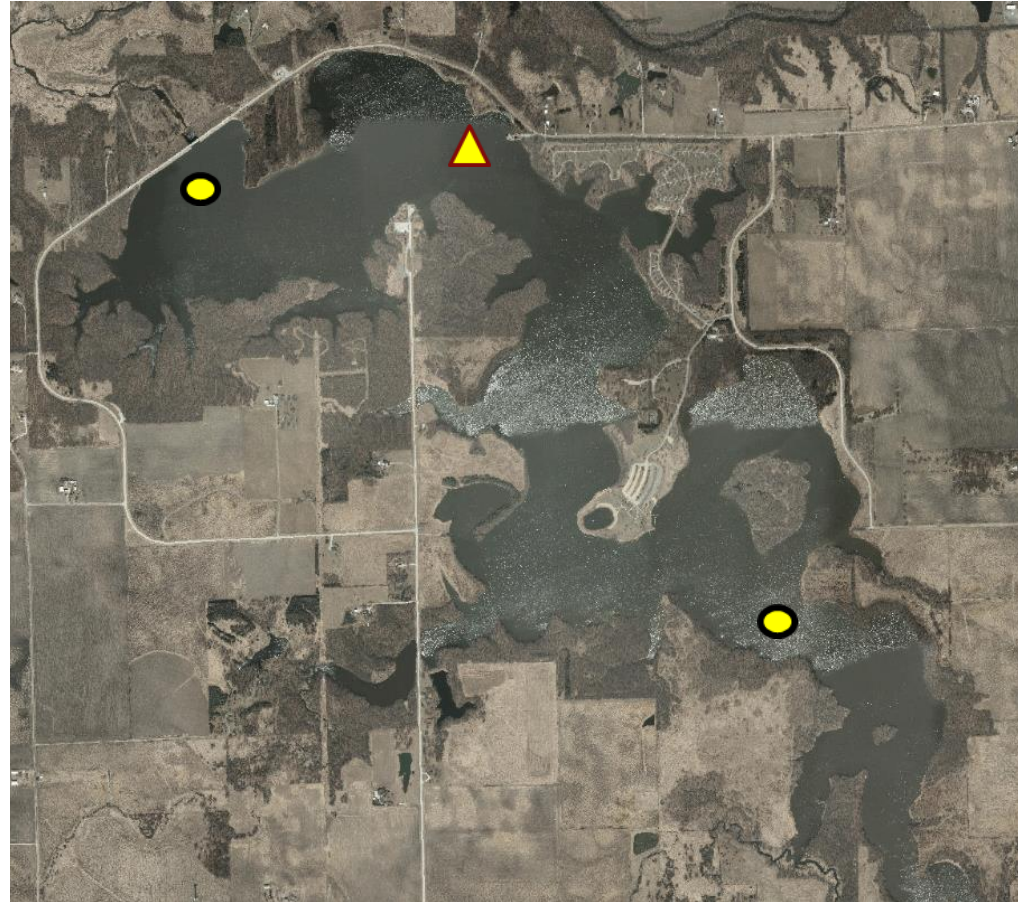
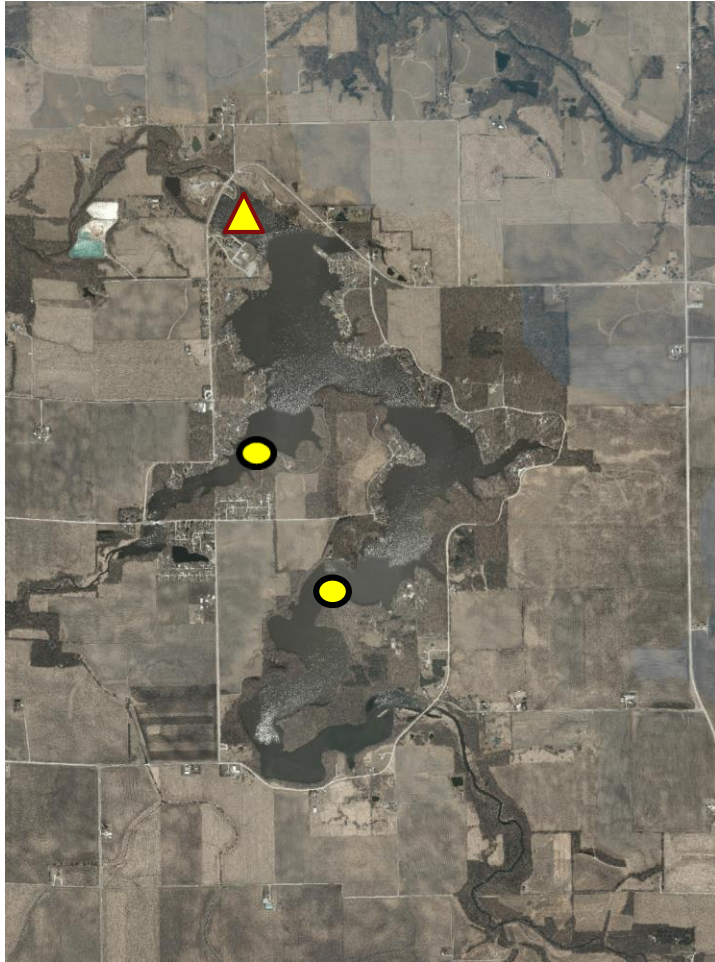
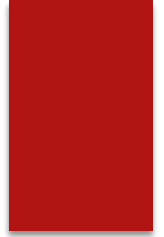






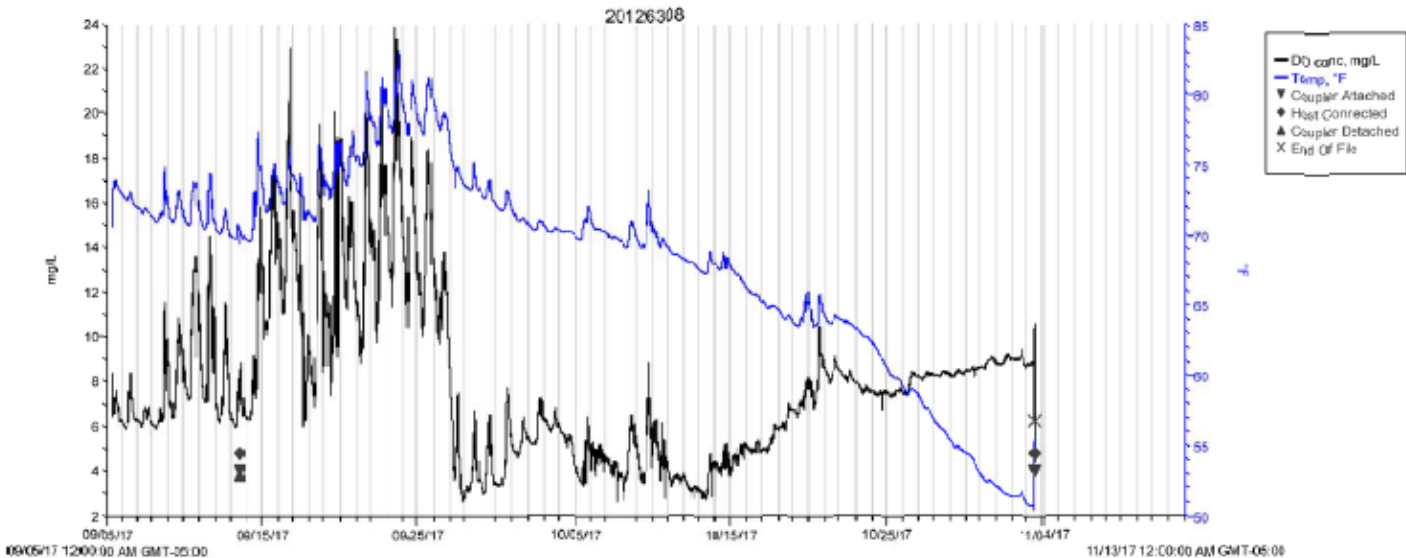
Where the Buoys Are

(and are planned to be summer 2017)



Loggers will be placed at two depths at the deep stations for both lakes

Lake Bloomington Hobo Dissolved Oxygen/Temperature Logger Results



Mobile deployment platforms

- ▶ PAR at multiple depths
- ▶ 24 hourly samples at four depths (schedules permitting)
- ▶ Various locations



Questions?



Thank You



Acknowledgements

A photograph of a lake with dead trees and green algae. The water is dark blue with a thick layer of bright green algae floating on the surface. Several dead, skeletal trees stand in the water, their reflections visible. The background is a dense line of green trees under a blue sky with light clouds.

City of Bloomington Water Department Staff
Bob Yehl, Water Director
Illinois EPA Lakes Unit
Our Water Customers