Monitoring Efforts in Wonder Lake and the Upper Nippersink Creek Watershed: A pre-dredging update

Ryan Jackson

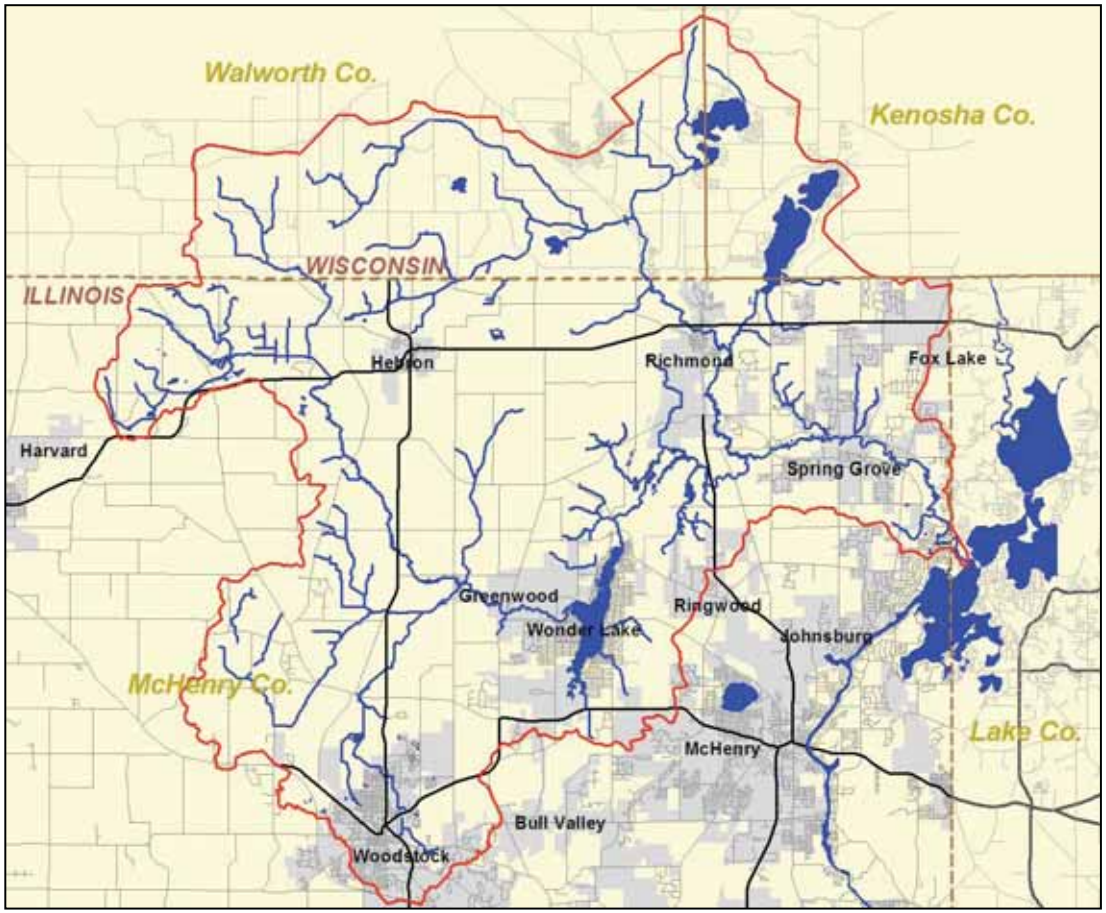
Hydrologist, U.S. Geological Survey Illinois Water Science Center

Randy Stowe

Lake Manager, Wonder Lake

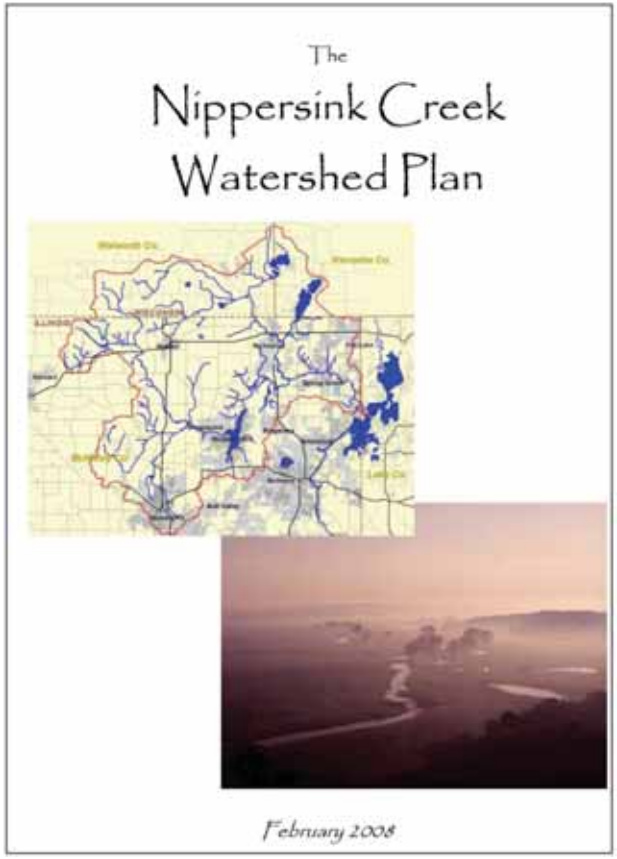
Nippersink Creek Watershed

202 square mile watershed, draining to the Fox River, with Wonder Lake, an 830 acre impoundment



Nippersink Creek is listed by IEPA as "impaired" for fecal coliform from an unknown source

Watershed Plan Protection Objectives:

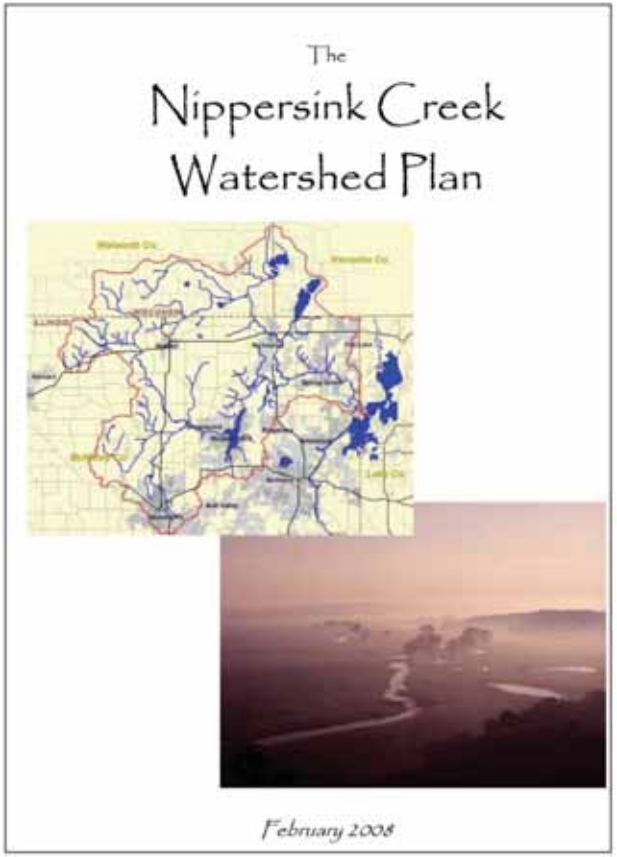


www.nippersink.org

Objective 17:

Provide multiple opportunities for assessing measurable watershed plan implementation milestones, such as whether pollutant loading reductions are being achieved over time; evaluating the effectiveness of proactive watershed protection measures; and whether social behavior has changed because of the implementation of the plan.

General Watershed Plan Recommendation:



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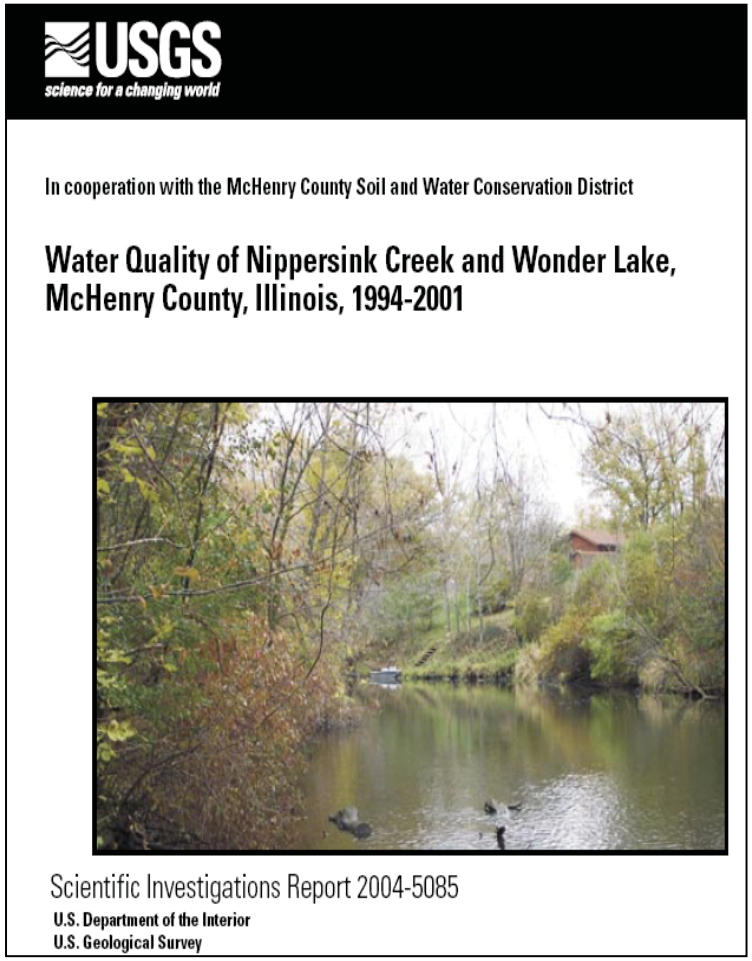
GWR-1

Implement an expanded water quality and biological monitoring program throughout the Nippersink Creek Watershed.

Water Quality of Nippersink Creek and Wonder Lake Study (2004)


USGS
science for a changing world

In cooperation with the McHenry County Soil and Water Conservation District

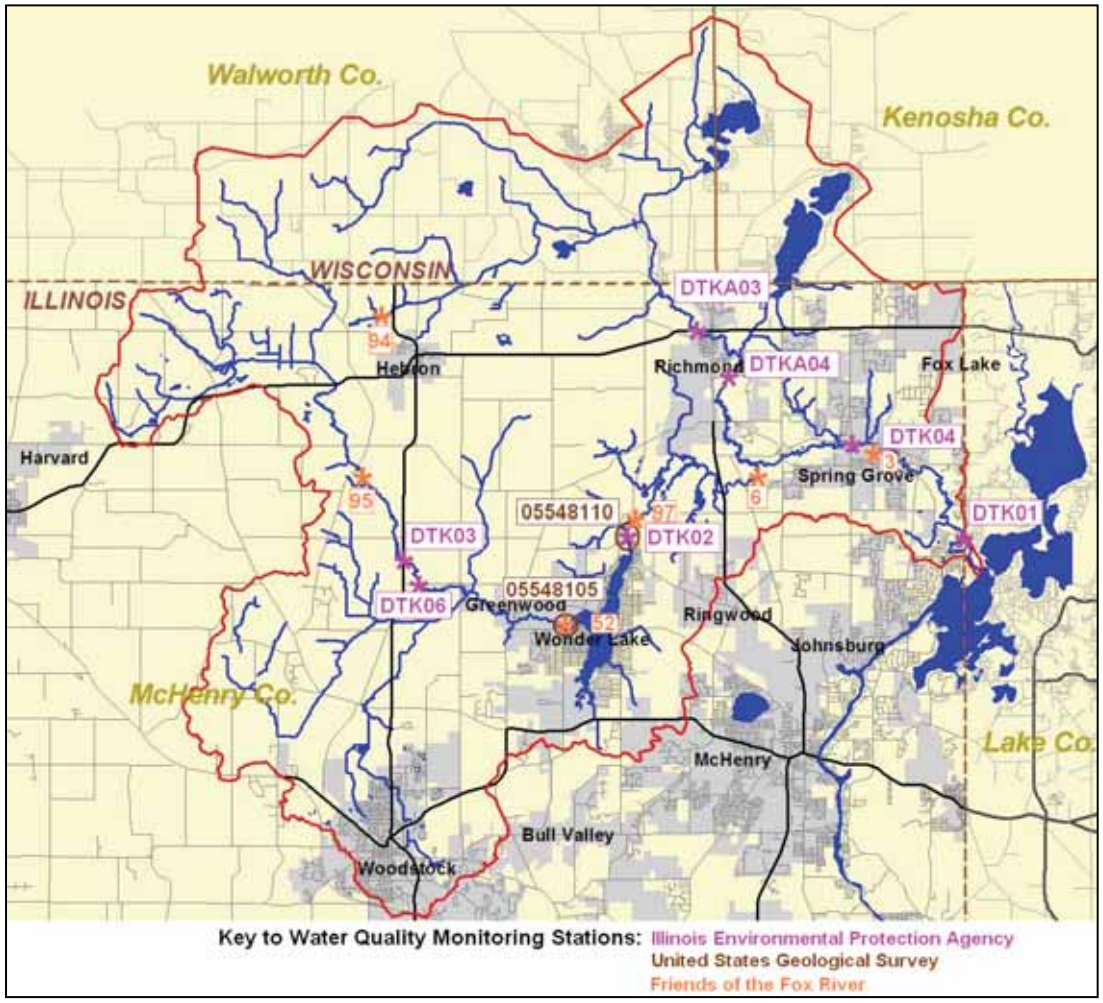
Water Quality of Nippersink Creek and Wonder Lake, McHenry County, Illinois, 1994-2001

Scientific Investigations Report 2004-5085

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

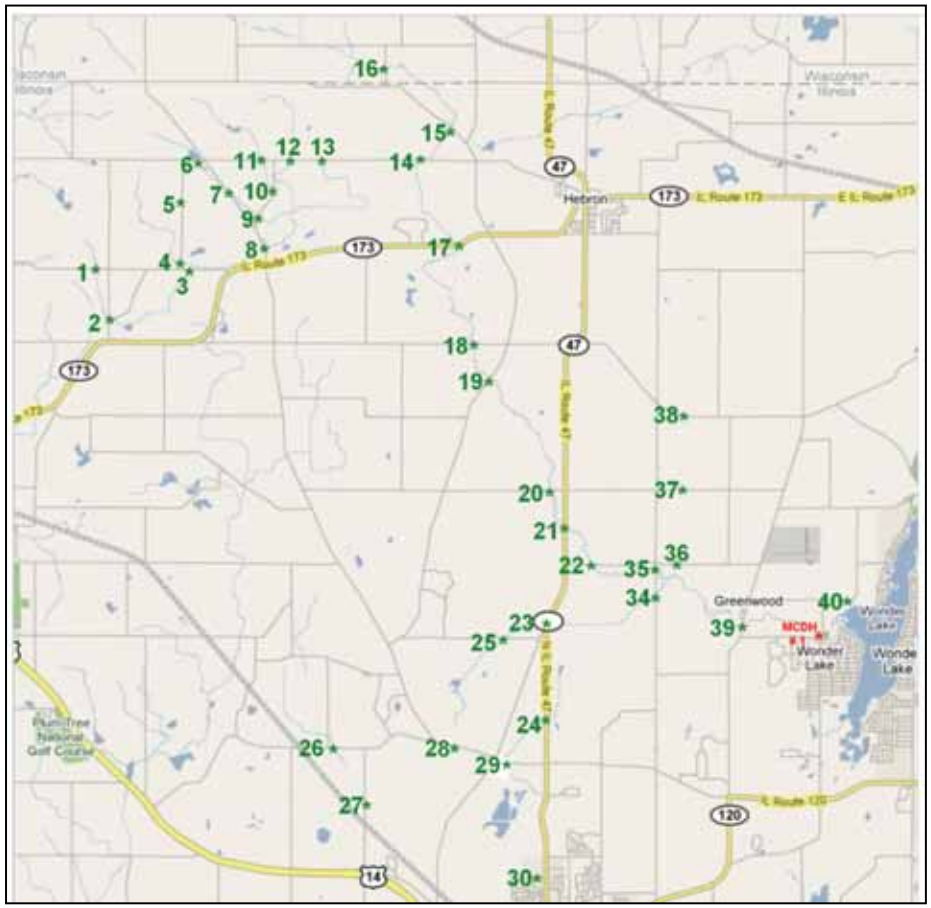
- Watershed planning efforts over a 15 year period reduced the annual sediment load from Nippersink Creek to Wonder Lake from 33,000 to 12,000 cubic yards per year.
- Lake sediment core samples show no elevated levels of regulated contaminants.

Existing Water Quality Monitoring Sites



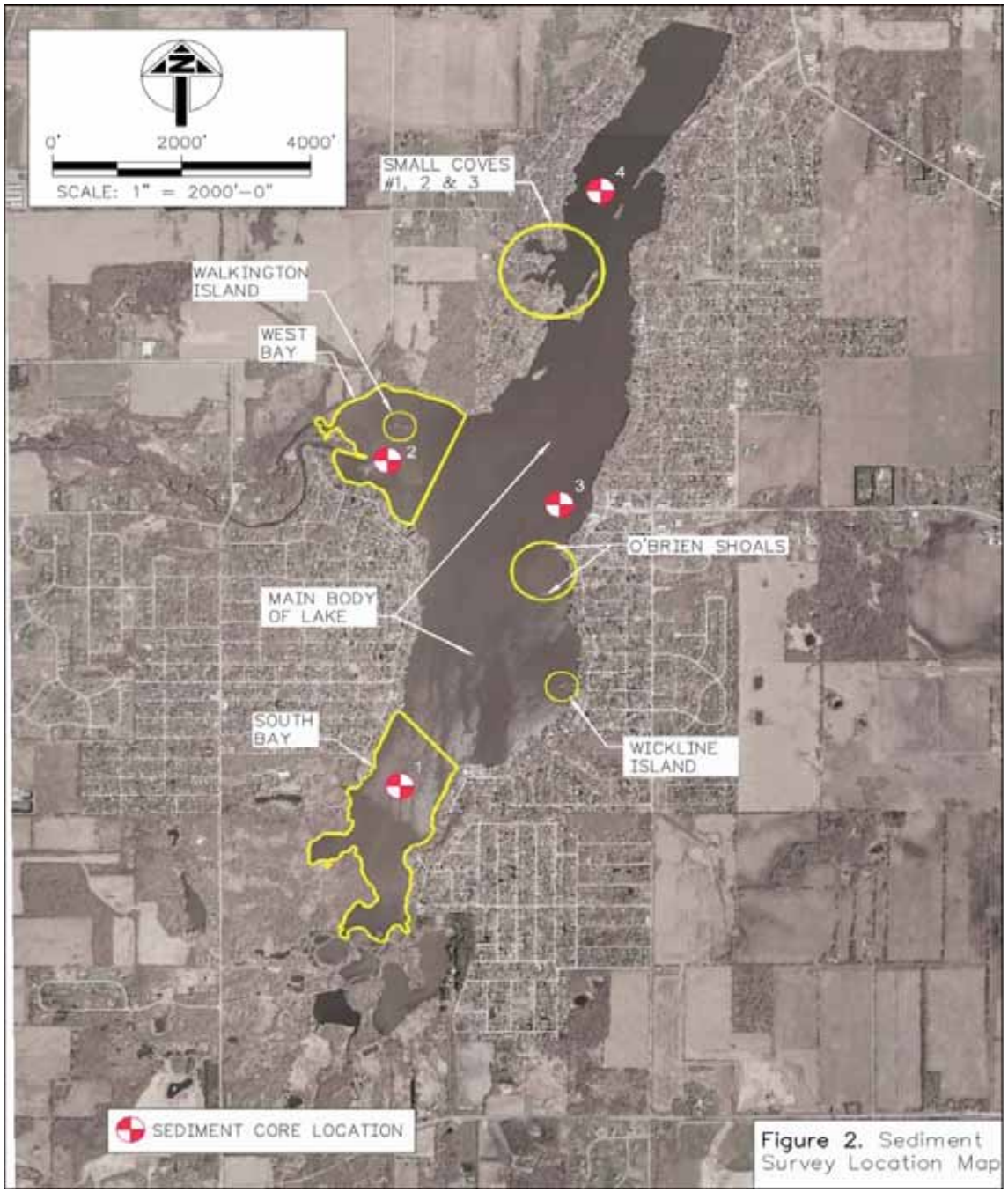
Expanded Wonder Lake Monitoring

Ecolipalooza ™



Wonder Lake Dredging Project

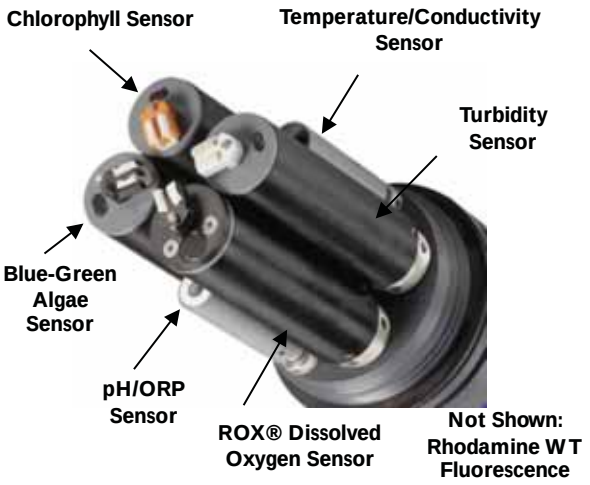
A $5.9 million Special Service Area (SSA) funded project to remove up to 1 million cubic yards of accumulated sediment.



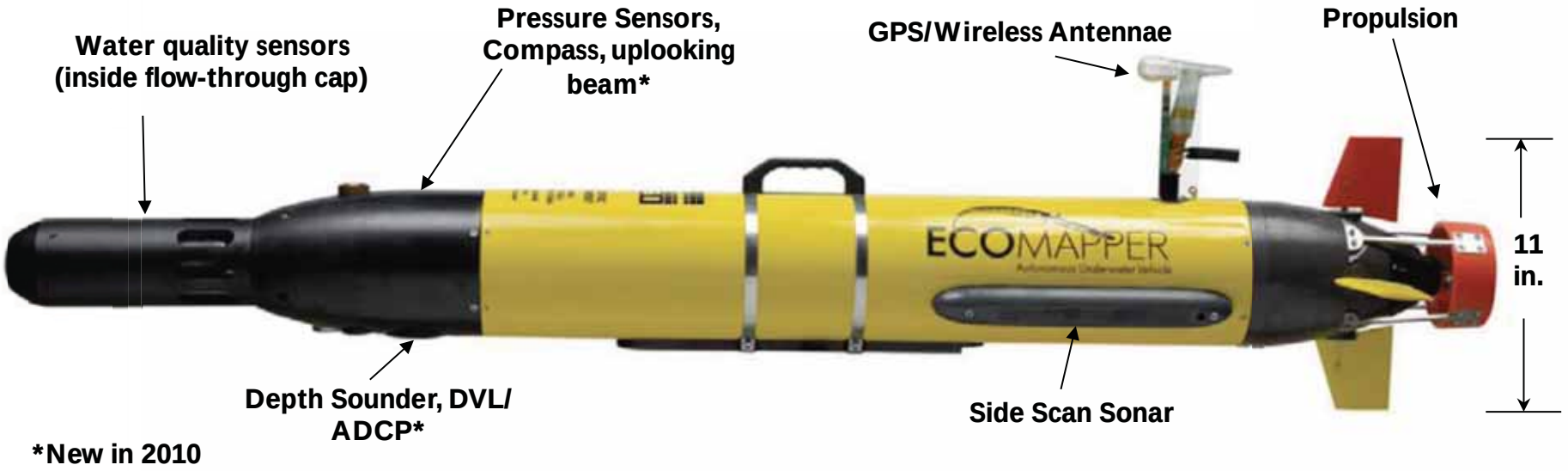
USGS Monitoring/Synoptic Surveys

- (2009-Present) Monitoring of discharge and suspended sediment in Nippersink Creek above Wonder Lake
- (2010) Pre-dredging synoptic water quality, water velocity, and bathymetric survey of Wonder Lake
  - Targeted August 2010 based on past water quality data
- (2015?) Post-dredging synoptic survey

EcoMapper Autonomous Underwater Vehicle (AUV)



- **Capable of diving to 200 ft depth at up to 6.75 ft/s**
- **10+ hours of run time**
- **1 Hz sampling rate**



*New in 2010

Survey Missions

Wonder Lake (Illinois)
August 2010

EcoMapper Data Sets*

- WL_South_EM_QWDataPoints
- WL_Middle_EM_QWDataPoints
- WL_North_EM_QWDataPoints

*Surface Water (Approx. 0.5 ft depth)

Wonder Lake (Illinois)
August 2010

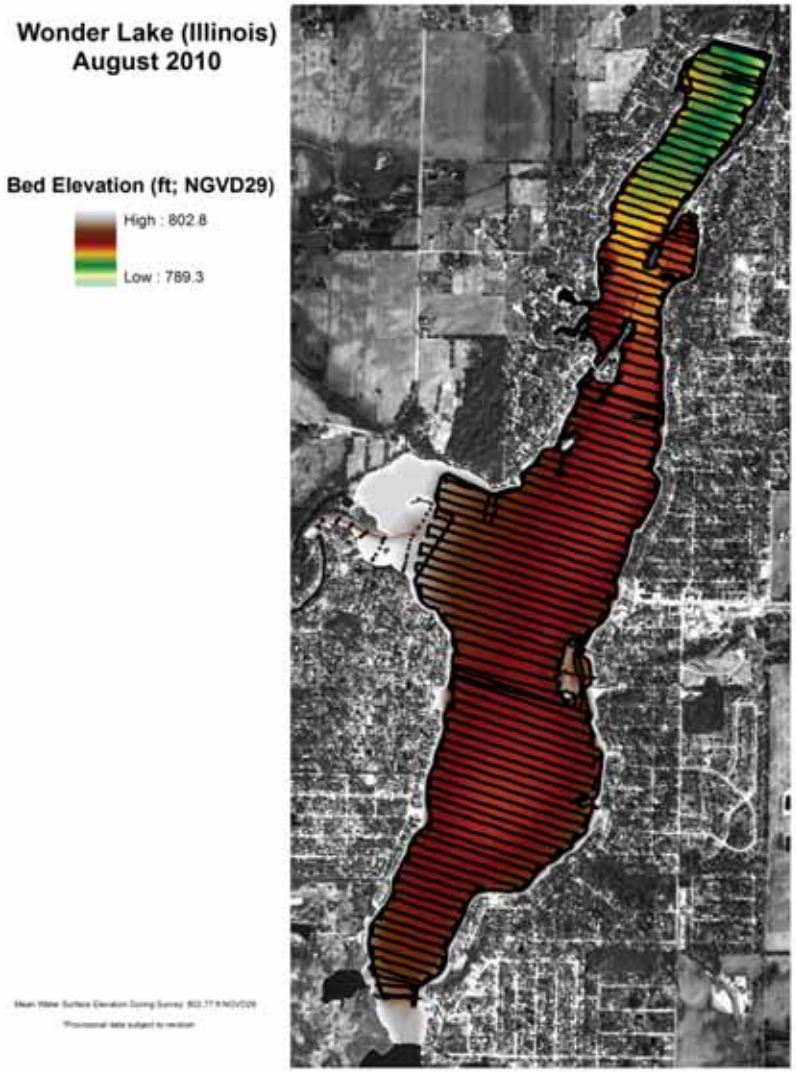
Sample Hour

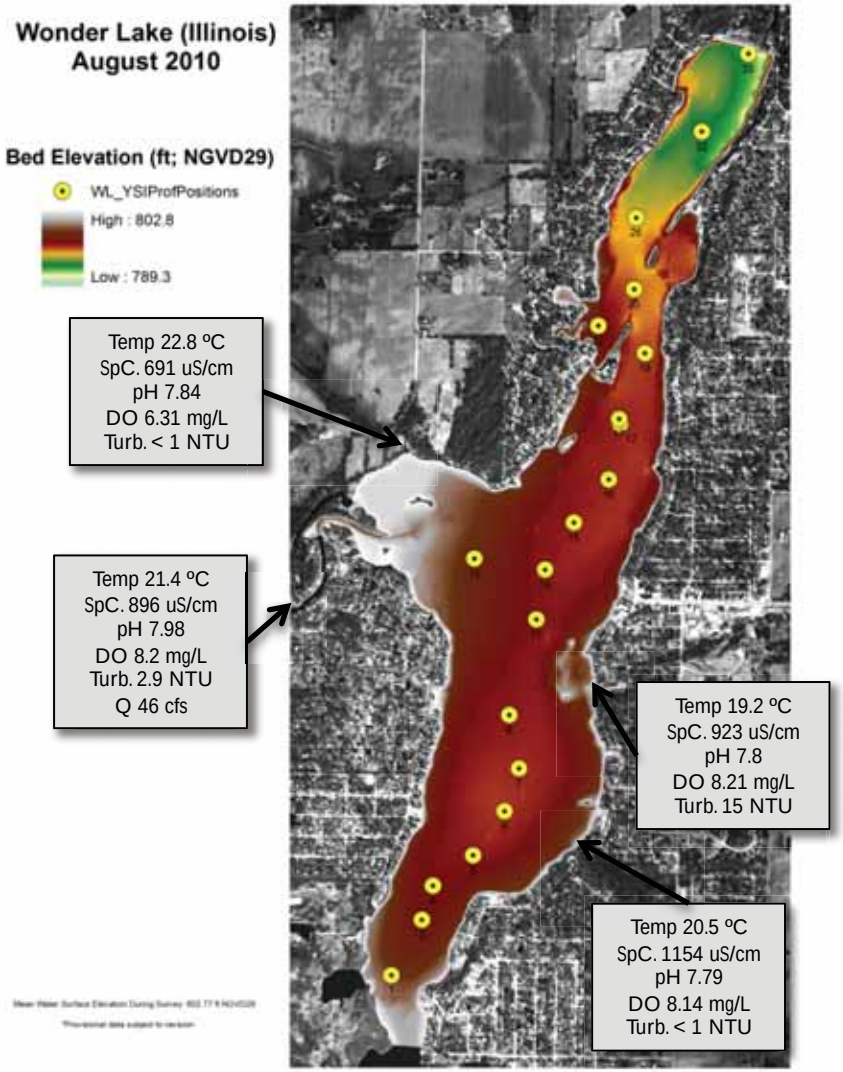
- 8
- 9
- 10
- 11
- 12
- 13
- 14

*Surface Water (Approx. 0.5 ft depth)

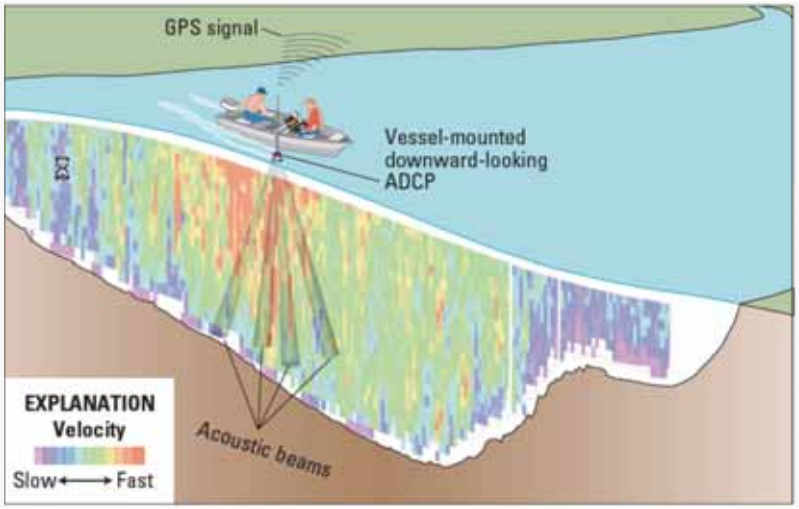
Bathymetry

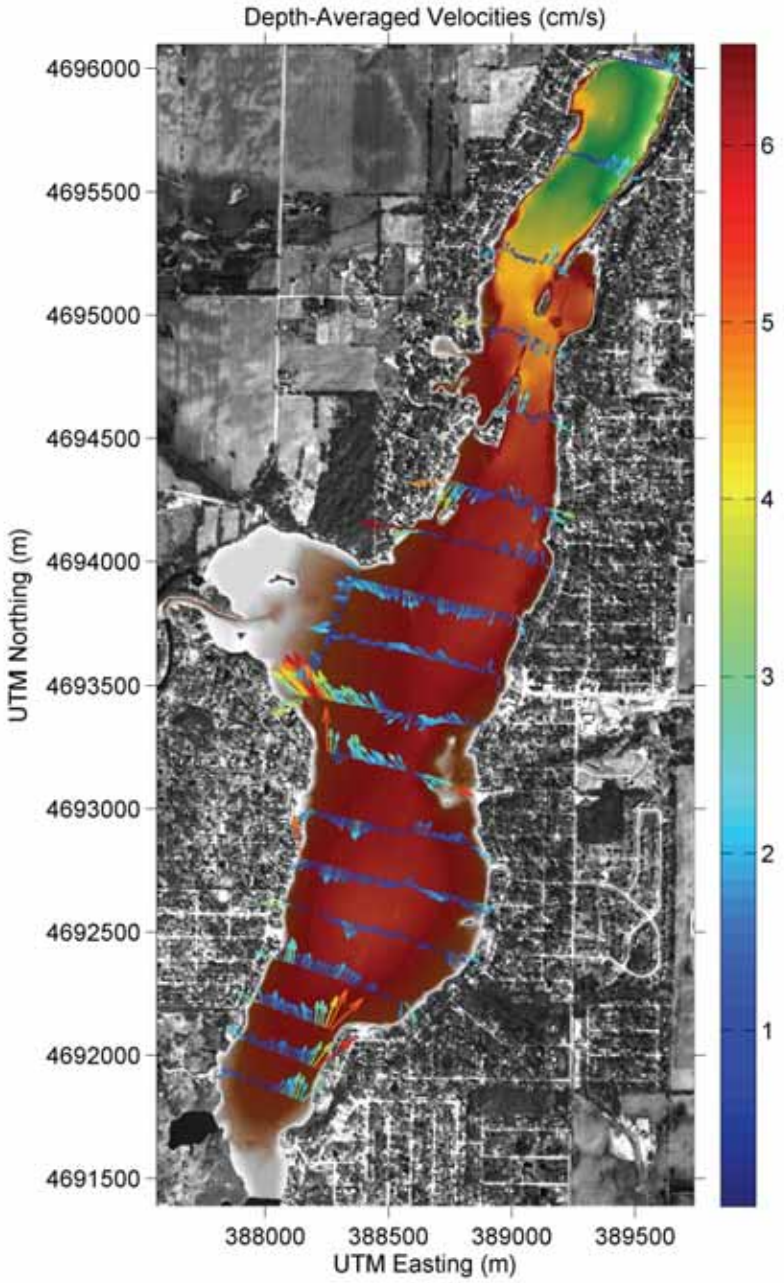
Tributaries Sampled Aug. 13, 2010

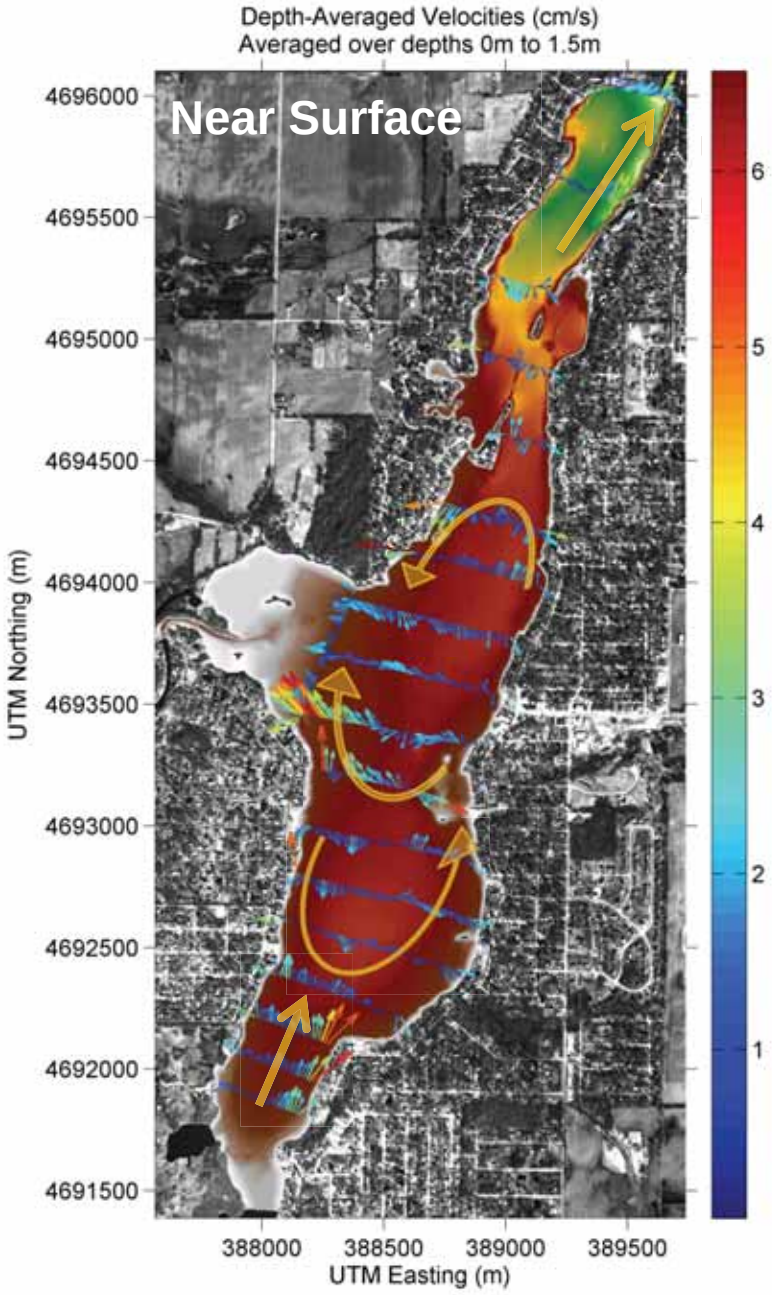


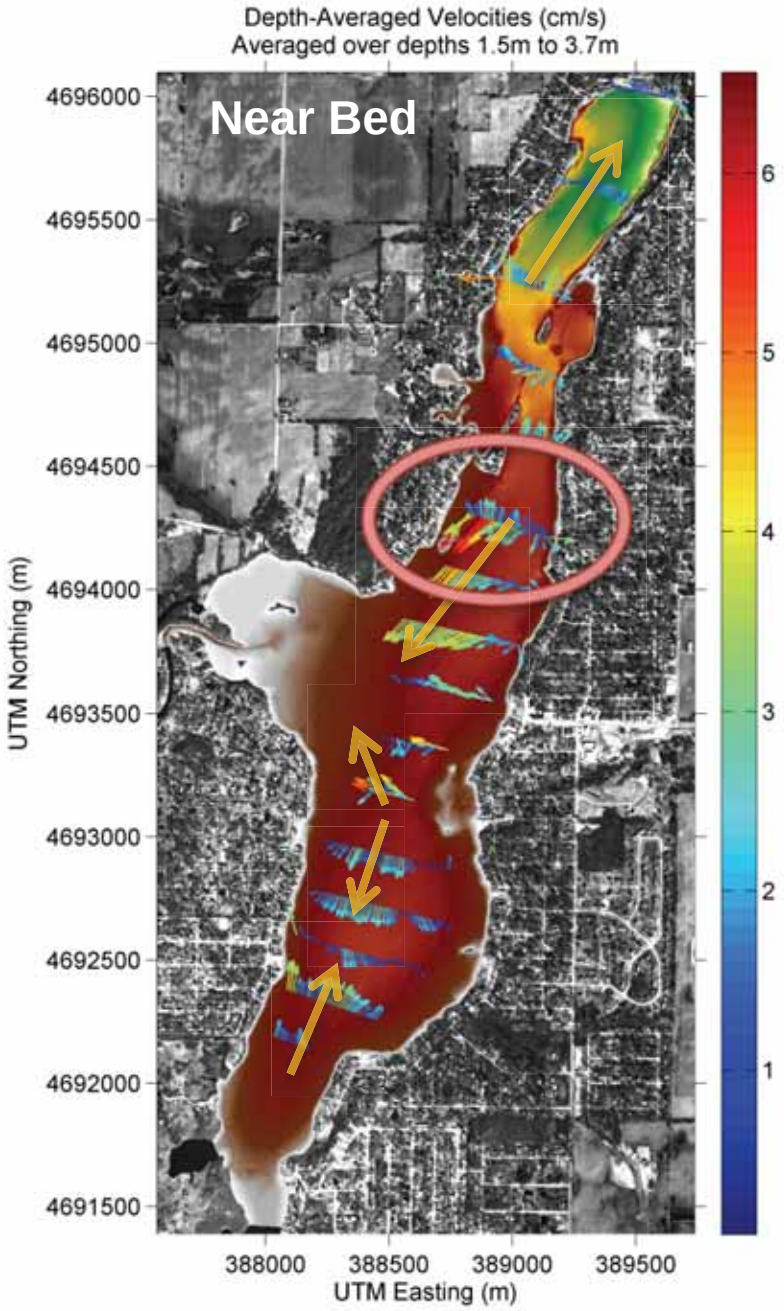


Water Velocity

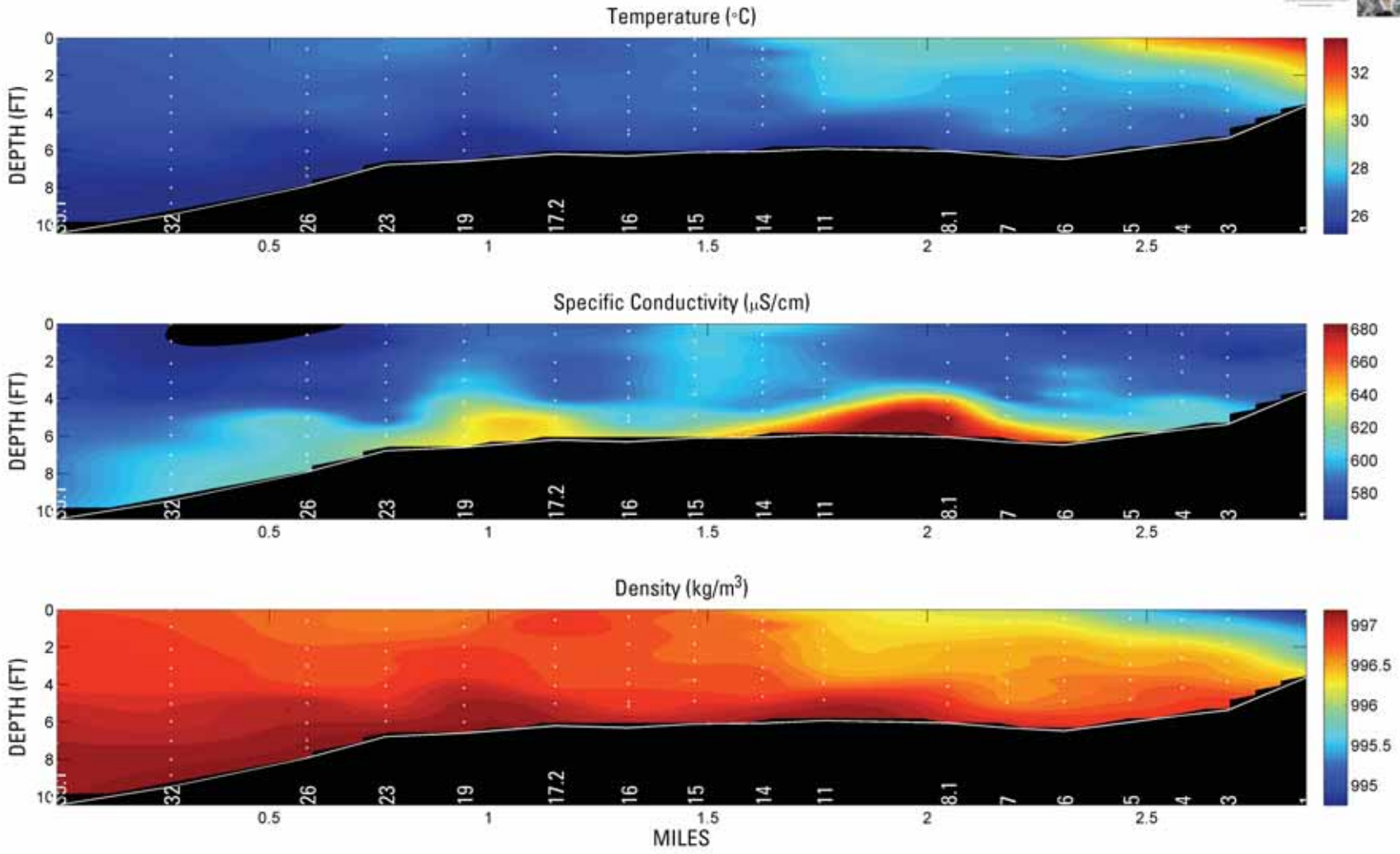





Depth-Averaged Velocities (cm/s)
Averaged over depths 0m to 1.5m
Near Surface
4696000
4695500
4695000
4694500
4694000
4693500
4693000
4692500
4692000
4691500
UTM Northing (m)
388000
388500
389000
389500
UTM Easting (m)
6
5
4
3
2
1

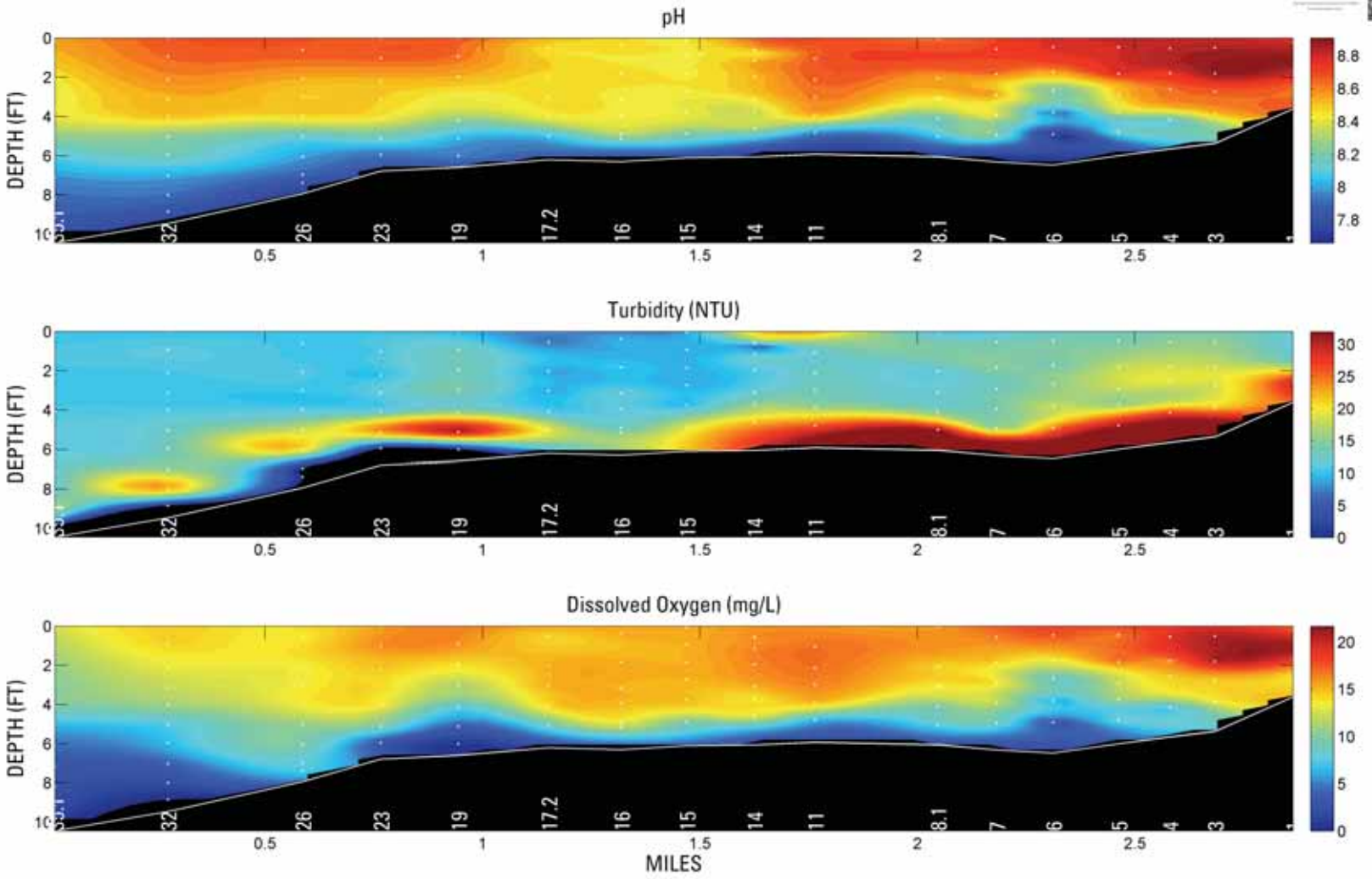

Depth-Averaged Velocities (cm/s)
Averaged over depths 1.5m to 3.7m
Near Bed
4696000
4695500
4695000
4694500
4694000
4693500
4693000
4692500
4692000
4691500
UTM Northing (m)
388000
388500
389000
389500
UTM Easting (m)
6
5
4
3
2
1

Water Quality Profiles



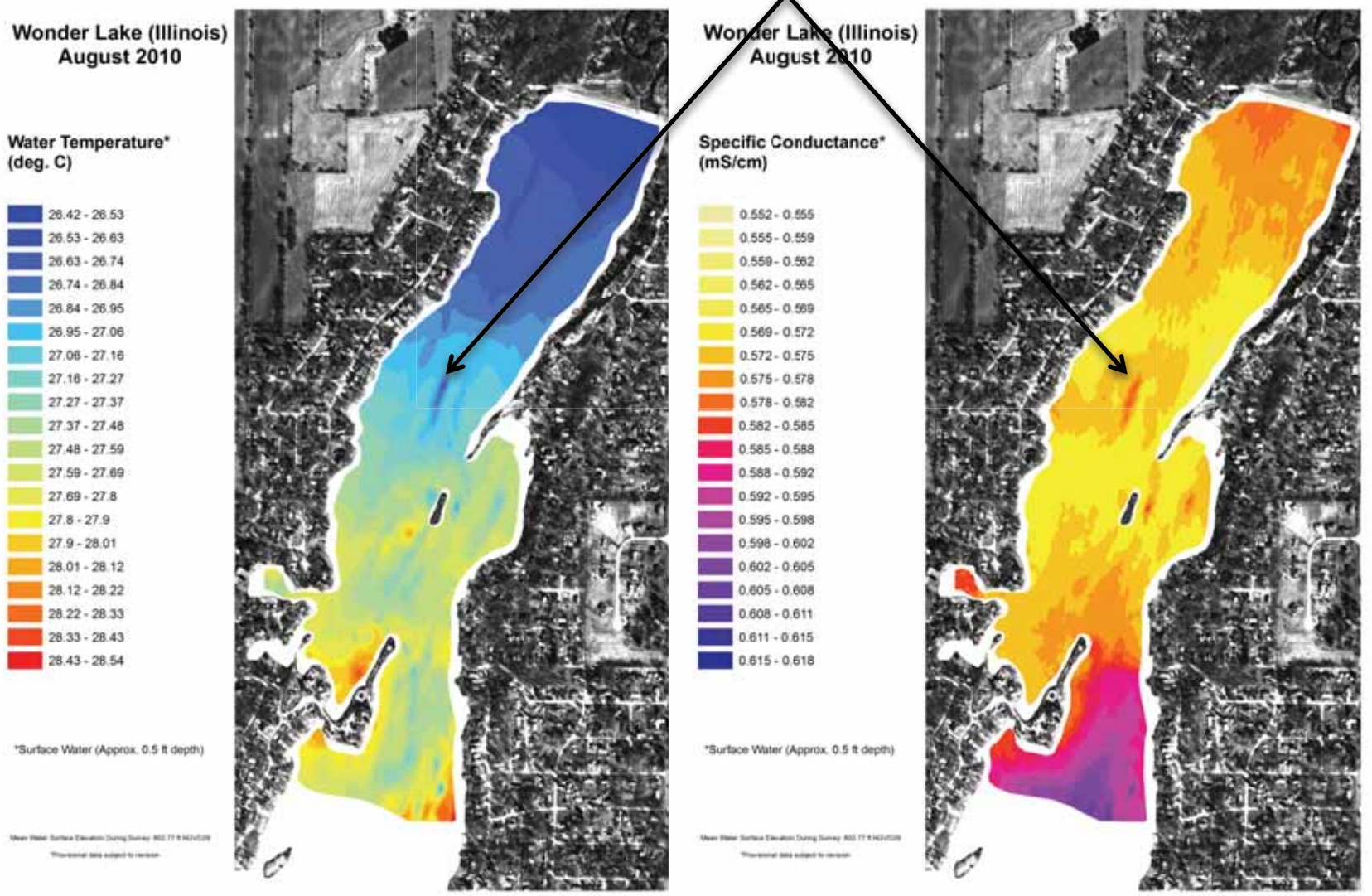
North **Mid** **South**

Water Quality Profiles

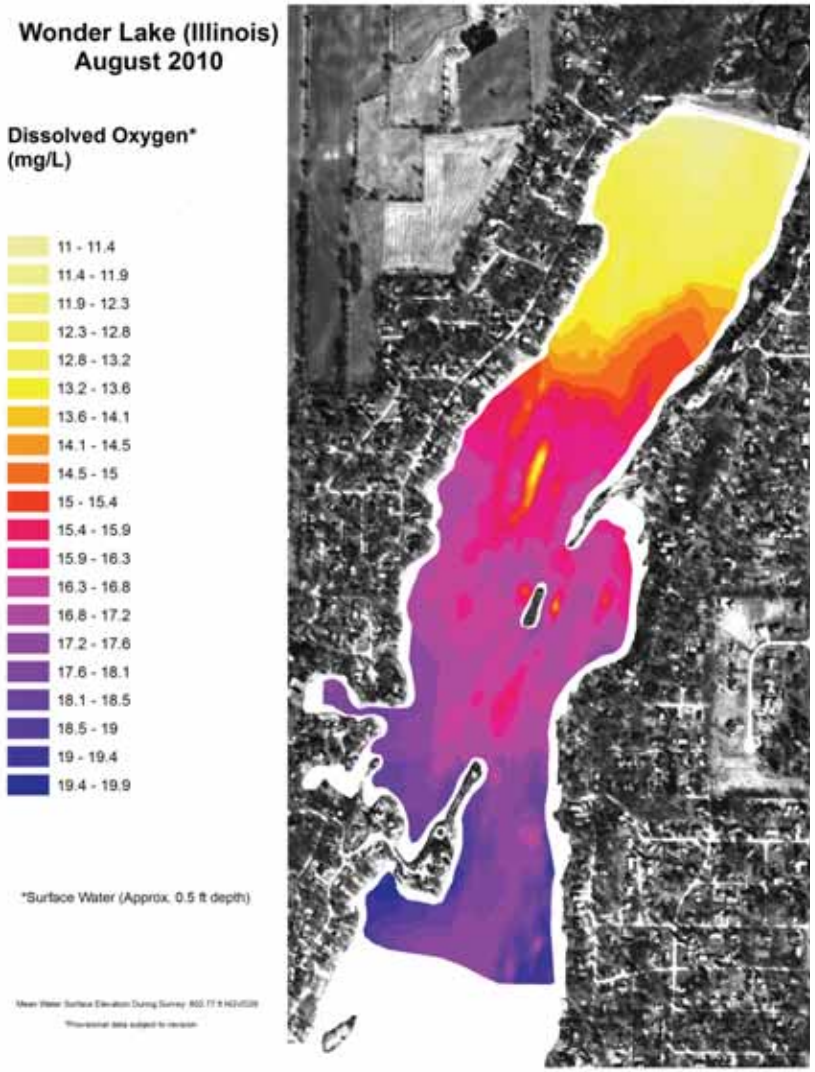


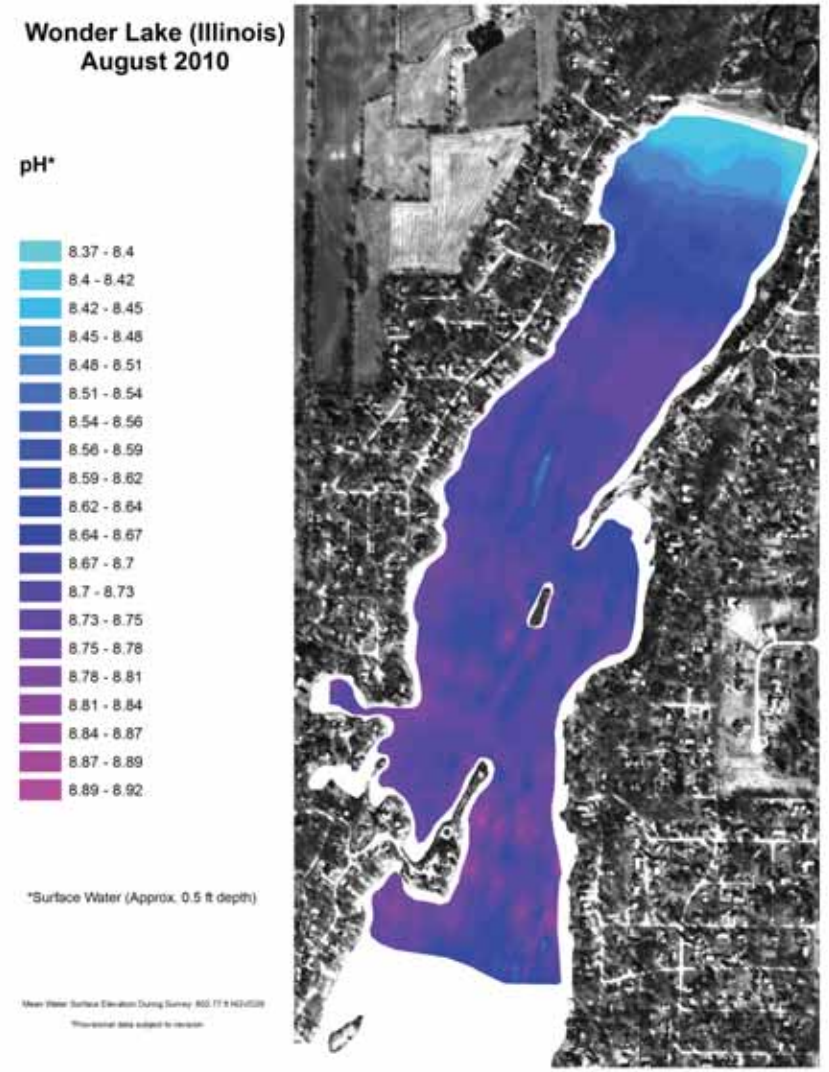
North **Mid** **South**

Surface Water Quality Distributions (North Basin)

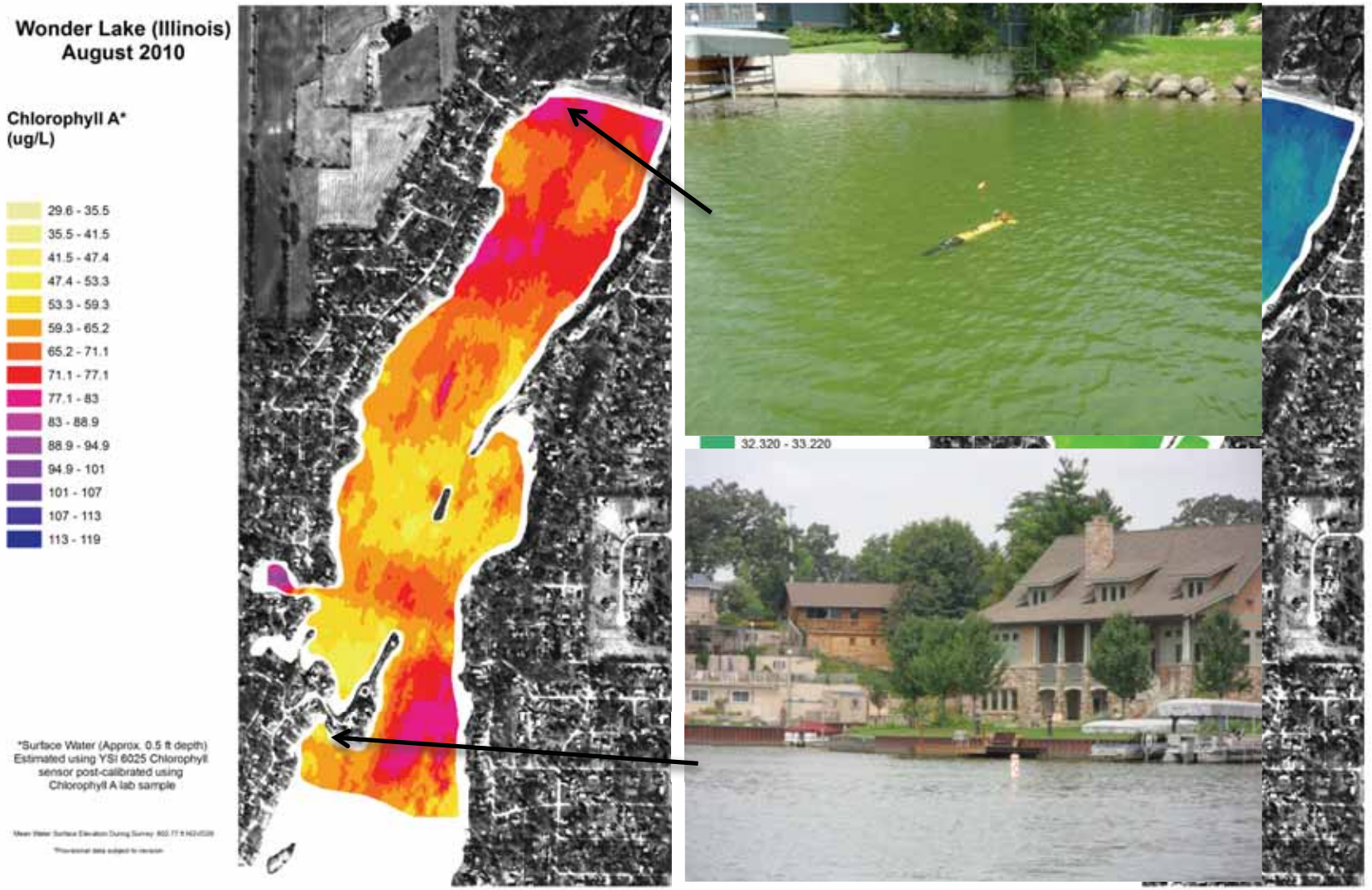


Surface Water Quality Distributions (North Basin)

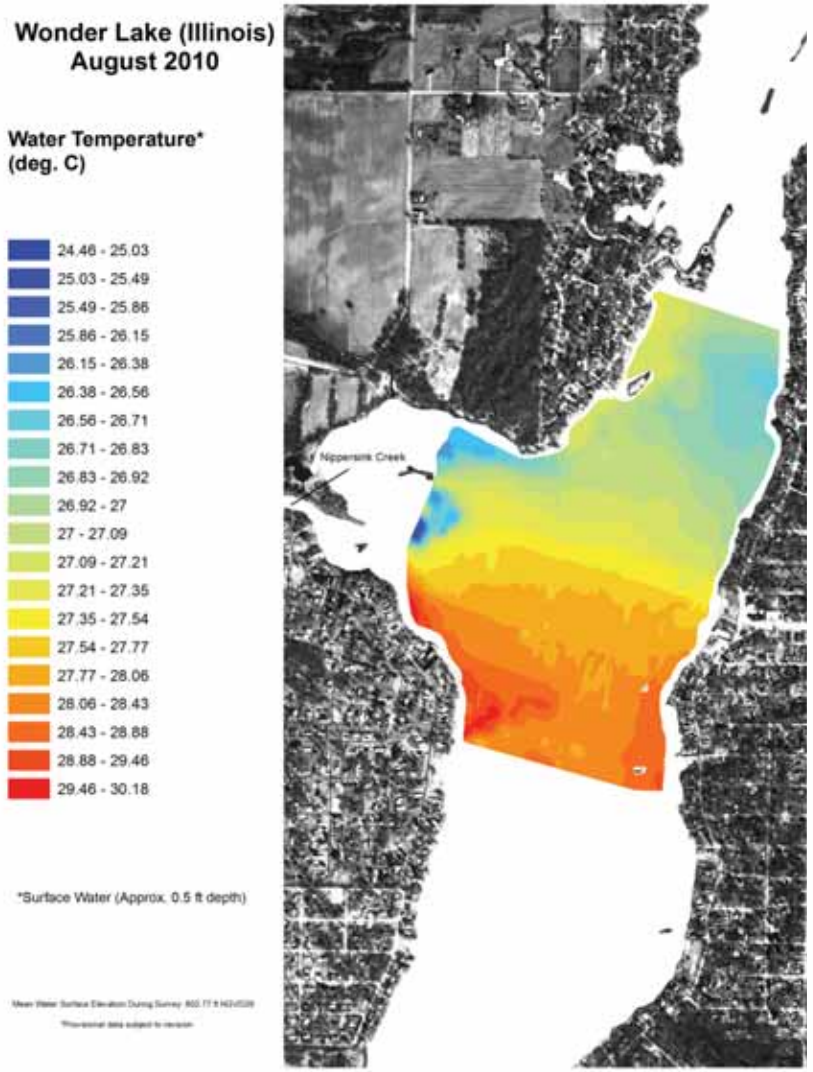


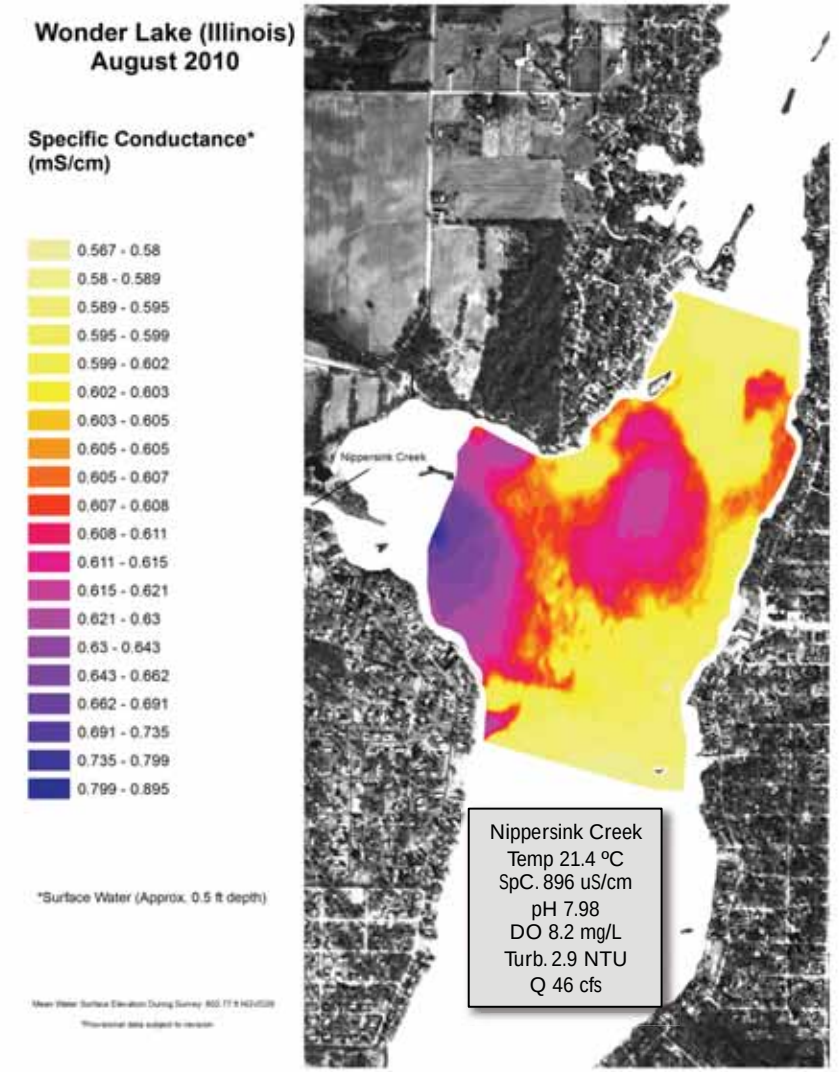


Surface Water Quality Distributions (North Basin)

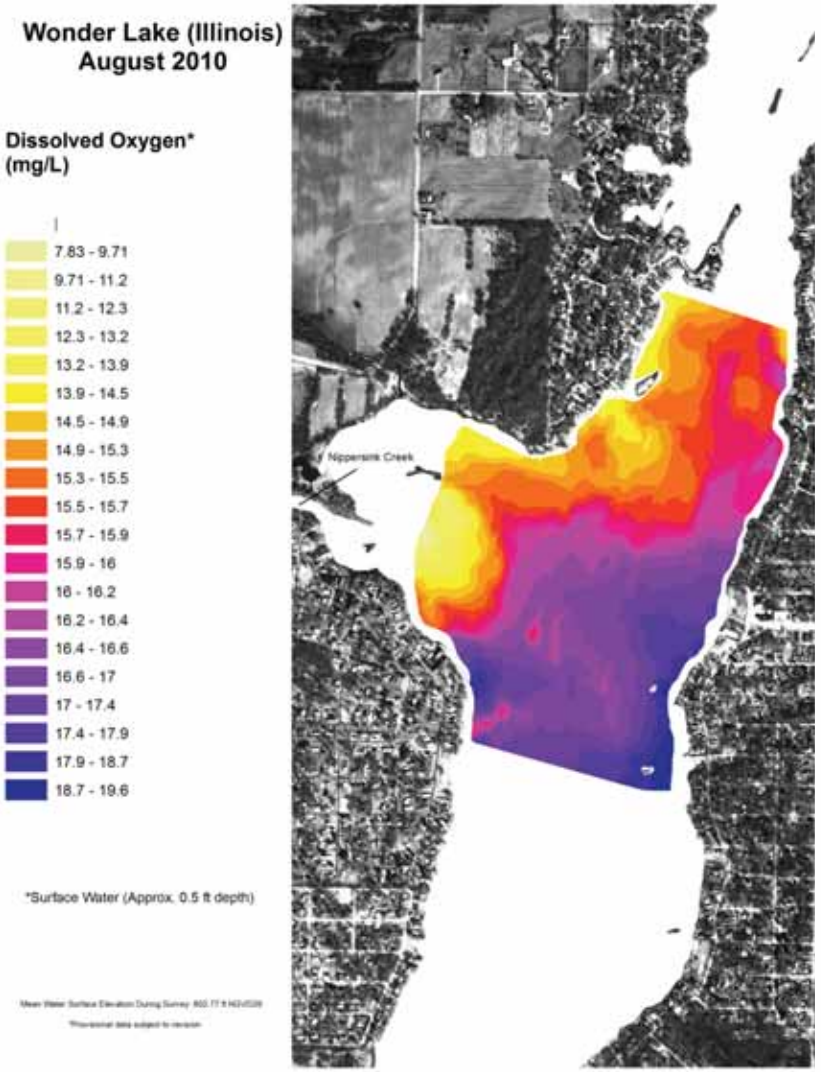


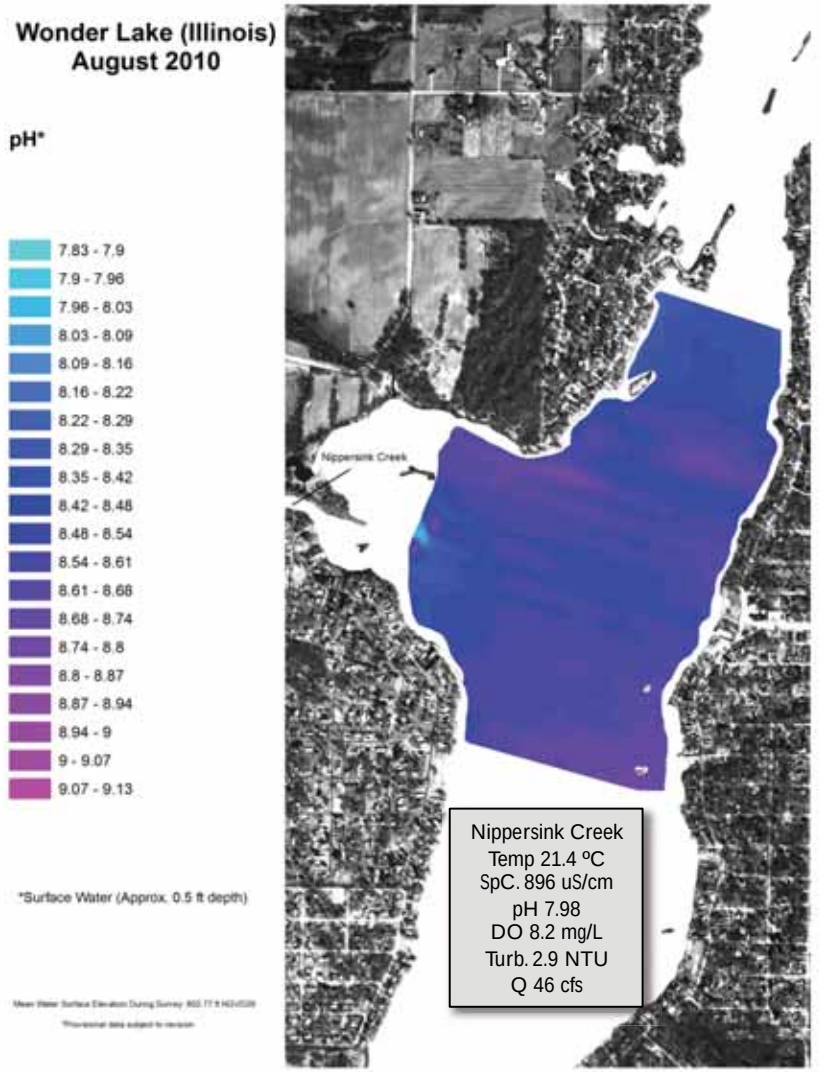
Surface Water Quality Distributions (Middle Basin)



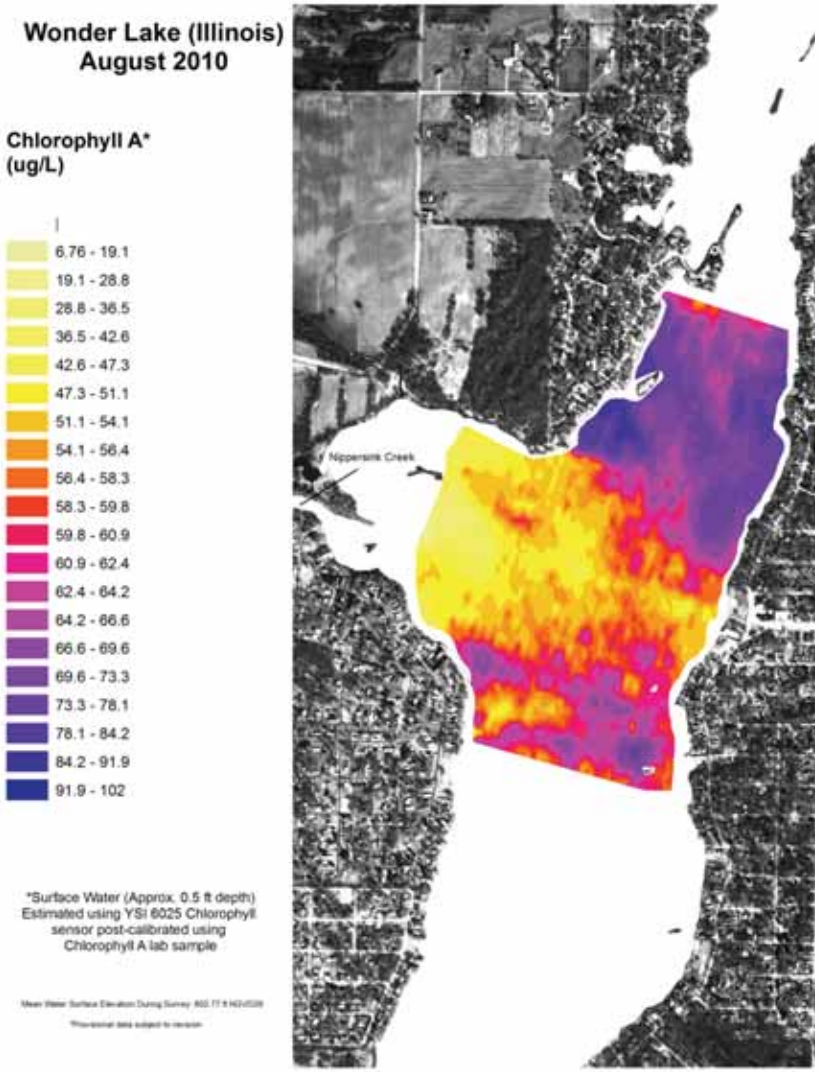


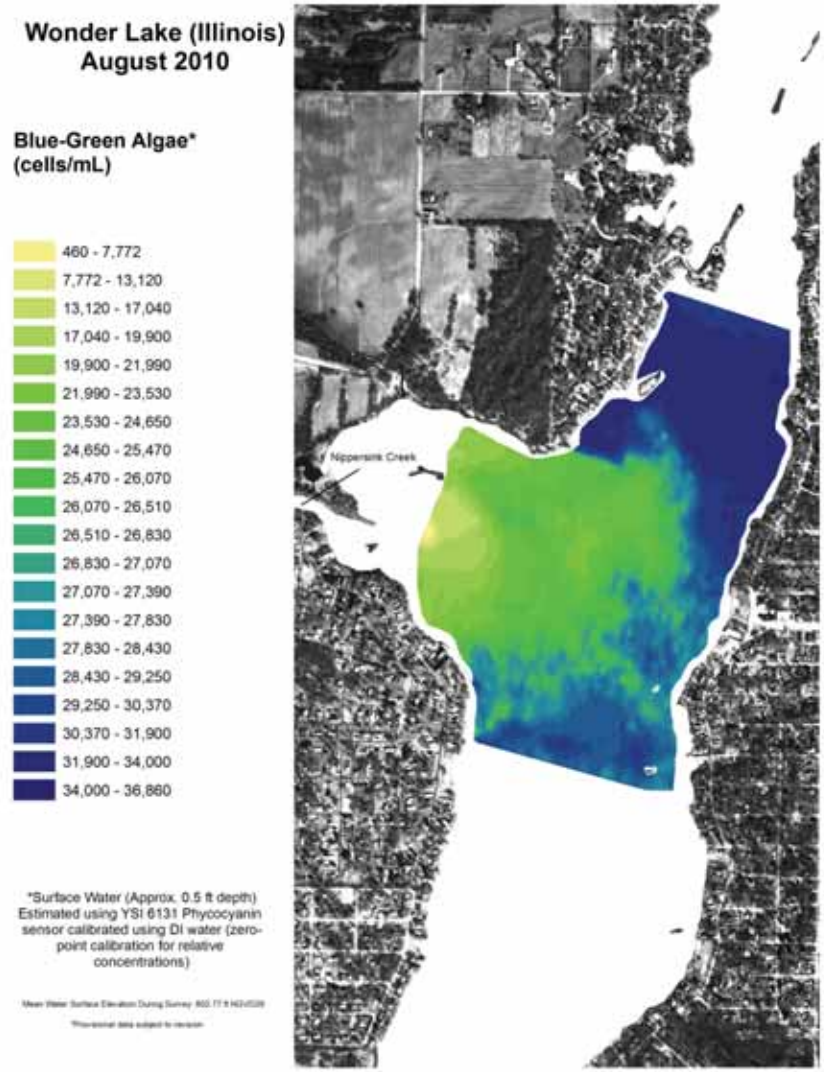
Surface Water Quality Distributions (Middle Basin)



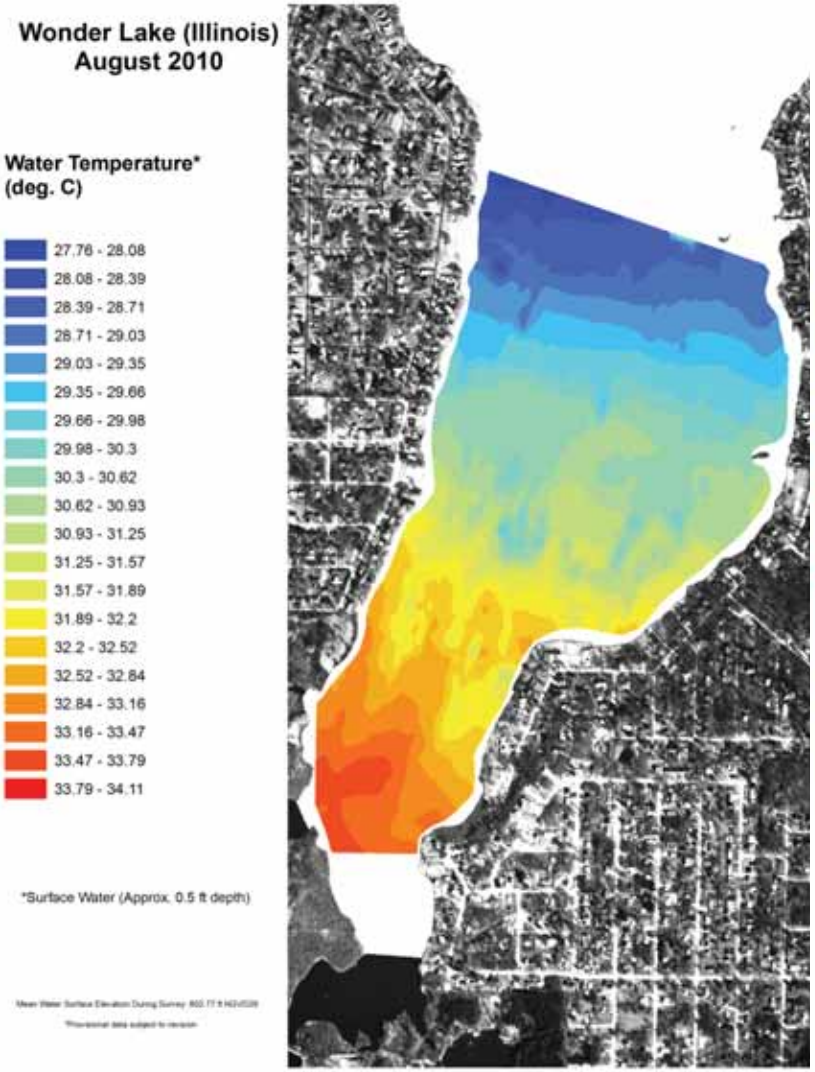


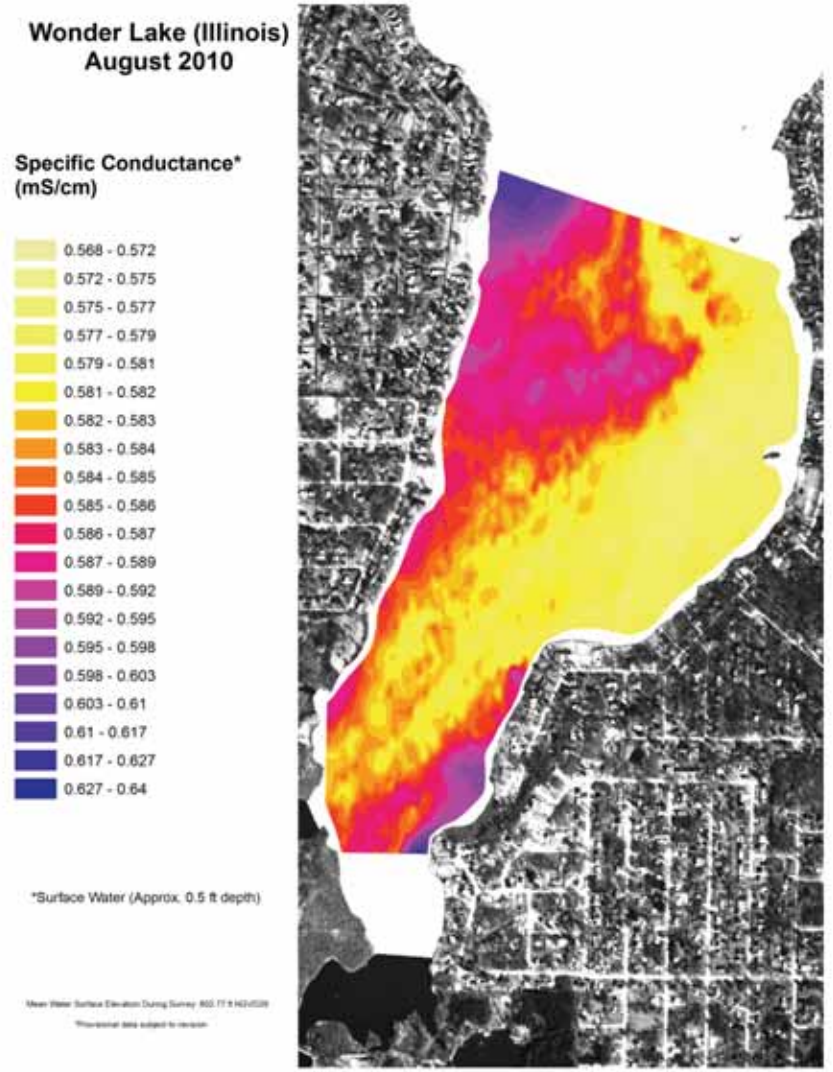
Surface Water Quality Distributions (Middle Basin)



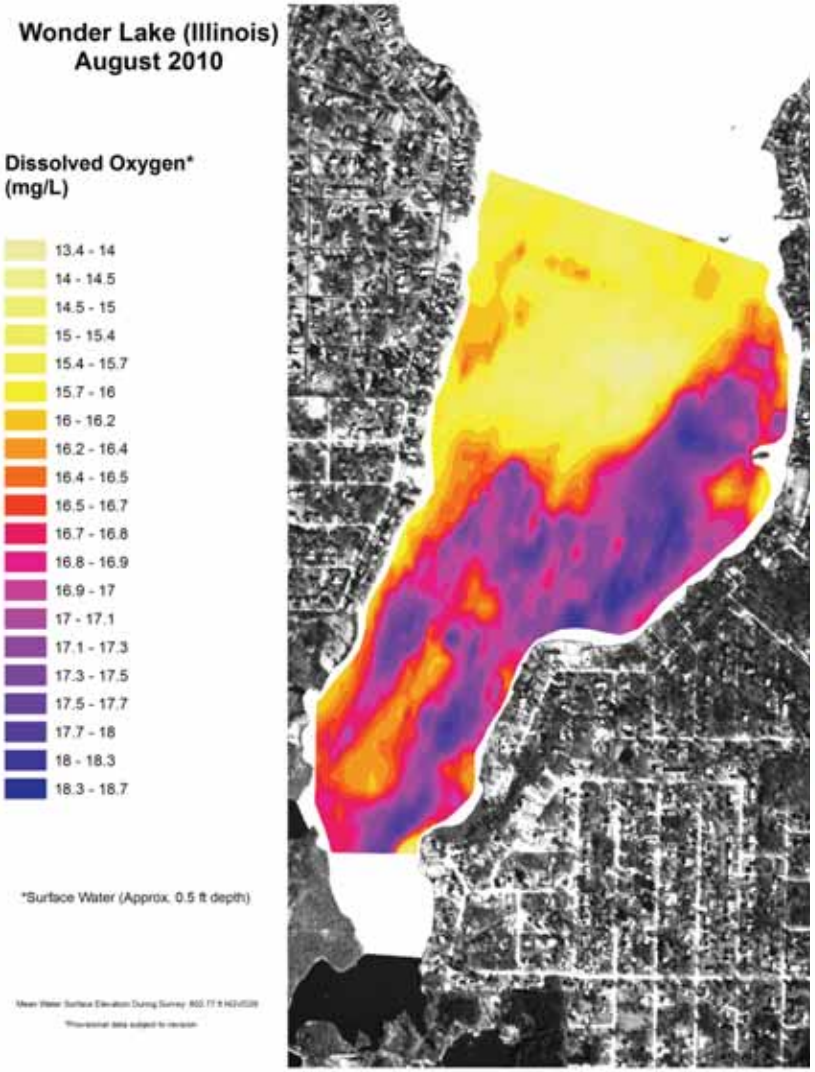


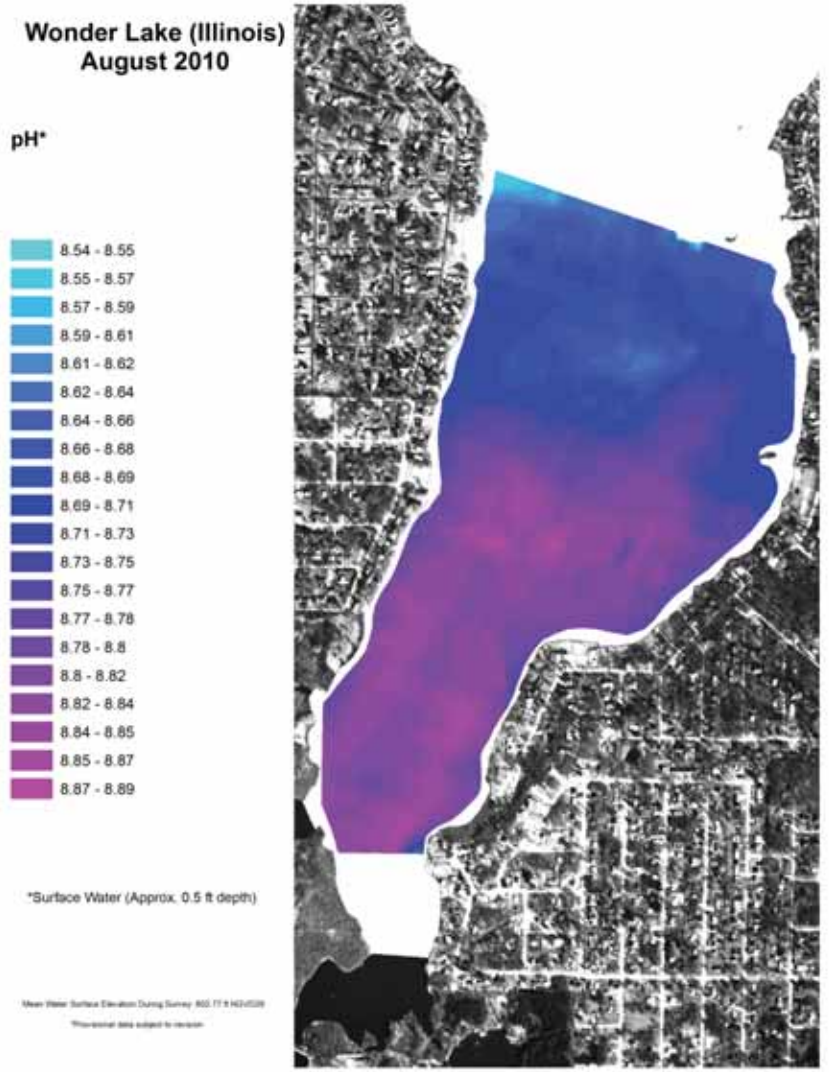
Surface Water Quality Distributions (South Basin)



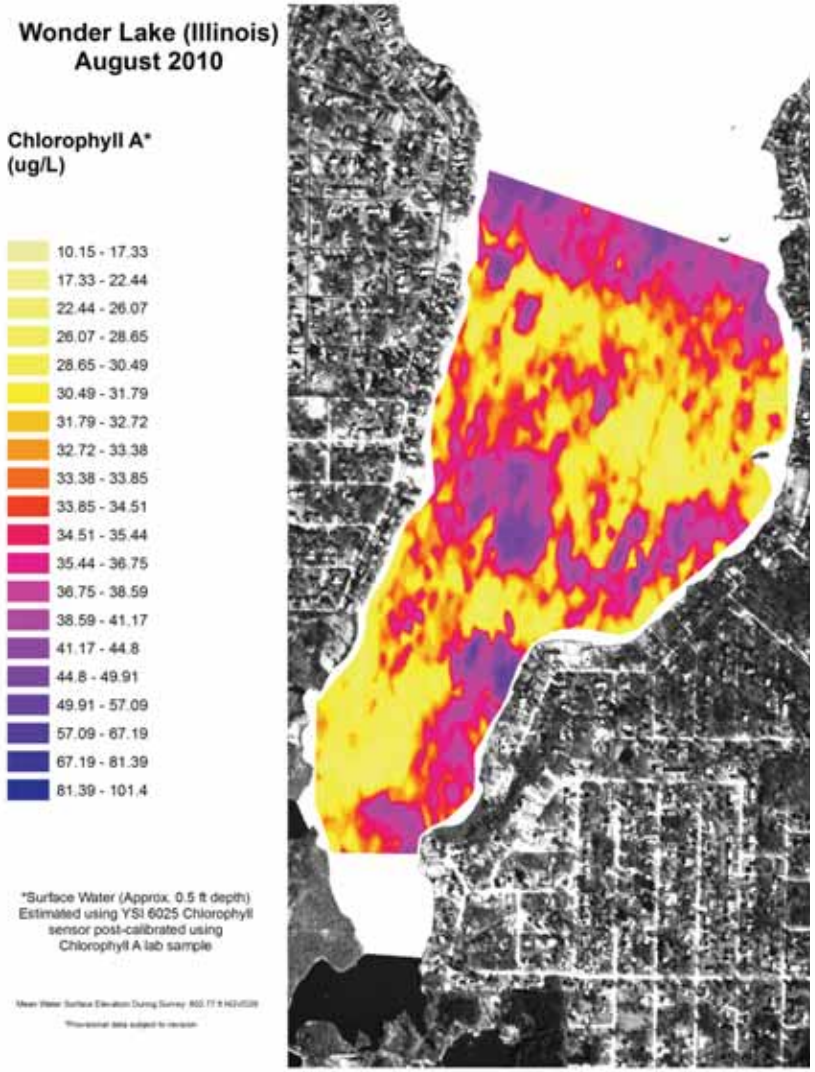


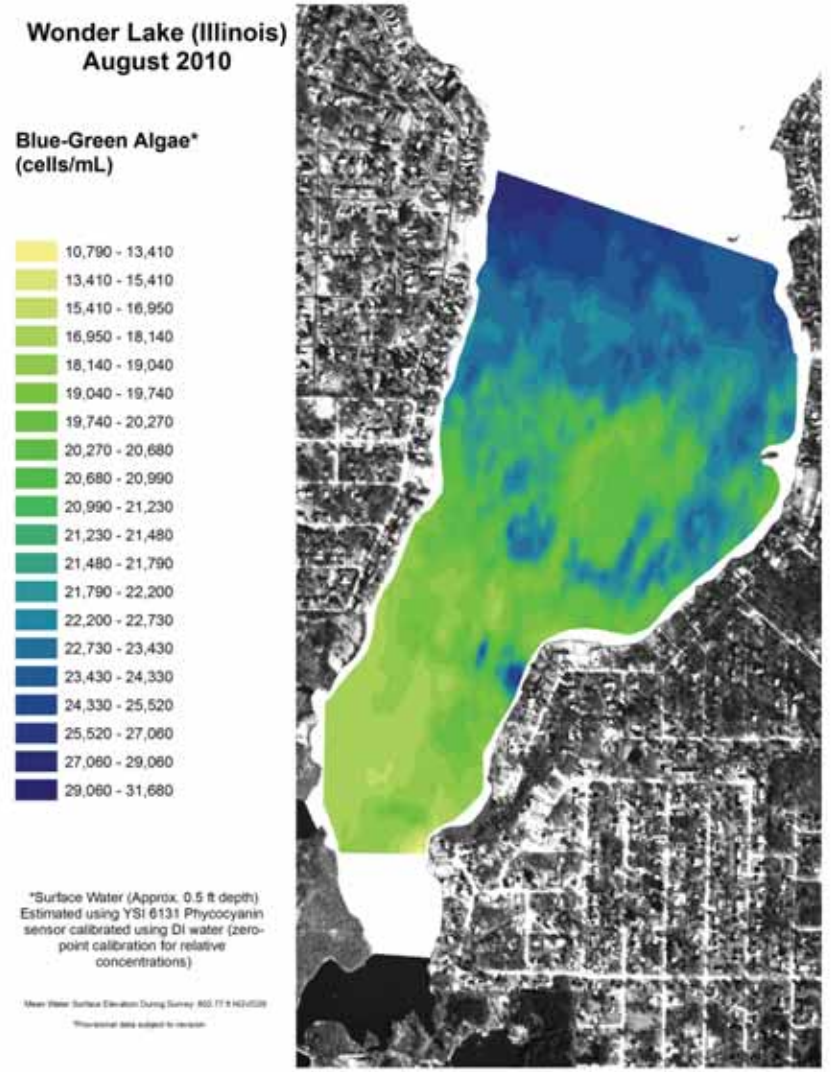
Surface Water Quality Distributions (South Basin)





Surface Water Quality Distributions (South Basin)





The Next Step

- Compare and contrast USGS synoptic data with Ecolipalooza™, IEPA ,VLMP, and MCDH data to better understand the system
- Compare synoptic data with long-term monitoring data
  - Do distributions explain variations seen between sampling sites?
- Assess data gaps and fill if necessary

Questions?

Contact Information:

Ryan Jackson

Hydrologist, USGS Illinois Water Science Center

pjackson@usgs.gov

Randy Stowe

Lake Manager, Wonder Lake

lakemanager@gmail.com

Survey Missions

South

Mid

North