

Creation of a Great Rivers Ecological Observatory Network (GREON) for real-time water quality monitoring in the Mississippi River Basin

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Introduction

There is a need for water quality monitoring in the Mississippi River and its tributaries that is seamless in its methodology and both real-time and continuous in its collection. The National Great Rivers Research & Education Center (NGRREC) is strategically located on the Mississippi River near its confluence with major tributaries (Illinois, Missouri, and Ohio). The Great Rivers Ecological Observatory Network (GREON) will consist of a series of 5 to 7 water quality monitoring platforms on the Mississippi River collecting real-time, continuous water quality data. Data collected from the network will lead to a greater understanding of the contribution of the major tributaries on water quality and aquatic ecology in the Great River system and also on the hypoxic zone in the Gulf of Mexico.

Monitoring Technology

The GREON system uses existing sensor technology for monitoring a suite of water quality parameters mounted on a Pontoon for In-Situ Characterization of Environmental Systems (PISCES) from YSI, Inc.*

GREON 1

- Conductivity and Temperature
- Dissolved Oxygen (Optical)
- Turbidity
- Chlorophyll
- Blue-green Algae
- Nitrate
 - Satlantic (In Situ Ultraviolet Spectroscopy)



YSI 6600 Sonde
ysisystems.com/products.php



Satlantic SUNA UV nitrate sensor
satlantic.com/suna

GREON 2+

- Nitrate
 - YSI (silver/silver chloride wire electrode)
- Fluorescent Dissolved Organic Matter (surrogate for CDOM)
- Others depending on advances in sensor technology (phosphorus?)



YSI EXO2 Sonde
www.exowater.com/exo2

Preliminary Test Deployment and Data Collection

- Placed on Mississippi River in Ellis Bay upstream from Melvin Price Locks & Dam No. 26
- Deployed on May 13, 2013 before 5th highest recorded flood crest on June 4, 2013 at Alton, Illinois.
- The PISCES is easily transported and deployed on the river and can be serviced in-place by boat



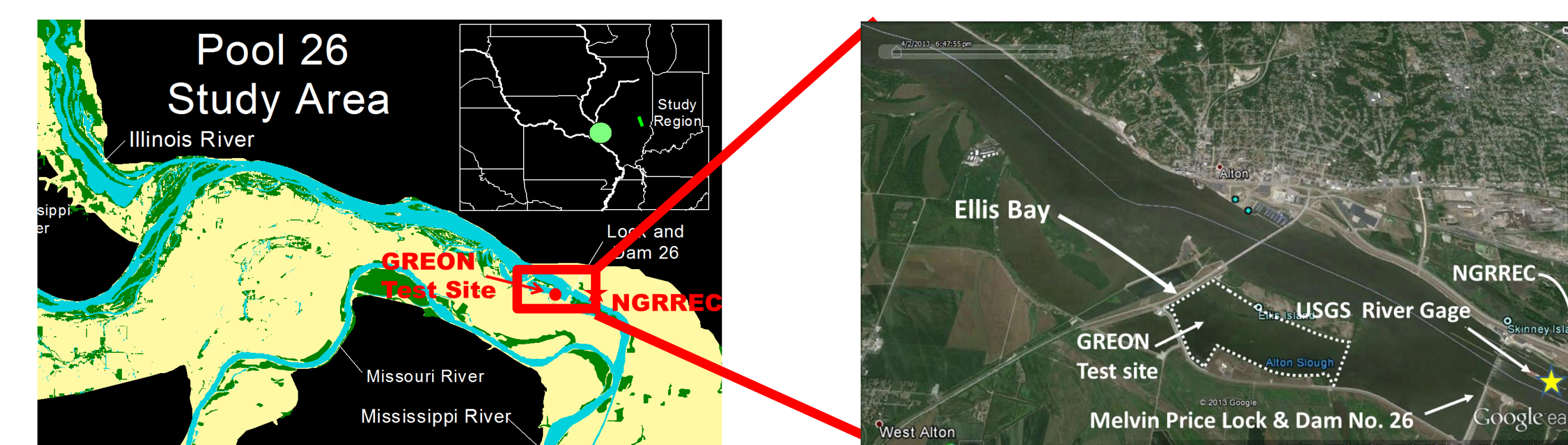
Launching GREON1 from the Alton Marina



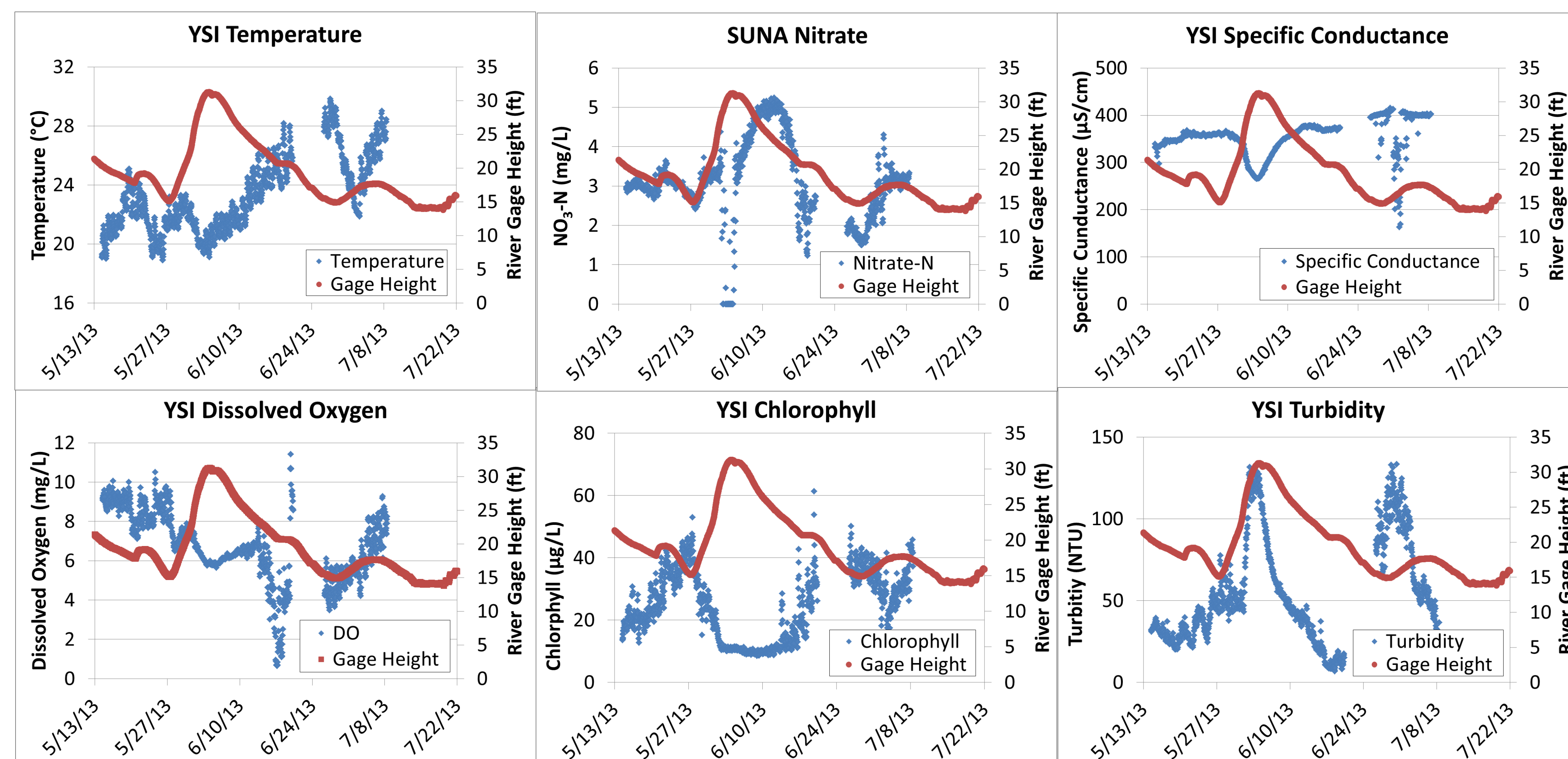
Servicing GREON1 from boat.

GREON Test Site

For the initial GREON test deployment, a site was chosen near the National Great Rivers Research and Education Center in Pool 26 immediately upstream from the Melvin Price Lock & Dam 26.



Sensor Readings – May 14 to July 8, 2013 / River Gage at Lock and Dam 26 (Alton, IL)



Preliminary Observations and Conclusions

- Trends in water quality parameters are impacted by the river hydrograph
- Flooding events had major influences on water quality parameters
- Real time monitoring captures rapid changes in river water quality due to rainfall and flooding events that might otherwise be missed by manual and intermittent monitoring.
- Comparing data from multiple sensors can help explain impacts of fluctuating river hydrology on river water quality

The Next Phase

- Acquire equipment and instrumentation for additional GREON sites (GREON 1 and 2 by 2014; GREON 3 to 7 by 2016)
- Identify monitoring sites that provide the most valuable data (main channel, side channels, backwater, confluence areas)
- Work out logistics of placing monitoring platforms on a major river (permissions, anchoring, etc.)