Upper Neuse River Basin Association
Special Study Plan
Date Issued: August 4, 2015

Special Study Name, ID# and Origination:

Analyze Historic Light Extinction Data, SS.LR.7a

This Special Study is contained in the Cardno FY 2016 monitoring contract. It is linked with an optional special study in the same contract that addresses the potential collection of new light extinction data, which may be unnecessary if the results of this study are deemed sufficient for updating the Falls Lake water quality model with respect to light extinction and establishing the depth of the photic zone.

Responsible Contractor(s):

Cardno – Data acquisition, analysis and reporting

Purpose of Study:

This Special Study comprises a minor effort to analyze available data on light extinction from Falls Lake and to determine the relationship between actual light extinction measurements and Secchi depth. This evaluation will help to determine whether Secchi depth data can fulfill the water quality data requirements for future updates to and calibration of the Falls Lake Environmental Fluid Dynamics Code (EFDC) lake response model and other data analysis approaches. This study will also be a factor in determining whether collection of additional light attenuation data is warranted.

This Special Study supports these objectives of the UNRBA Monitoring Program:

- Lake response modeling and
- Support of regulatory options

Anticipated Schedule:

Cardno will analyze available historic light extinction data during the first quarter of FY2016 (i.e., July - September, 2015). Results of the evaluation will be included in the Mid-Year Report planned for release in October 2015.

Summary of Study Methods:

Cardno has located pertinent Falls Lake historic data in the U.S. EPA STORET database. From 1986 to 1991, light extinction and Secchi depth data were collected by the NCDENR-DWR at the locations listed in Table 1 and shown on Figure 1. Cardno will explore the relationship between the depth of 99% light extinction and Secchi depth based on that data. Statistical methods such as regression analysis will be used to determine the strength of the relationship between Secchi depth and light extinction measurements. To the extent possible, Cardno will look for potential spatial (e.g., upper lake and lower lake) and temporal (e.g., seasonal) differences in the relationship to help identify whether the relationship varies due to changes in the physical or biological conditions observed in different seasons or at different locations in the lake. Cardno will also evaluate the uncertainty associated with using Secchi depth to estimate the depth of the photic zone in Falls Lake, which can also inform the EFDC modeling process.

Table 1. Locations with Historic Light Extinction/Secchi Depth Data

Station ID	Location
J1727000	Falls Lake at Hwy 98 near Bayleaf
J1725000	Falls Lake at Channel Marker #6 near Bayleaf
J1715000	Falls Lake at the mouth of Beaverdam Creek near Marker #10
J1675000	Falls Lake at the mouth of Ledge Creek near Creedmoor
J1590000	Falls Lake at the mouth of Little Lick Creek near Marker #13
J1370000	Falls Lake at I 85 near Northside
J1250000	Falls Lake at Southern Rr near Durham
J1740000	Falls Lake at Marker #1 near Bayleaf
J1430000	Falls Lake at Marker #16 near Redwood
J1710000	Beaverdam Lake near Sandy Plain

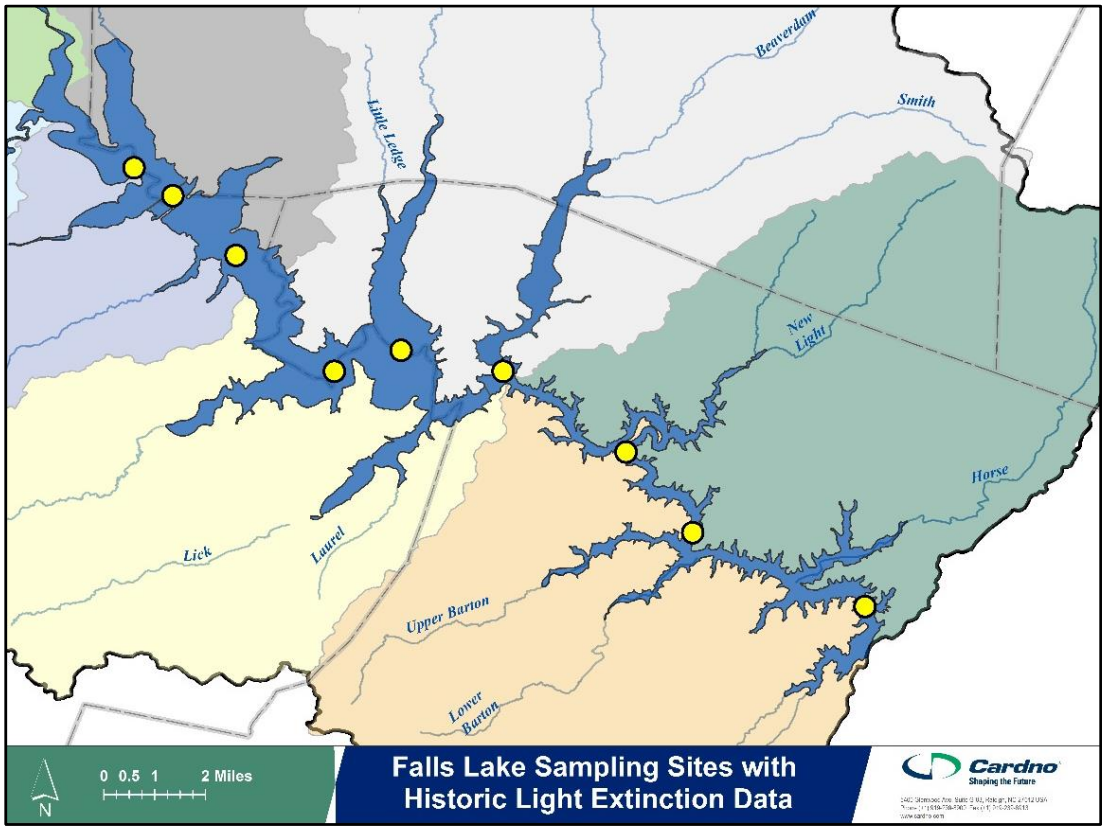

Figure 1. Map of Locations with Historic Light Extinction/Secchi Depth Data

Quality Assurance/Quality Control:

This Special Study does not involve the collection of any new data. Cardno will evaluate the reliability of the data from STORET to the degree possible based on metadata in that database and knowledge of the equipment and methods used to obtain it. Given that the data were originally collected by DWR, QA/QC protocols in place for the agency at that time would apply to the data collection methodology. Cardno will use accepted statistical procedures in its analyses and will note the procedures used in any reporting of the results of this study.

Reporting/Deliverables:

Cardno will communicate with the UNRBA Executive Director on a regular basis on the progress of this Special Study. Status updates will be provided to the UNRBA Path Forward Committee and the Board of Directors at their regular meetings during Cardno's updates on the overall Monitoring Program status.

Discussion of the status and results from this Special Study will be included in the Mid-Year and Annual Reports. Information generated by this Special Study will largely be used to inform future lake modeling efforts, therefore the results will be produced in a format suitable for use by those conducting modeling updates.