Study Plan for the Ongoing Assessment of Falls of the Neuse Reservoir

Background

Falls of the Neuse Reservoir (Falls Lake) is a multipurpose impoundment of the Neuse River located in the Upper Neuse River basin. The reservoir is the primary water supply for the City of Raleigh and surrounding towns in Wake County. The Falls Lake dam was constructed and filled by 1983 and is currently operated by the United States Army Corps of Engineers (USACOE). The reservoir extends 28 miles to just above the confluence of the Eno and Flat Rivers. The uses for the reservoir include: water supply, flood control, recreation, wildlife enhancement, and augmentation of low flows for purposes of pollution abatement and water quality control in the Neuse River basin. Algal blooms and eutrophic conditions have been present in the lake since impoundment. Falls Lake was listed on North Carolina's 2008 303(d) list as impaired for chlorophyll *a*. The portion of the lake upstream of I-85 was also listed as impaired for turbidity.

In 2005, the North Carolina General Assembly passed Session Law 2005-190 (also referred to as Senate Bill 981), which directed the Environmental Management Commission (EMC) to study drinking supply reservoirs in general, and to develop and implement a nutrient management strategy based on a calibrated nutrient response model for certain reservoirs, including Falls Lake. In 2009 Senate Bill 1020 was ratified and signed into law as Session Law 2009-486. This revises the EMC adoption deadline to January 15, 2011 and adds certain requirements for water quality improvements in the watershed. After developing a nutrient response model for and engaging stakeholders for input, a nutrient management strategy was developed, and was presented to the EMC as draft rules 15A NCAC 2B .0275 through .0282 and .0315(q) in March 2010. Section 5.(a) of the draft Goals Rule (15A NCAC 2B .0275) includes provisions for water quality monitoring as follows.

> *"The Division shall perform water quality monitoring throughout Falls Reservoir and shall accept reservoir water quality monitoring data provided by other parties that meets Division standards and quality assurance protocols. The Division shall utilize this data to produce load reduction estimates and to perform periodic use support assessments pursuant to 40 CFR 130.7(b)."*

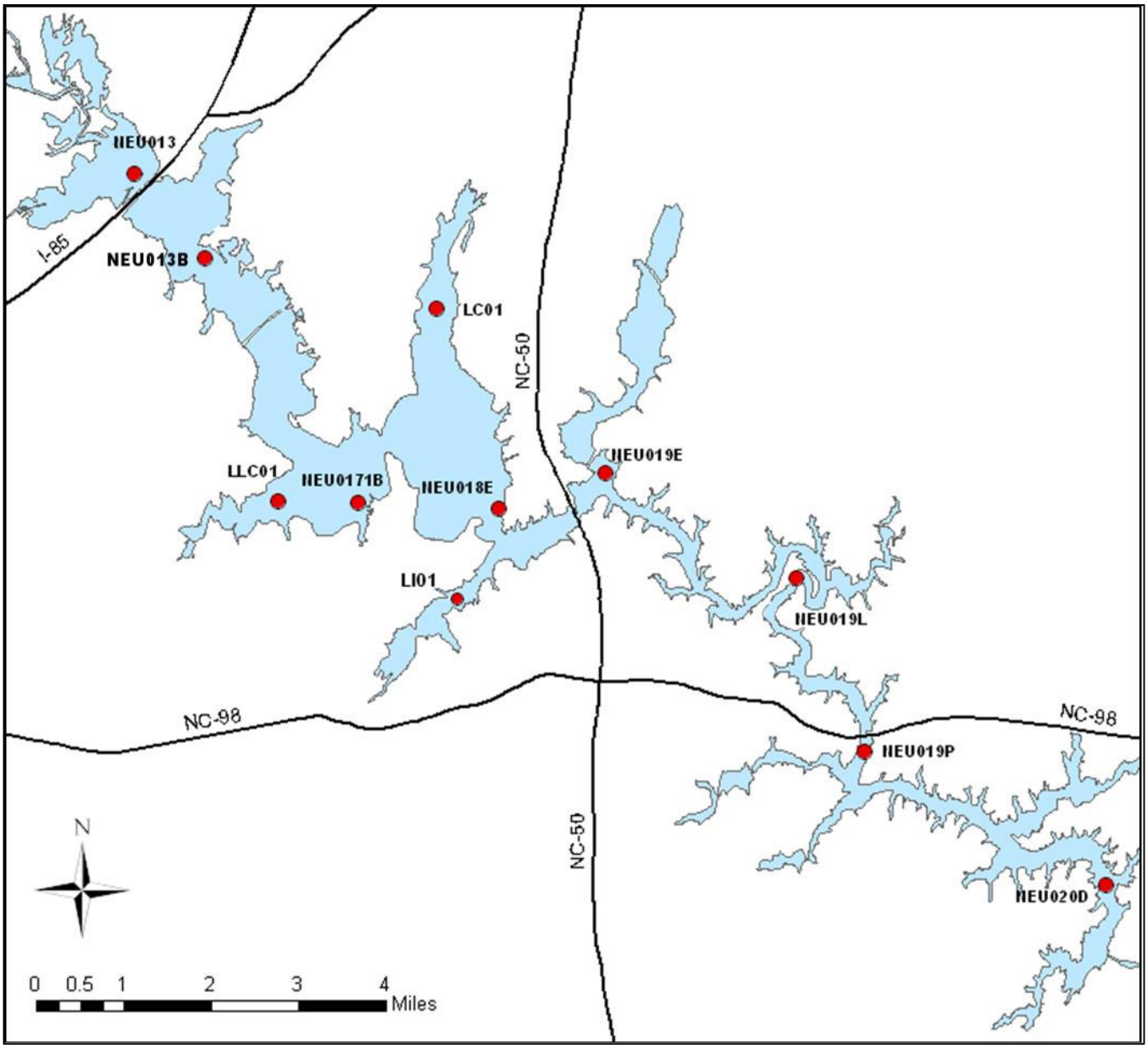
Purpose

The objective of this study is to evaluate progress in attainment of water quality standards and use support in Falls Lake as required by the nutrient management strategy rules. Data for load reduction estimates are not part of this particular study.

Study Plan

Monthly sampling will begin in May 2010, and will continue until 2021 or as required by the nutrient management strategy rules. A total of eleven stations will be sampled as shown in Figure 1. Station LI01 was added April 2011.

Figure 1. Falls Lake Monitoring Stations



Parameters

Parameters to be evaluated in this study are shown in Table 1. The photic zone is assumed to range from the water surface to a depth equal to two times the Secchi depth. Depth stratified physical parameters will be collected at the surface (0.15 m), 1 m increments to a depth of 10 m, and every 5 m thereafter. Station NEU013 will not have chlorophyll *a* collected as part of the photic zone samples. Total organic carbon (TOC) was added as a photic zone composite sample in April 2011 and was not collected prior to this date.

Table 1. Parameters to be Evaluated

Transparency			
Secchi Depth			
Photic Zone Composite Samples			
Chlorophyll *a*	Total Organic Carbon	Nutrients (TP, TKN, NH_3, NO_2+NO_3)	Turbidity
Depth Stratified Physical Measurements			
Temperature	pH	Dissolved Oxygen	Conductivity

Quality Assurance

Samples will be collected according to the DWQ Intensive Survey Unit Standard Operating Procedures (November 2011). QA/QC procedures will adhere to the Ambient Lakes Quality Assurance Project Plan. Both of these documents can be found on the DWQ Intensive Survey Unit website at: http://portal.ncdenr.org/web/wq/ess/isu.

In addition to the QA/QC processes described in the Ambient Lakes Quality Assurance Project Plan, the following procedures will also be performed.

Chlorophyll a Round Robin

In light of the challenges associated with chlorophyll *a* analysis, DWQ will continue to conduct annual chlorophyll *a* round robins so that confidence in laboratory results for this parameter can be assured. To date, three round robins have taken place with approximately 17 laboratories participating.

Duplicate Sampling

At one station per sampling event, duplicate samples will be collected for all photic zone parameters evaluated in this study. Duplicate samples will be collected by filling a churn sample splitter at that station with the required volume for two sets of sample bottles. Both sets of samples will be analyzed by the DWQ laboratory. The duplicate samples will be collected at each monitoring station on a rotating basis except at NEU013.

Split Sampling

The draft nutrient management strategy states that the Division "shall accept reservoir water quality monitoring data provided by other parties that meets Division standards and quality assurance protocols." If other entities do conduct additional monitoring and analyses and their data are approved by DWQ, the Division will split samples with those entities to document data comparability. Split samples will be collected in the same manner as the duplicate samples described above, except that two different laboratories would perform the analyses. The frequency of split sampling will depend on the frequency of monitoring by other entities, thus detailed schedules for split sampling would be developed on a case-by-case basis.

Data Reporting

A brief summary report and an excel spreadsheet containing the monitoring data for samples collected during Falls Lake monitoring will be reported on the Intensive Survey Unit website annually as data becomes available (http://portal.ncdenr.org/web/wq/fallsjordan).