

Water Quality Progress Report
October 2007

Claytor Lake Relicensing Project

Water Quality Studies

Status Report

October 25, 2007

The Claytor Lake water quality study has several study objectives:

- Objective 1: Assemble and Review Available Water Quality Data.
- Objective 2: Characterize Existing Dissolved Oxygen and Temperature Conditions in the Project Waters
- Objective 3: Identify Measures that could Enhance Downstream Dissolved Oxygen Concentrations under Typical and Extreme (Drought) River Flow Conditions
- Objective 4: Collect Additional Water Quality Data Upstream and Downstream of Claytor Lake Dam from 15 June through 15 September during the Study Year
- Objective 5: Develop Protocols for Future Water Quality Monitoring, as Appropriate
- Objective 6: Identify How Sediment is/may be Affecting Water Quality
- Objective 7: Identify the Impact of Project Operations on Reservoir and Downstream Water Quality
- Objective 8: Assess the Effects of the Project and its Operations on Downstream New River Temperatures

Objectives 1 and 2 have been completed. A draft report was prepared and results were presented at the May Stakeholders meetings. The report remains in draft form, pending comment from VDEQ. Objectives 3, 5, 6, 7 and 8 have not been completed and await completion of the field program and subsequent thorough evaluation of the field data. Objective 4 is ongoing at this time and will be reported on here.

Objective 4 components:

- 4.1 Collect Claytor Lake water quality data at selected locations and by 1-meter profile in the lake. This study component was modified after the May stakeholders meeting to a) sample throughout the length of Claytor Lake rather than at just three transects near the dam; b) include one (1) sun-up-to-sun-down, hourly sampling event at a location near the dam on a selected day during the summer; and, c) to extend the sampling period beyond 15 September if low DO conditions in the lake and dam tailwater warrant it. Water quality parameters to be sampled were DO, temperature, pH, conductivity and chlorophyll *a*.
- 4.2 Collect water quality data downstream of Claytor Lake in selected locations. This study component remained largely the same as proposed,

except for the potential extended sampling period, and includes sampling for DO, temperature, pH and conductivity at three selected, downriver New River locations.

- 4.3 Collect continuous DO, temperature, conductivity and pH data in the tailwater of Claytor Lake dam. This study component was modified by our original proposal to include continuous monitoring for the entire water quality sampling program. The sampling period was also potentially extended by group agreement after the May stakeholders meeting.
- 4.4 Collect continuous temperature data upstream of Claytor Lake at a site to be identified by VDGIF. This site was selected in April by agreement with VDGIF.

Status of the field studies

The field sampling program was initiated in late April with the installation of 3 temperature recording devices in the New River upstream of Claytor Lake. The location selected, after consultation with VDGIF, was in the vicinity of the New River Trail State Park. All three devices have been recording temperature continuously since that time. The data record for each is complete without break or lost data, except for when the monitor is retrieved for servicing and data downloading. These monitors are scheduled to remain in service through April 2008.

The continuous DO, temperature, pH and conductivity monitor was installed in the Claytor Lake tailrace on June 18, 2007. The unit has been retrieved and calibrated and data has been downloaded weekly since installation. The dataset is complete, without break or data loss, except for when the monitor is retrieved for servicing and data downloading. Because of relatively extreme low flow and corresponding low DO conditions in Claytor Lake and in the tailrace, the monitor is still in place. Recent improvements in DO conditions in the lake and tailrace as a result of cooler temperatures and higher river flow make it likely that the unit will be removed on or around the 1st of November. This decision will be made after reviewing this week's sampling data.

The Claytor Lake and downriver water quality sampling program was begun on June 19, 2007. In-lake sampling has occurred at 11 sampling stations, each located approximately 2 miles apart from Allisonia to near the Claytor Lake dam and at 3 downriver stations, exclusive of the tailwater monitoring location (the lake sampling station closest to the Claytor Lake Dam actually was comprised of a cross-lake transect with four (4) equi-spaced sampling locations. All sampling has been completed according to study plan in terms of sampling methods, parameters and number of sampling events. There have been no deviations from the sampling plan, and there are no missing data or missing sampling events. One sun-up-to-sun-down sampling event was conducted in August at a mid-channel location in the sampling transect nearest the dam. As with the continuous monitoring in the tailrace, the in-lake and downriver sampling program has been extended to the present date due to continuing low DO conditions in the deeper waters of Claytor Lake, within and below the intake zone, and in the tailrace. It is anticipated that this week's sampling event (October 24th, 2007) will be the last for the lake and downriver water quality sampling program, but that decision will not be made until after review of the data.

Wetlands, Littoral Habitat and Aquatic Vegetation Progress Report
October 2007



**CLAYTOR LAKE INTERIM REPORT
Wetland Terrestrial Habitat and Aquatic Vegetation Studies
October 26, 2007**

TERRESTRIAL HABITAT SURVEYS

Task 1. Wetland Habitat

Normandeau used aerial photos (stereo, 1":800", true color, flown in March 2007) acquired by AEP to map all wetlands within 1000 feet of the project area. Wetland cover types were classified using the US Fish and Wildlife Service's 1979 classification system. To aid in other tasks such as riparian and woody debris habitat, eagle surveys and aquatic bed impacts, the upland land use was mapped using broad categories of forested, agricultural, residential and commercial. Land use categories were further broken down to designate important activities such as logging and mowing.

The mapped wetlands and uplands were digitized and transferred onto the georeferenced, site-specific topographic and bathymetric base map provided by AEP. The cover types were quantified by category and color-coded for visual reference. Quality control measures were implemented throughout the process, including multiple reviews of photointerpreted wetlands by qualified staff, review of the digitized maps for precision of the transfer, and review of the cover typing and quantification for accuracy.

The maps were field-verified during July and August, 2007, by wetland scientists. The approximate extent and cover type classification were reviewed from boat surveys, on foot and from oblique aerial photos flown in July. Representative examples of each cover type were characterized using features such as vegetation composition and structure, percent cover of dominant species, soil saturation, stoniness, hydrology and ground litter.

Task 2. Riparian and Woody Debris

Riparian habitats were mapped from the aerial photographs used in Task 1. These were identified based on topographic signature: elevation slightly above full pond, and level or slightly sloping terrace implying current or historic floodplain. The land use within the riparian zone was mapped according to the categories described in Task 1.

The in-lake woody debris will be mapped and characterized during the late fall littoral habitat survey (Task 3).

Task 3. Littoral Habitat

This task is scheduled to occur in late November or whenever the maximum drawdown is scheduled for the year. The littoral habitat survey will be performed by mapping with an integrated GPS and laser range finder system the entire shoreline exposed by the drawdown. The dewatered substrates will be categorized into classes relating to substrate texture, structure and composition that are important to fish habitat. Due to regional drought conditions, AEP is considering limiting or not performing the drawdown, which will limit or prohibit the survey by eliminating the exposed shoreline below run-of-river.

Task 4. Erosion and Sedimentation

The sources for erosion and sedimentation are being mapped and quantified by others. Normandeau has noted shoreline erosion during field work and areas of erosion and sedimentation will be mapped during the littoral habitat survey (Task 3). The findings of all of these data will be used to assess the effects of sedimentation and erosion on terrestrial and wetland habitats and the littoral zone of the impoundment.



Task 5. Bald Eagle Habitat

The Center for Conservation Biology (CCB) at the College of William and Mary was subcontracted to perform most of the eagle habitat analysis. The Claytor Lake project area was flown twice in the spring (April and late May) searching for eagle nest locations and activity. In April, a nest was identified within the project area with an incubating adult bird. A second visit in May found the nest empty with no adults in attendance, which indicates a failed nest attempt for the season. CCB subsequently performed a habitat analysis of the project area, identifying high quality nesting, roosting and perching habitat. They are currently preparing a report and map summarizing their findings.

NATIVE AND EXOTIC AQUATIC VEGETATION

Aquatic vegetation is being mapped using a variety of sources, including the stereo and oblique aerial photos, AEP bathymetry maps, Friends of Claytor Lake and DEP verbal descriptions, and a 2006 map of aquatic herbicide treatment areas provided by Nuisance Aquatic Plant Control, Inc. The March 2007 aerial photos are too early in the season to show aquatic vegetation, but depict shallow bars and coves which could support aquatic beds. These combined with the bathymetry were used to identify likely aquatic bed areas. Normandeau surveyed Claytor Lake for aquatic beds on July 18 -20 in preparation for intensive sampling in August. The purpose of the visit was to map the locations of the beds and determine composition of the dominant species. This survey, consistent with other reports, found that the dominant species were all non-native species: hydrilla (*Hydrilla verticillata*), slender naiad (*Najas minor*), and curly pondweed (*Potamogeton crispus*). The hydrilla was most concentrated in the southern, more riverine sections of the reservoir, the slender naiad at the northern lacustrine end. Some natives, primarily pondweeds (*Potamogeton* spp and *Elodea canadensis*) still occur, but in relatively small percentages. From these data, 50 locations were selected in which to establish transects for plot sampling. The findings and proposed sampling locations were circulated to the stakeholders for comment.

Aquatic bed sampling occurred in late August. The 50 transects were located so as to sample most existing beds, and the larger or more diverse ones were sampled multiple times. Several locations that appeared to be suitable habitat for aquatic vegetation but lacked it were also sampled. Some of these areas include shorelines where vegetation control treatment has occurred in the past (e.g., near Browns Hollow).

A minimum of three 1 m²-plots per transect were established along the transect at the quarter points (25, 50 and 75% of the transect length). Some additional plots were established to sample distinctive features of the aquatic bed. Plots were sampled using a 6" diameter underwater viewscope where water visibility was adequate, and a garden rake with an extendible handle. Vegetation species and percent cover by layer (basal, mid-column, floating-leaved and emergent) were recorded. Water depth, secchi depth and substrate data were collected at each station.

The report will summarize the results of the transect sampling and field surveys. The mapped aquatic beds will be digitized, quantified and integrated with the wetland and terrestrial cover type map. GPS coordinates of all transects and plots will be provided for future sampling efforts. Recommendations for management of invasive exotic aquatics will likely include control of run-off quantity and quality from developed areas, education of lake-side landowners, and continued mechanical and chemical controls of the nuisance beds. Because the overall percentage of aquatic vegetation is low in the reservoir, the beds provide valuable fish nursery and feeding habitat, regardless of species composition.