

**Carters Lake Chlorophyll *a* TMDL Study**  
Continuous Water Quality Monitoring

**Carters Lake Chlorophyll *a* TMDL Study**  
**2008 Field Study Plan**  
**Module 3 Continuous Monitoring**

**Georgia Department of Natural Resources**  
**Environmental Protection Division**  
**Watershed Protection Branch**  
**Watershed Planning & Monitoring Program**  
**4220 International Parkway**  
**Suite 101**  
**Atlanta, Georgia 30354**

## **Introduction**

The objective of this module is to collect continuous water quality data at two water quality standard sites located on Carters Lake. The Georgia EPD will operate and maintain these two sites and their associated equipment. These monitoring stations will be continuously operated from March through October. EPD personnel will collect the data from the continuous monitors approximately once a week. Data from these continuous monitors will be used in the hydrologic models being used for development of a chlorophyll a TMDL for the lake.

## **Study Area and Monitoring Locations**

The study area encompasses the main body of Carters Lake from the Coosawattee River to the mid-lake site, upstream from the Woodring Branch. Table 3-1 provides a description of the continuous water quality monitor locations.

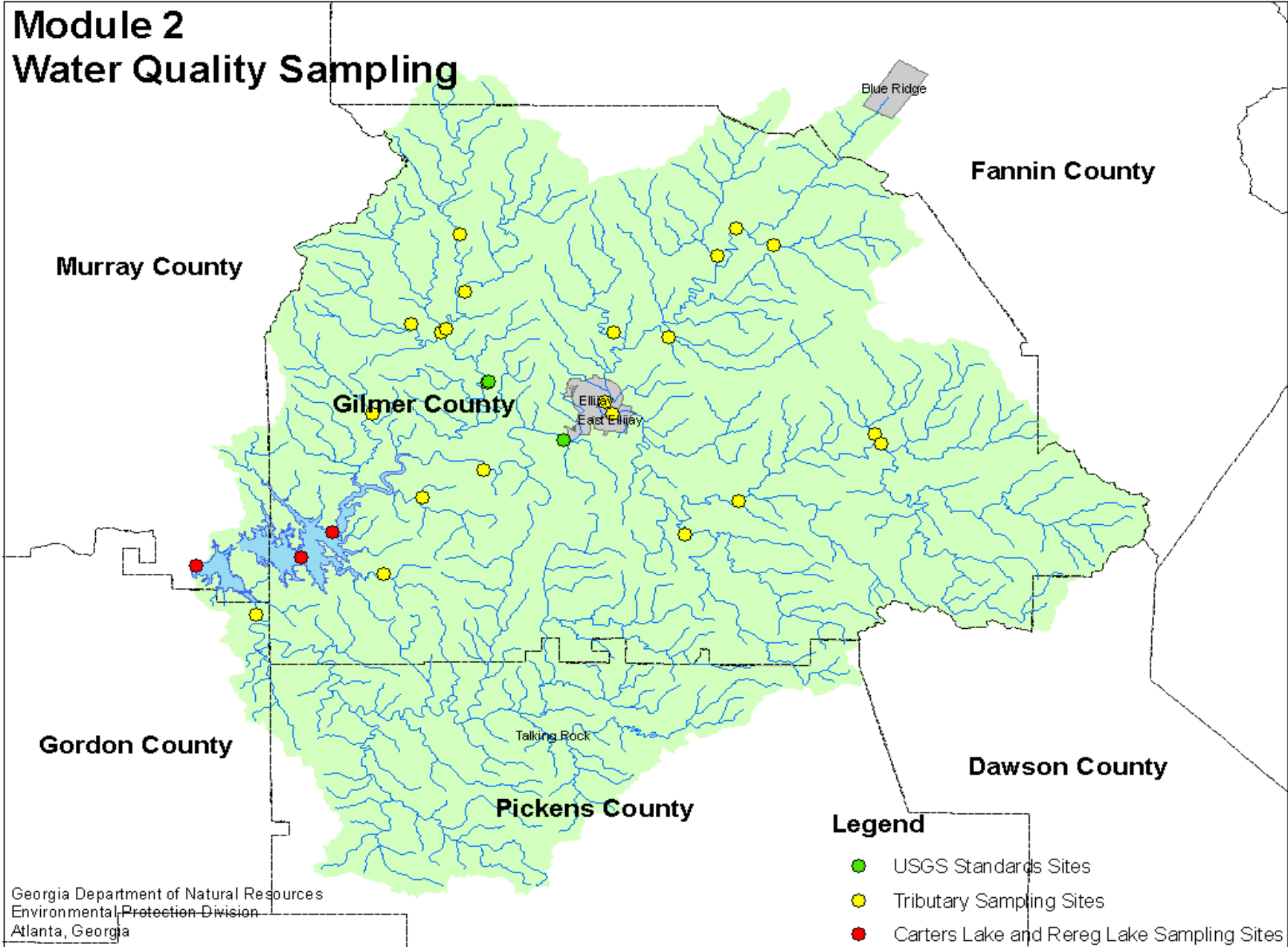
**Table 1-1. Location of the EPD Permanent Continuous Water Quality Monitors**

<b>Carters Lake</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>
Cossawattee	Contained in a YSI buoy	N 34 ° 37.504	W 84 ° 37.029
Mid-lake (upstream from Woodring Branch)	Contained in a YSI buoy	N 34 ° 36.456	W 84 ° 38.280

Water quality measurements will be taken using programmable, in-situ, multi-parametric water quality monitoring devices, commonly referred to as sondes. The monitors will be programmed to record hourly dissolved oxygen, temperature, pH, conductivity, and depth readings.

## **General Monitoring Procedures**

The continuous monitoring sondes will be placed in holders engineered into the design of each buoy. The buoys will be placed in locations that allow collection of data to meet data quality objectives.



The containment buoy will consist of a YSI EMM 375 bright yellow buoy with a containment tube which houses the water monitoring device. The Ysi EMM 375 is a commercial type buoy, which will meet the requirements of the study.

Prior to deployment, the continuous monitors (parametric Sondes) will be pre-calibrated according to the protocols found in the instrument's manual. At the time of deployment and retrieval of each sonde, an independently calibrated sonde will be used to take a co-reading of the five water quality parameters being recorded. This reading will be used to corroborate the final reading of the retrieved sonde as well as the initial reading of the newly deployed sonde. This additional instrument will also be pre-calibrated in the lab prior to each day's fieldwork. Upon removal, the sondes will be checked for calibration drift in the laboratory and then cleaned and prepared for the next deployment.

### **Measurements and Documentation of Field Data/Observations**

Parameters measured by the weekly-deployed units will be depth, water temperature, conductivity, dissolved oxygen, and pH. The recorded data from each sonde will be downloaded to a personal computer before being prepared for redeployment. The data will be reviewed by personnel of the Watershed Planning and Monitoring Unit and stored in electronic spreadsheets. The spreadsheets will include all data collected during the sampling period as well as graphs for temperature and dissolved oxygen.

Calibration histories for all sondes will be maintained in logbooks located at the EPD Watershed Protection Branch Headquarters.

### **Schedule**

Each of the two monitoring stations will be continuously monitored from April through October 2007. Each recording unit will remain in place for approximately one week, then be exchanged with a newly calibrated unit which, has been programmed to overlap readings with the one removed. With the exception of unforeseeable equipment failures, this deployment schedule should provide a continuous data set for the seven-month period.

### **Quality Control**

All fieldwork will be performed in accordance with the Division's Quality Assurance/Quality Control (QA/QC) procedures maintained by the Watershed Planning and Monitoring Program. Equipment used will be calibrated in the laboratory prior to and after sampling according to the manufacturer's instructions. The deployed sonde's readings will be compared with the readings from an additional unit used for in-situ measurements at each deployment and

**Carters Lake Chlorophyll a TMDL Study**  
Continuous Water Quality Monitoring

retrieval. This data will be recorded in the field book and used to estimate instrument drift while deployed. Data will be put in spreadsheets following each sampling day, reviewed by the Watershed Modeling Unit, and ultimately entered and maintained in the Watershed Protection Branch's Water Resources Database (WRDB).

**Safety**

Each vehicle and boat will be equipped with a first aid kit, fire extinguisher and other emergency equipment, as required. All safety procedures will be followed as outlined in EPD's Safety Manual. Boat operators will be proficient in all aspects of boat operation and safety. The recovery/deployment efforts may be canceled if extreme weather conditions exist.

## **Equipment**

The equipment to be used for the project includes:

- Vehicle with tow rating higher than 4000 lbs.
- Boat capable of 40 mile round trip with anchor
- Thermometer
- Twelve Hydrolab Minisonde units with memory capable of long term deployment
- Field Book, waterproof permanent pens
- Secchi disk
- Li-Cor photometer
- Van Dorn sampler or similar instrument
- Mixing carboy
- Tool kit
- GPS unit
- Depth finder
- Life jackets and float cushion
- Emergency boat kit
- Digital Camera
- First Aid kit
- Deployment tubes and necessary mounting equipment
- Minisonde with Surveyor Display for readings collaboration