

Coosa River Modeling Project
2006 Field Study Plan
Module 2
Continuous Water Quality Monitoring

Georgia Department of Natural Resources
Environmental Protection Division
Watershed Protection Branch
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Introduction

The objective of this module is to collect continuous water quality data from the Coosa River. The USGS maintains six continuous water quality monitors within the Coosa River Basin. EPD will collect data from eight stations located upstream from the Georgia/Alabama State Line. These stations will be continuously monitored throughout the entire study period. These data will be used directly as model input for the tributaries and upstream boundaries and to calibrate the EPD RIV-1 Coosa River model.

Study Area and Monitoring Locations

The study area includes the Coosa, Consauga, Coosawattee, Etowah, and Oostanuala Rivers, and Pumpkinvine and Armuchee Creeks. The first priority in determining monitoring sites will be given to the regions of the rivers where continuous data is most crucial. The second priority in determining monitoring sites will follow the criteria outlined in *Hydraulic conditions of the ideal gauge site* (after Rantz and others, USGS 2000) and given below, where applicable:

- The general course of the stream is straight for about 300 feet upstream and downstream from the gage site.
- The total flow is confined to one channel at all stages, and no flow bypasses the site as subsurface flow.
- The streambed is not subject to scour and the fill is free of aquatic growth.
- Banks are permanent, high enough to contain floods, and free of brush.
- Unchanging natural controls are present in the form of a bedrock outcrop or other stable riffle for low flow and a channel constriction for high flow, or a falls or cascade that is submerged at all times.
- A pool is present upstream from the control at extremely low stages to ensure a recording at extremely low flow, and to avoid high velocities at the stream ward end of station intakes during periods of high flow.
- The station is far enough upstream from a confluence with another stream or from tidal effects to avoid any variable influence from the other stream or tide on the station.
- The site is readily accessible for ease of installation and operation of the station.
- The site is not susceptible to manmade disturbances, nearby tributaries, or point-source discharges.

Water quality measurements will be taken using programmable in-situ water quality monitors (Hydrolab multiprobe loggers). The monitors will record hourly dissolved oxygen, temperature, pH, conductivity, and depth readings. The data collected from these monitors will supplement the data from the permanent USGS monitors of the same type (YSI multiprobe loggers). Table 2-1 lists the locations of the permanent USGS continuous monitors.

Table 2-1. Location of the USGS Continuous Water Quality Monitors

Mainstem	Location	USGS Station ID
Conasauga Sub-Basin		
Conasauga River	near Eton, GA (SR 286)	02384500
Conasauga River	at Tilton, GA (Tilton Road Bridge)	02387000
Coosawattee Sub-Basin		
Coosawattee River	at Carters, GA (US 411)	02382500
Etowah Sub-Basin		
Etowah River	at Allatoona Dam, above Cartersville, GA	02394000
Etowah River	at GA Loop 1, near Rome, GA	02395980
Upper Coosa Sub-Basin		
Coosa River	near Rome, GA (Mayo's Bar)	02397000

Table 2-2 lists the locations of the eight permanent EPD monitoring sties and their coordinates.

Table 2-2. Location of the EPD Permanent Continuous Water Quality Monitors

Mainstem/Tributary	Location	Latitude	Longitude
Coosawattee Sub-Basin			
Coosawattee River	at Pine Chapel, GA (Pine Chapel Rd)	N 34.5764	W 84.8603
Oostanaula Sub-Basin			
Oostanaula River	at Resaca, GA (US 41)	N 34.5771	W 84.9419
Oostanaula River	at GA Loop 1, near Rome (Veterans Highway)	N 34.2823	W 85.1737
Armuchee Creek	at Old Dalton Road (near Rome)	N 34.3608	W 85.1403
Etowah Sub-Basin			
Etowah River	near Kingston, GA (US 411)	N 34.2089	W 84.9786
Pumpkinvine Creek	near Emerson, GA (CR 293)	N 34.1426	W 84.8387
Etowah River	at Hardin Bridge Road	N 34.1888	W 84.9250
Upper Coosa Sub-Basin			
Coosa River	at DNR Dock d/s SR 100	N 34.2483	W 85.3551

General Monitoring Procedures

The Minisondes must be placed in mounting tubes located at each sampling station. These mounting tubes will be constructed in-house of three inch PVC pipe. The tubes will then be mounted using aircraft quality cable and cable clamps. The mounting tubes will be placed in locations that will allow for collection of data to meet the data quality objectives. These tubes will be mounted to the downstream side of bridge supports as suggested by Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Site Selection, Field Operation, Calibration, Record Computation, and Reporting (USGS 2000) when possible (Refer to Study area and Sample Location).

The Minisondes, prior to deployment, will be pre-calibrated according to the protocols found in the Datasonde 4 and Minisonde Water Quality Probes User's Manual. Also prior to deployment an in-situ reading, alongside the unit to be deployed, will be taken with a second instrument. This reading will be used to collaborate the deployed Minisonde's readings (drift, etc.). This instrument will be a Minisonde not capable of memory. This non-memory Minisonde will also be pre-calibrated in the lab prior to each day's fieldwork. Upon removal the Minisondes will be post calibrated in the laboratory and then cleaned. They will then be set up for the next field day's pre-calibration.

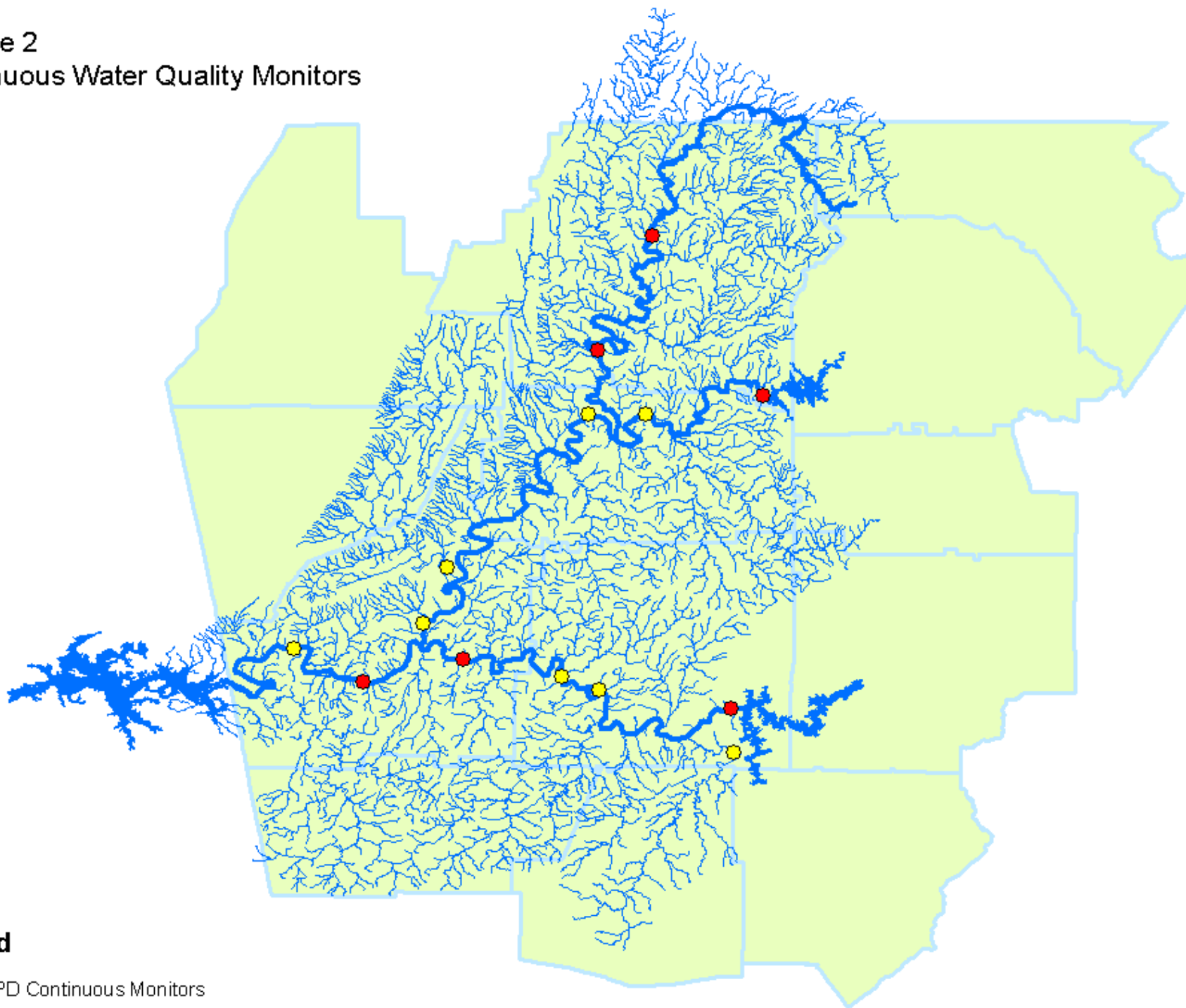
Measurements and Documentation of Field Data/Observations

Measurements taken will primarily be in-situ Hydrolab readings consisting of depth, water temperature, conductivity, dissolved oxygen, and pH. These readings will be downloaded from the equipment once a week upon retrieval of the Minisonde.

Sampling data will be electronically recorded in the Minisonde memory. Upon retrieval of the device, the data will be downloaded and reviewed. Data will be put in spreadsheets and reviewed by the Watershed Modeling Unit following each sampling day. The spreadsheets will include all data collected during the sampling period as well as graphs for temperature and dissolved oxygen.

Calibration histories for all Minisondes, and in-situ measurements produced by the Minisonde will be maintained. The data will be documented in table format for each

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Legend

- EPD Continuous Monitors
- USGS Continuous Monitors

sampling period. The temperature and DO data will also be documented in graph format alongside the USGS data for the purpose of distinguishing trends among the readings depending on the time period and level of flow. Unusual observations and their date and time will be noted.

Schedule

Each continuous monitoring station will have a Minisonde deployed once a week. Each monitor will read for seven days prior to removal. The rotating stations will each have a Minisonde deployed for seven days prior to removal. These stations will have a continuous reading for one week in three.

Quality Control

All fieldwork will be performed in accordance with the Division's Quality Assurance/Quality Control (QA/QC) procedures maintained by the Watershed Protection and Management Program. Equipment used will be calibrated in the laboratory prior to and after sampling is conducted according to manufacturer's instructions. Sampling data will be recorded within the Minisonde unit and downloaded after retrieval. The deployed Minisonde's readings will be collaborated with the readings of a second, non-memory, Minisonde at deployment and retrieval. This data will be noted 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 entered and maintained in the Watershed Protection Branch's Water Resources Data-Base (WRDB).

Safety

The vehicle will be equipped with a first aid kit. If a boat is needed, boat safety procedures will be followed. The samplers will be proficient in towing procedures. While operating the boat, the samplers will have life jackets and float cushion, emergency equipment (horn, paddle, booster box, maps, tools, cell phone) and be proficient in boat operation procedures. The recovery/deployment efforts will 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 24 mile round trip with anchor or canoe (depending on station)
- Thermometer
- Twelve Hydrolab Minisonde units with memory capable of long term deployment
- Field Book, waterproof permanent pens
- Tapedown
- 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