

# THE USE OF IN-HOUSE RESOURCES BY A MUNICIPALITY TO CONDUCT A WATERSHED ASSESSMENT

Steve Shelton<sup>1</sup> and Robert L. Bourne<sup>2</sup>

---

*AUTHORS:* <sup>1</sup>Laboratory Superintendent, and <sup>2</sup> Environmental Compliance Supervisor, Cobb County Water System, 660 South Cobb Drive, Marietta, Georgia 30060-3113.

*REFERENCE:* *Proceeding of the 2003 Georgia Water Resource Conference*, held April 23-24, 2003, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia 30602.

---

**Abstract.** Municipalities seeking Environmental Protection Division (EPD) approval for Wastewater Plant Expansions must conduct watershed studies of the Plant's service area. The Cobb County Water System (CCWS) out-sourced its first watershed study. After reviewing the study, however, the CCWS found they possessed the resources to conduct the study in-house.

All sampling is completed for the first phase of the study. Biological and chemical data were analyzed using indexes developed by the Georgia Department of Natural Resources.

## INTRODUCTION

Cobb County is facing ever increasing demands to monitor and report on the quality of its surface waters as a requirement for stormwater and wastewater plant permits. Cobb County's response to these challenges has been to expand and intensify its existing stream monitoring program. Cobb County is utilizing a wealth of historical information and resources from the ongoing Stream Monitoring Program. We have 138 monitoring sites located throughout the County. Stream monitoring staff are versed in advanced sampling techniques for both chemical and biological sampling. Stream staff are trained in taxonomy and can process most specimens to genus level. They are trained in Rosgen geomorphological techniques and habitat assessment. Industrial monitoring and stormwater personnel are skilled in advanced chemical sampling techniques and familiar with the operation of automated samplers.

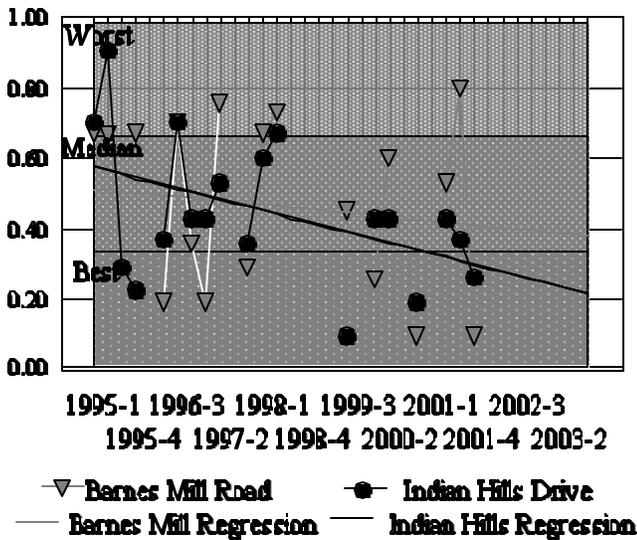
The Cobb County Water Department has invested in a state of the art Laboratory and has a well trained professional staff proficient in sampling techniques and laboratory analysis. The analytical lab is capable of processing the majority of samples generated by these programs as well as NPDES analysis for the County's wastewater treatment plants.

Other departments in the CCWS, including the Engineering and Stormwater Divisions, were also ready to assist. Communications between the Laboratory, Engineering, and Stormwater Divisions revealed the opportunity to create an in-house watershed management strategy that satisfied both wastewater plant expansion and stormwater permit compliance concerns. It also contributes to our program to reduce sanitary sewer overflows. The decision to build an in-house program will enable the county to reduce outsourcing costs for surface water studies and allow the county more flexibility when addressing surface water issues. Consultant assistance was used on specific parts of the study.

## STUDY SITES

The study area is located in eastern Cobb County. Existing stream monitoring sites were preferred whenever possible due the abundance of historical data. The sampling stations are located on stream sections draining areas representing land uses typically found in the study area. In addition to land use, sites were also examined for habitat characteristics as determined by the habitat assessment criteria in EPD's SOP. Sites with the same habitat characteristics were preferred. CH<sub>2</sub>MHill Engineering personnel assisted in the site selection process.

Twelve sampling stations were chosen representing three sub-basins in the watershed: Sope Creek, Rottenwood Creek, and Little Nancy Creek. Two reference stations located in Carroll County, on Snake Creek and Whooping Creek, were also chosen. Water quality measurements were collected at all stations, benthic macroinvertebrate samples were collected at ten stations, and fish were collected at seven. Data analysis was performed using protocols developed for the State of Georgia and Atlanta Region.



**Figure 1. Linear regression chart of fecal coliform density WQI values for Sope Creek sites, 1995 through 2003.**

#### CHEMICAL MONITORING

Water quality sampling included both wet and dry weather sampling. The CCWS Water Quality Laboratory has coordinated and supervised all wet and dry weather sampling. The CCWS Laboratory is performing the analysis on all samples. This will ensure that samples are run in a timely manner at minimal cost to the county. The CCWS laboratory has an extensive QA/QC program in place for both analysis and sampling. Analyzing the samples in-house will give the laboratory better supervision over methods.

Dry weather samples were collected at all study sites to establish baseline conditions. Data continues to be collected quarterly for some of the study sites as part of our ongoing stream monitoring program. Biological sites were also sampled for chemical parameters when biological sampling was conducted.

The U.S. Geological Survey (USGS) is providing information on the hydrologic data from their gauging station at Sope Creek on Lower Roswell Road. The USGS has historical sampling data from the site and continues to collect grab samples as part of their NAWQA study. CCWS collected sequential samples at the Lower Roswell Road gauging station during wet weather sampling. Flow data collected during these sampling events will be used in model calibration and assist us in loadings calculations.

Chemical data was evaluated using the Water Quality Index (WQI) described in "Urban Streams Assessment and Evaluation Guidelines." The index was prepared by the Atlanta Regional Commission and the U. S. Geological Survey for the Georgia Environmental Protection Division. Data necessary for index calculations were made available on digital format by Ted Mikalsen of the Georgia EPD. This data set was incorporated into a spreadsheet to calculate WQI values. Values are generated by comparing the current chemical data against a data set provided with the index. The spreadsheet enables one to evaluate one chemical parameter in isolation with the WQI data set for that parameter (table 1) or several parameters at once. Since most of the sites in the R. L. Sutton Plant Watershed Study have been sampled for many years, trend analysis was performed. The overall stream WQI and the WQI value for each analytical parameter can be charted and trends determined using linear regression analysis. The slopes of these linear regression lines were compared to evaluate rates of change in water quality among the stream sites.

#### MACROINVERTEBRATES STUDIES

Macroinvertebrates studies were conducted following the State of Georgia macroinvertebrate SOP. Cobb County Stream Monitoring consulted with biological monitoring personnel from CH<sub>2</sub>Mhill and Georgia EPD for a review of their biological field sampling techniques. Our field personnel established their own field elutriation protocol utilizing the standard sieve bucket and a bucket sieve. The bucket sieve, which has a large 1 cm<sup>2</sup> aperture, is placed on top of the sieve bucket, which has a 30-mesh sieve in the bottom. Utilization of the bucket sieve in addition to the standard sieve bucket greatly decreases the amount of an elutriation necessary in the laboratory by removing more of the large coarse particulate organic matter. This process also makes it easier to separate macroinvertebrates from the detritus in the field if field separation is desired.

Cobb County identified all macroinvertebrates except chironomids to the genus level in-house. Voucher specimens and all chironomids were sent to a taxonomist for verification. All voucher specimens will be retained by Cobb County for future use in studies and routine monitoring.

The Index of Biotic Integrity developed by the Georgia Department of Natural Resources was utilized to evaluate macroinvertebrate data. This information is available from

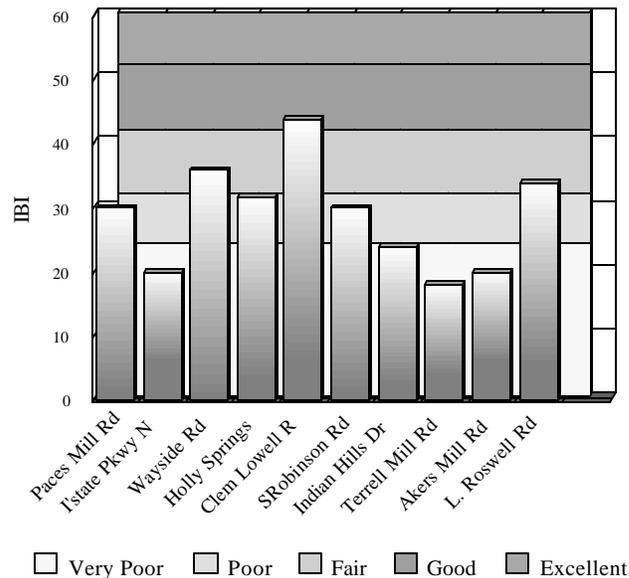
**Table 1. Percent comparable macroinvertebrate IBI scores for R. L. Sutton WRF watershed study sites**

Stream	Site	Score	Category
Sope Ck	Indian Hills Dr	37.1%	Poor
Sewell Mill Ck	Robinson Rd	40.0%	Poor
Poplar Ck	Interstate Pkwy	42.9%	Poor
Rottenwood Ck	Akers Mill Rd	42.9%	Poor
Rottenwood Ck	Franklin Road	42.9%	Poor
Sope Ck	Lower Roswell	42.9%	Poor
Sope Ck	Barnes Mill	48.6%	Poor
Rottenwood Ck	Terrell Mill Rd	51.4%	Fair
Little Nancy Ck	Paces Mill Rd	51.4%	Fair
Sewell Mill Ck	Holly Springs	62.9%	Fair
Snake Ck	Wayside Rd	100.0%	Excellent

the Georgia DNR Water Protection Branch. CCWS personnel created a spreadsheet to calculate and graphically represent the macroinvertebrate data utilizing the metrics provided in the state SOP (Table 1). The North Carolina sensitivity index was provided in digital format by Georgia EPD. The spreadsheet calculates metrics such as EPT and functional feeding groups. Most metric values are calculated by comparing the study sites with our reference site. EPD plans in future publications to have their reference site data included in the calculation. This will prevent skewing of numbers due to a variance in results caused by limited reference site sampling for each study. This will also alleviate the necessity of finding and sampling appropriate reference sites. CCWS used the IBI data to appraise and compare biological conditions at each stream and stream site in the study area. Future studies will establish trends in each area.

### FISH SAMPLING

Fish samples were collected by a fisheries biologist from CH<sub>2</sub>MHill Engineering and Cobb County Stream Monitoring employees. Fish were collected utilizing a battery-powered electro-shocker. Larger specimens were identified in the field; all others were brought back to the lab for identification. Specimens were identified by CH<sub>2</sub>MHill fisheries biologists and Cobb County



**Figure 2. R. L. Sutton WRF watershed 1999 fish Survey IBI scores.**

Stream Monitoring personnel. Voucher samples were retained by the County and have been used in subsequent fish studies. Cobb County has obtained a collector's permit and follows State Fish and Wildlife protocols for fish studies and fish kill investigations.

The Fish Index of Biotic Integrity was calculated using metrics developed by the Georgia Department of Natural Resources Fisheries Division (Figure 2). A spreadsheet was created to graphically represent various ecological aspects of the fish community. CCWS used this information to appraise and compare biological conditions at each stream and stream site in the study area. Future studies will help establish trends in each area.

### HABITAT ASSESSMENTS

Habitat assessments were conducted using the protocol provided in the State of Georgia SOP for: Freshwater Macroinvertebrate Biological Assessment. Scores were used to calculate the macroinvertebrate IBI and will be used when considering opportunities for habitat restoration.

## LITERATURE CITED

- Georgia Department of Natural Resources Wildlife Resources Division, Fisheries Section, 2000. Standard Operating Procedures for Conducting Biomonitoring of Fish Communities in the Piedmont Ecoregion of Georgia (Draft). Atlanta, GA.
- Georgia DNR, Water Protection Branch, 2002. Standard Operating Procedures: Freshwater Macroinvertebrate Biological Assessment (Draft). Atlanta, GA.
- Atlanta Regional Commission and USGS, 1997. Urban Streams Assessment and Evaluation Guidelines. Atlanta:Georgia.