

**Sampling and Quality Assurance Plan**  
Little Commissioner Creek, Wilkinson County Georgia  
Fecal Coliform Monitoring Program 2006/2007

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## **Project Organization**

US Environmental Protection Agency (EPA) will provide technical assistance.

UGA River Basin Center: Christine Rodick, member of the UGA River Basin Center staff, will coordinate stream assessment and stream sampling efforts. In addition, Christine Rodick will assist with public education, involvement, and outreach components of this project.

Wilkinson County will use this data to assess possible public health concerns if the data shows elevated levels of bacteria. They will also use this data to assess and direct water quality education, outreach, and public involvement efforts for adult and high school audiences. They will also assist with sample mapping and pollutant tracking.

City of Gordon: Mayor Kenneth L. Turner will use this data to assess possible public health concerns if the data shows elevated levels of bacteria. Mayor Turner will also be the chief liaison between Christine Rodick and the other interested partners in the project.

Georgia Environmental Protection Division (GA EPD) will use this data for TMDL management; to determine if the segment of Little Commissioner Creek from Georgia Highway 18 to Commissioner Creek in Wilkinson County is currently impaired. They will review the data collected in the project and use the results when evaluating the impaired segment of Little Commissioner Creek in Wilkinson County.

City of Ivey uses Gordon's wastewater treatment facility for the processing of its solid waste. It has a vested interest in seeing the stream segment delisted.

UGA Feed and Environmental Water Lab is EPD certified and will carry out the required sample analysis under the plan. The lab is under the supervision of Paul Vendrell.

UGA Extension Service will provide technical assistance. In particular, Frank Henning and Susan Varlamoff will be available. This organization will provide suggestions for possible funding, sampling methods, and water assessment. The Extension Services hopes to replicate this project's success in other listed stream locations.

Wilkinson County Commission and Development Authority: if Gordon is successful in delisting this stream, county officials will become more interested in working on assessing and delisting the two additional listed streams located within the county.

## **Background**

### **I. Introduction:**

A nine mile segment of Little Commissioner Creek in Wilkinson County from Georgia Highway 18 to Commissioner Creek is listed as impaired for fecal coliform and biota by the Environmental Protection Agency. A Total Maximum Daily Load (TMDL) plan was proposed by the Georgia Department of Natural Resources and developed by the Middle Georgia Development Center in coordination with the Commissioner/Little Commissioner Creek Plan Advisory Committee on September 15, 2001 in order to address the stream's listing.

This plan describes the regulatory and voluntary actions that are currently in place to deal with issues surrounding the listing, as well as recommended actions and partnerships to achieve delisting of the stream. In accordance with the plan's goal to perform stream walks and biological and chemical sampling, a study was conducted to assess the entire nine mile segment and determine locations for targeted sampling in the future. Time constraints narrowed this study's focus on fecal coliform, specifically E.coli. The biota listing should also be addressed in the future. The ultimate goal of this study was to provide background samples and analysis on which a Quality Assurance Project Plan might be justified.

### **II. Methods/Materials:**

An aerial GIS map of the City of Gordon was assessed for potential sampling points. Previous sampling points were also identified and added to the sampling agenda. After seeking advice from Mayor Kenneth L. Turner and Spence Basinger, consultant to the City of Gordon, a total of eight points covering the length of the listed segment were selected.

Photographs were taken at each site to document the conditions. A handheld GPS unit plotted the latitude, longitude, and elevation of the sample point. The following sampling protocol was used for each sample.

1. Latex gloves were worn for protection and to limit sample contamination.
2. Whirlpak were labeled with the number that corresponds to the sample site.
3. When possible, samples were taken from the center of the stream in a location of good water flow.
  - After arrival in the center of the stream, the individual collecting the sample waited a few seconds to allow the disturbed sediments to flow downstream from the sample location.
  - When it was not possible to stand in the center of the stream, samples were collected from the bank.
4. Each collector faced upstream to take the sample.
5. The whirlpak was inverted and submerged.

6. Submerged whirlpak was then turned right-side up and removed from water, while allowing some air bubbles to escape and be replaced by water inside the whirlpak.
7. Sample collectors then sealed each whirlpak by folding over the plastic top and securing wires. Excess sample was removed as needed to close overfilled whirlpaks.
8. The whirlpaks were stored upright in a bucket or soft cooler until the end of the sampling session.
9. Before departure from Gordon, all samples were placed into the large cooler for transport.

### III. Summary of Results

A group from the Fall 2006 Environmental Practicum class at the University of Georgia was able to test informally at seven different points along the nine mile section of Little Commissioner Creek and at one point on Commissioner Creek shortly after Little Commissioner empties into it. These points were well-spaced along the nine mile listed stretch of creek.

Our testing methods were geared toward discovering an E.coli count within the samples. We decided to test for E.coli due to the relative administrative ease of such testing procedures as compared to fecal coliform assessment. Additionally, the results would be available more quickly for analysis. After receiving the E.coli level for a given sample, we used a 0.727 conversion factor to arrive at an approximate fecal coliform count.

At the first two points, Highway 18 North and Brooks-McNear, there was no flow at all. These points represent the wetlands that give birth to the stream. Only during high flow periods would these points offer sufficient water flow for sampling.

The first point at which we were able to locate any visible flow was point three: Ballpark. Testing below what appeared to be a beaver dam, we discovered a fecal count of 165.06 colonies/mL.

At the following sampling location at Highway 18 South, our first reading was 220.08 colonies/mL. However, we took a second sample at this point due to a perceived contamination during sample collection. This second, more accurate sample, returned a 115.54 colonies/mL reading.

Three samples were collected at Owen Shepard. At this point, a tributary into which the wastewater treatment facility discharges its treated effluent converges with Little Commissioner Creek. The sample taken above the entry of the tributary revealed a 0 fecal count, as did a sample taken directly from the tributary. The absence of fecal coliform in the tributary is not surprising, given the wastewater treatment facility's utilization of a UV radiation system. What was surprising, however, was the reading below the tributary's entry point, which was 27.51 colonies/mL. At this point, the water

was flowing rather briskly, and we hypothesize that the fecal count is a result of the stirring up of debris from the stream bottom.

The last two sample locations on Little Commissioner Creek, Claymont and Gordon McIntyre, returned fecal counts of 27.51 colonies/mL and 167.81 colonies/mL, respectively.

Finally, a sample drawn from Commissioner Creek immediately after Little Commissioner Creek empties into it revealed a fecal count of 148.56 colonies/mL.

**Little Commissioner Creek  
Gordon, Georgia      October 21, 2006**

<u>Sample Point</u>	<u>Latitude/Longitude</u>	<u>Elevation (ft)</u>	<u>E.Coli Count (counts/100mL)</u>	<u>Fecal Coliform Count</u>
Hwy. 18 North*	N 32° 54.110' W 83° 22.294'	401	N/A	N/A
Brooks- McNear*	N 32° 53.749' W 83° 22.233'	369	N/A	N/A
Ball Park	N 32° 52.791' W 83° 21.684'	N/A	120	165.06
Hwy. 18 South	N 32° 52.520' W 83° 20.457'	345	4A: 160** 4B: 84	4A: 220.08 4B: 115.54
Owen- Shepard***	N 32° 52.665' W 83° 19.226'	346	5A: 0 5B: 0 5C: 20	5A: 0 5B: 0 5C: 27.51
Claymont (EPD sample location)	N 32° 51.302' W 83° 15.096'	313	20	27.51
Gordon McIntyre	N 32° 51.374' W 83° 13.513'	261	122	167.81
Commissioner Creek	N 32° 51.012' W 83° 11.741'	285	108	148.56

\*No flow at these points.

\*\*The collector allowed some dirt from his glove to contaminate sample 4A. That is why two samples were taken at this point. 4B is the more accurate of the two.

\*\*\*The three samples from this point are as follows:

- 5A: Above the point where the tributary enters Little Commissioner Creek.
- 5B: In the tributary where the Wastewater Treatment Facility discharges.
- 5C: Below the point where the tributary enters Little Commissioner Creek.

#### IV. Significance of Informal Sampling Results

The results of our targeted sampling show acceptable fecal coliform concentrations at all sample locations. With the exception of the sampling point at Gordon McIntyre, all the samples are well below the acceptable fecal concentration. The sample from Gordon McIntyre is close to the 200 colonies/mL ceiling, but it still falls short of the maximum allowable concentration.

We hypothesize that Little Commissioner Creek was listed as a result of fecal coliform testing conducted during an uncharacteristically high flow period caused by hurricane season. All of the EPD samples taken before and after this event were within the acceptable limits. It was only this one aberrational sample that prompted EPD to list this stream segment.

Our targeted sampling results would seem to support the notion that Little Commissioner Creek should not be listed as impaired for fecal coliform. We feel that our sampling results support going forward with such a testing plan.

#### **Objective**

Use visual examination and stream testing to determine where pollutant loads are entering the approximate nine mile section of Little Commissioner Creek in Wilkinson County from Georgia Highway 18 to Commissioner Creek. Use public education and outreach efforts to increase interest in water quality and promote best management practices near impaired streams.

Little Commissioner Creek is designated as a fishing water way. State waters are occasionally sampled for bacteria and other parameters that indicate if the waters are safe for use by the general public. Currently, the state's standards for drinking and recreational waters are documented in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6. The classification for this listed stream segment of the Oconee River Basin between Georgia Highway 18 and Commissioner Creek is fishing. The criterion violated is listed as fecal coliform and biota. Potential causes for this fecal coliform listing include: urban runoff, runoff from agriculture, wildlife and other nonpoint sources. The use classification water quality standards for fecal coliform bacteria, as stated in the State of Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03(6) ( c ) (iii) (GA EPD, 2005) are:

For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 per 100 ml based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200/100 ml (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 per 100 ml in lakes and reservoirs and 500 per 100 ml in free flowing freshwater streams.

For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 per 100 ml based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a geometric mean of 4,000 per 100 ml for any sample.

In this project, water samples from Little Commissioner Creek will be collected as grab samples from the creek at Claymont Road in Gordon, Georgia (-83.41937 longitude, 33.65877 latitude) and analyzed for fecal coliform according to the schedule outlined in the Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03-(13). The samples will be analyzed by a certified lab analyst at an accredited laboratory (the Feed and Environmental Water Lab run by Paul Vendrell at UGA). The analysis of the bacterial counts from each 30-day sampling period will conclude with a calculation that will give the geometric mean. After the samples have been collected and analyzed according to the State of Georgia's standards and after four (4) geometric mean calculations have been performed, the project team (public, private and non-profit sectors) will know whether low-cost local efforts, including education, public involvement, outreach and visual stream assessments can be used to effectively reduce fecal coliform loading and improve stream water quality.

### **Work Schedule**

Jan. - May 2007	Begin further targeted sampling, identify pollution hotspots and potential sources of pollution.
June 2007 - Sept. 2007	Begin Fecal Coliform sample collection. Collect four samples from Little Commissioner Creek at Claymont Rd. in Gordon, GA (Longitude -83.41937, Latitude 33.65877) over a 30-day period at intervals not less than 24 hours.
Oct. 2007 - Jan. 2008	Collect four samples from Little Commissioner Creek at Claymont Road (Longitude -83.41937, Latitude 33.65877) over a 30-day period at intervals not less than 24 hours.
Feb. 2008 - May 2008	Collect four samples from Little Commissioner Creek at Claymont Road (Longitude -83.41937, Latitude 33.65877) over a 30-day period at intervals not less than 24 hours.
June 2008 - Aug. 2008	Collect four samples from Little Commissioner Creek at Claymont Road (Longitude -83.41937, Latitude 33.65877) over a 30-day period at intervals not less than 24 hours.

## **Special Certification**

The University of Georgia's Feed and Environmental Water Lab was selected to do the bacterial analysis for the samples collected in and around the City of Gordon, Georgia primarily due to the close working relationship between the University and Gordon. The lab is certified in compliance with the Georgia State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators and Laboratory Analysts Act. This lab uses the Membrane Filter Coliform Method derived from Method 9222D of Standard Methods for the Examination of Water and Wastewater, 19<sup>th</sup> ed, 1995.

## **Documents and Records**

Chain of Custody - for the sample containers while collecting samples in the field and while in the laboratory.

Water Quality Sampling Field Data Sheet - for the sampling stations while the field technician is collecting the water samples.

Field Notebook - to take official field notes for weather and GPS location.

Receipt of Sample Form - for the laboratory staff at the University of Georgia's Feed and Environmental Water to fill out as samples arrive at their lab.

## **Sampling Process**

During September and October 2007, program cooperators will work with local landowners and other persons with knowledge about Little Commissioner Creek in order to identify potential sources of fecal contamination. Visual assessment, electrical conductivity and e. coli measurements will be used to identify and map potential contamination hotspots. Targeted sampling will be repeated for hotspots if necessary to further limit potential sources of contamination to the smallest geographic area possible. Public outreach efforts will be used to make the general public aware of potential sources of contamination. Where feasible, individuals near hotspots will be encouraged to use best management practices to address potential sources of contamination.

Grab samples for quantification of fecal coliform bacteria will be collected from Big Sandy Creek at Sandy Creek road near Apalachee, (Longitude -83.41937, Latitude 33.65877). Four grab samples will be collected and analyzed over a 30-day period at intervals not less than 24 hours between the months of November 2006 and January 2007, February and April 2007, May and July 2007 and August and October 2007 respectively. The field technician (Christine Rodick) will transport the water sample from the sample site to the Madison Wastewater Laboratory for bacterial analysis.

In order for EPD to use this data for 303(d) listing, a certified laboratory analyst or Accredited Laboratory must calculate the bacterial counts from the sampled sites to

include geometric means for bacteria data. The University of Georgia's Feed and Environmental Water Lab has been certified to perform this analysis. The field sampling will follow the guidance of the Water Protection Branch Quality Assurance Manual (June, 1999), Georgia Department of Natural Resources, Environmental Protection Division, Water Protection Branch, Atlanta, GA 30354.

## **Sampling Methods**

The samples will be collected according to *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, 1998), the *U.S. Environmental Protection Agency Region 4, SESD-EAB Ecological Assessment Standard Operating Procedures and Quality Assurance Manual* (USEPA, 2002), and the University of Georgia's Feed and Environmental Water Standard Operating Procedures.

### Sample Task 1

Christine Rodick will use sterile, sealed 200 ml plastic bottles for sample collection. A cooler lined and iced will be prepared to hold samples after collection. The samples will have a gummed label with the necessary information attached. Samples will be in the custody of Christine Rodick during collection and transport.

### Sample Task 2

Christine Rodick will collect the water samples directly into plastic bottles. The bottles will remain capped until filled with the sample water. When the cap is removed, care will be taken not to contaminate the cap or the inside of the bottle. Samples will always be collected from mid-stream and if possible, mid-depth. When collecting the water sample, the sample container will be held near its base and plunged, neck downward, below the surface to mid-depth. The sample container will be turned until the neck points slightly upward and the mouth of the sample container is directed toward the stream current. If there is no stream current, the sample container will be pushed forward horizontally to fill. Adequate headspace will be left in the sample container to facilitate mixing by shaking before analysis.

### Sample Task 3

After collection, water samples will be stored on ice in a lined cooler for transport.

### Sample Task 4

Samples will be transferred to the University of Georgia's Feed and Environmental Water Lab for analysis. During travel to the lab, samples will be stored in a lined cooler. Prior to analysis, samples will be stored in a refrigerator in the lab which is accessible only to authorized personnel. Samples will be analyzed for fecal coliform bacteria within 8 h of collection.

### Sample Task 5

Appropriate aliquots of samples will be analyzed and a minimum of three (3) dilutions will be used. Paul Vendrell will be responsible for corrective action for anything

happening in the laboratory. If samples are not handled properly, if holding time is exceeded, or the range of aliquots is not adequate, the stations will be re-sampled the following sampling week and the appropriate action will be taken to ensure proper sampling/analysis.

### **Sample Handling and Custody Requirements**

The samples will be collected, stored and processed according to *Standard Methods* (1998) and *SESD-EAB Ecological Assessment Standard Operating Procedures* (2002). The samples will have a gummed label with the necessary information attached and will be analyzed within 8 h of collection.

The samples will be in the custody of Christine Rodick during collection and transport. The samples will be in the custody of Paul Vendrell during processing. At all other times the samples will be stored in a refrigerator in a lab, accessible only to authorized personnel.

### **Analytical Methods**

The samples will be collected according to Standard Methods for the Examination of Water and Wastewater (American Public Health Association, 1998), the U.S. Environmental Protection Agency Region 4, *SESD-EAB Ecological Assessment Standard Operating Procedures and Quality Assurance Manual* (USEPA, 2002), and Madison's Standard Operating Procedures.

The samples will be collected according to the Part 136 of the Code of Federal Regulations approved analytical methods for fecal coliform. The samples will be analyzed for fecal coliform bacteria using the Membrane Filter Method.

The samples will be analyzed in the University of Georgia's Feed and Environmental Water microbiology lab. The turnaround time for sample results is a minimum of three (3) days or the maximum five (5) days (from Monday collection day to Thursday analysis day).

### **Quality Control Requirements**

QC procedures for monitoring quality of reagent water and for performance of media will be those in *Standard Methods* (1998) Section 9020 B. If the maximum pH and conductivity limits for reagent water are exceeded, then the reagent water will be discarded and a new batch prepared, and, if necessary, the samples will be discarded. Each new batch of medium will be tested with positive and negative control cultures. Fecal coliform and *E. coli* results will be verified monthly. One extra sample in every 10 collected will be analyzed in replicate.

### **Instrument/Equipment Testing**

QC procedures for monitoring the function of the autoclave, incubator and refrigerator will be those in *Standard Methods* (1998) Section 9020 B. The autoclave has a printed output; records will be kept manually of daily incubator and refrigerator temperature.

### **Inspection/Acceptance Requirements for Supplies and Consumables**

Christine Rodick will be responsible for corrective action in the field.

Paul Vendrell will be responsible for corrective action in the laboratory.

Each shipment of consumables and supplies will be inspected for expiration date, damage, discoloration and proper performance by the the University of Georgia's Feed and Environmental Water Lab. Media will be dated on reception and opening. Please see the University of Georgia's Feed and Environmental Water Lab Standard Operating Procedures.

### **Data Management**

Raw counts will be converted to cfu/100 ml and geometric mean calculated. Data will be stored in a database format, MS EXCEL. The raw data will be stored in the UGA lab, along with the appropriate Quality Assurance / Quality Control calibration records. These data will be maintained on file and available for review for a minimum of 3 years.

## References

APHA. 1998. *Standard Methods for the Examination of Water and Wastewater, 20th Edition*. American Public Health Association, American Water Works Association, and the Water Environmental Federation. Washington, D.C.

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