2011

Mountain Oak Creek TMDL Watershed Improvement Plan Revision

Developed by:

RIVER VALLEY REGIONAL COMMISSION

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1.0 SUMMARY

This document describes an interim framework for the implementation of Total Maximum Daily Loads (TMDLs). This interim framework is intended to guide and document the evolving local policies and procedures for advancing consistency with water quality standards. This documentation will promote internal coordination among local, state, and federal agencies and help inform the general public and commercial interests.

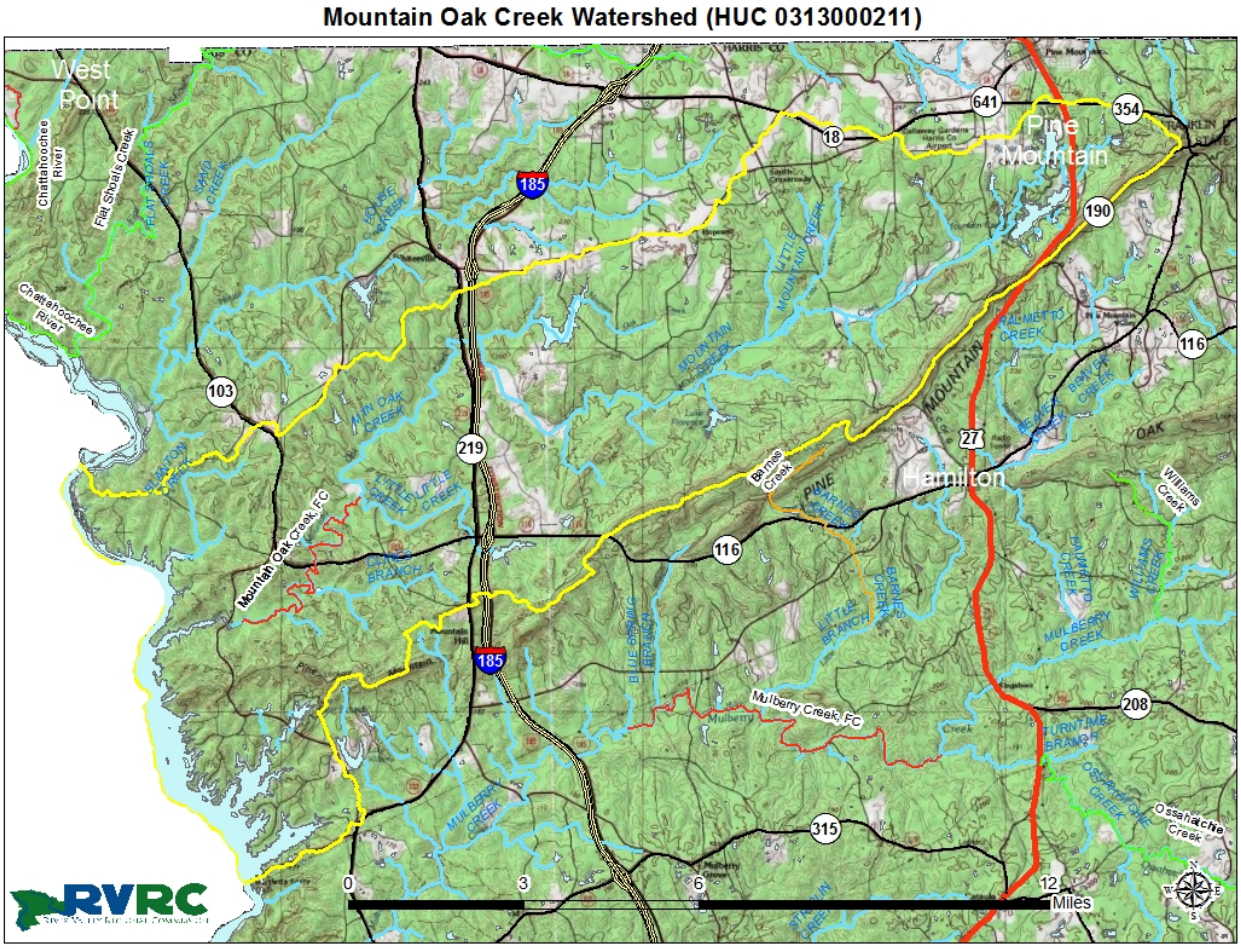
2.0 INTRODUCTION

The Federal Clean Water Act (33 U.S.C. §§ 1251-1387) allows the U.S. Environmental Protection Agency (EPA) to delegate authority to states to implement a technical and administrative framework for managing water quality. Those assigned responsibilities include setting water quality standards, assessing water quality, identifying waters that do not meet standards, establishing limits on impairing substances, and issuing permits to ensure consistency with those pollutant limits.

For waters that do not meet water quality standards due to an excessive pollutant load, the State must conduct a scientific study to determine the maximum amount of the pollutant that can be introduced to a waterbody and still meet standards. That maximum amount of pollutant is called a Total Maximum Daily Load (TMDL). A TMDL is a means for recommending controls needed to meet water quality standards, which are set by the state, and determines how much of a pollutant can be present in a waterbody. If the pollutant is over the set limit, a water quality violation has occurred. If a stream is polluted to the extent that there is a water quality standard violation, there cannot be any new additions (or "loadings") of the pollutant into the stream until a TMDL is developed. Pollutants can come from point source and non-point source pollution. Examples of "pollutants" include, but are not limited to: Point Source Pollution – wastewater treatment plant discharges and Non-point Source Pollution – runoff from urban, agricultural, and forested areas – such as animal waste, litter, antifreeze, gasoline, motor oil, pesticides, metals, and sediment. The purpose of developing a Watershed Improvement Plan of Mountain Oak Creek is to provide a tool that demonstrates a holistic approach to water quality management. The TMDL report is reviewed by the public, revised, and then submitted to Georgia Environmental Protection Division to be considered for approval.

The Mountain Oak Creek Total Maximum Daily Load (TMDL) Watershed Improvement Plan defines the approach to planning, implementing, and evaluating the effectiveness of best management practices (BMPs) with the goal to achieve the wasteload allocations (WLAs) for fecal coliform (FC) and restore the beneficial uses of the Mountain Oak Creek Watershed (Figure 1).

FIGURE 1. MOUNTAIN OAK CREEK WATERSHED (HUC 0313000211).



Watershed Improvement Plans require the development of a process to develop and implement a plan document for the purpose of: 1) creating the local network of partners; 2) identifying and securing the resources needed to fund and install the management practices and activities that would best achieve the pollutant load reductions needed to meet the TMDL and restore water quality; 3) verifying major sources or impairment; 4) developing a TMDL Implementation Plan that would address USEPA's 9-Key Elements of Watershed Planning; and 5) providing the information needed to support applications for funding (such as EQIP, Section 319(h), GEFA, or others), or identifying existing funding sources such as utility fees, SPLOST, or others.

3.0 SEGMENT AND WATERSHED DESCRIPTION

One of the first steps in understanding a watershed is through the discovery of its general and natural history. This section presents an overview and characterization of the Mountain Oak Creek Watershed. The successful application of BMPs in the Mountain Oak Creek Watershed will depend on the TMDL components, the physical characteristics of the watershed, and the regulatory requirements. By having a general knowledge of its history and natural resources, this can establish an understanding and appreciation of its existence.

The Mountain Oak Creek watershed is located in Harris County and covers over 86 square miles. This watershed lies between the Shoal Creek watershed and the Mulberry Creek watershed. The Mountain Oak Creek watershed is also part of the Upper Middle Chattahoochee watershed. The Chattahoochee River Basin extends from north-east Georgia and merges with the Flint River Basin at Georgia's south-west corner, where it forms the Apalachicola River before it empties into the Gulf of Mexico.

Mountain Oak Creek is located in the 10-digit hydrologic unit code (HUC) 0313000211. This stream has approximately 5 miles of impairment and is located about 10 miles west of the City of Hamilton. Mountain Oak Creek empties out into the Chattahoochee River on the western border of Harris County. Political jurisdictions of Mountain Oak Creek are Harris County and the City of Pine Mountain.

The physical landscape is fairly homogenous with no outstanding physical features, with the stream flowing generally south-westward. According to the *Harris Count Comprehensive Plan* of 2009, the Mountain Oak Creek watershed encompasses 54,778.61 acres; currently composed primarily of agricultural land (59.22%) with some conservation (31.22%) and residential use (7.34%). The remaining land uses includes 0.06% public, 0.03% commercial, 0.00% industrial, 0.69% unused, and 1.44% transportation/utilities. Figure 2 shows the Land Use Trends of 2008 prescribed by Natural Resources Spatial Analysis Laboratory. This map demonstrates the characteristics of the land use cover within the Mountain Oak Creek watershed. Figure 3, *Mountain Oak Creek Watershed Future Development*, illustrates the estimated future land use changes in the watershed. Future land use scenarios were created based on an analysis of trends between 2009 land use and future land use zoning projected to the year 2030.

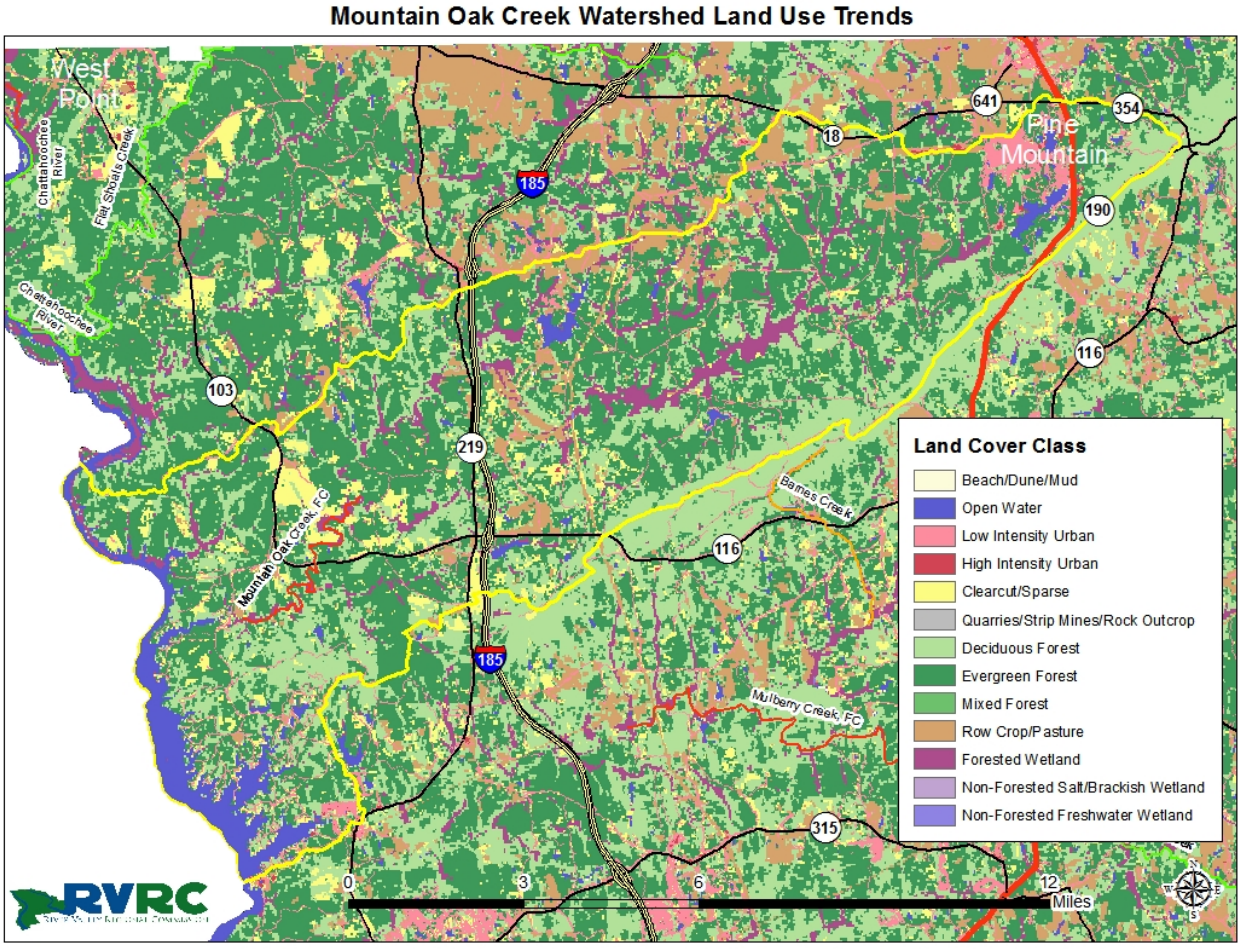
Harris County's climate is classified as humid - subtropical (Cfa) according to the Köppen climate classification system. Winters are cool and short with periodic cold spells moderating in 1-2 days. Summers are hot and humid. Annual precipitation averages to 53 inches and is spread evenly throughout the year (2-5 inches each month). Measurable snowfalls are very rare with a less than 5% probability each year. When they occur, snowfall amounts are most always less than one inch and melt quickly. In winter, the average minimum daily temperature is 39.6° F. In summer, the average maximum daily temperature is 90.2° F. The first winter freeze typically occurs in early November and the last freeze typically occurs in mid-March.

Harris County is located in the Piedmont Province, just north of the Fall Line. Foothills and broad valleys typify the topography and elevations range from approximately 400 feet to 1,500 feet above sea level. Harris County is also a transitional area. In the northern part of the County, the soils are uniform and typical of the Piedmont Province. As a result of its proximity to the Fall Line, however, the soils in the southern half of the County begin to transition from those characteristic of the Piedmont to those characteristic of the Coastal Plain.

The soils of Harris County are in the old stage of the erosion cycle, during which alluvial filling of valleys occurs until completion, with only small residual rock forms projecting. Relief is low and larger depressions contain arid lakes and playas. Harris County soils in general are this: exist on sloping terrain, are susceptible to erosion, and in many cases have slow percolation rates. The soil configuration of Harris County has many constraints and limitations on

development. Table 1 describes the soils identified in the county. Figure 4 depicts the *Mountain Oak Creek Watershed Generalized Soils*.

FIGURE 2. MOUNTAIN OAK CREEK WATERSHED LAND USE TRENDS.



The soil configuration in Harris County presents some limitations for development which are due in part to the County topography, namely existing steep slopes. Another reason for development limitations is because all soil types present in the County easily erode. Excessive erosion results in sedimentation, which is a major contributor to non-point source pollution. While erosion occurs in the natural landscape, development that disturbs the protective vegetative cover increases the degree and amount of erosion. Harris County addresses soil erosion through an Erosion and Sedimentation Control Ordinance with established control measures. In cooperation with the Natural Resource Conservation Service, the County monitors land-disturbing activities through a permitting and inspection process.

FIGURE 3. MOUNTAIN OAK CREEK WATERSHED FUTURE DEVELOPMENT.

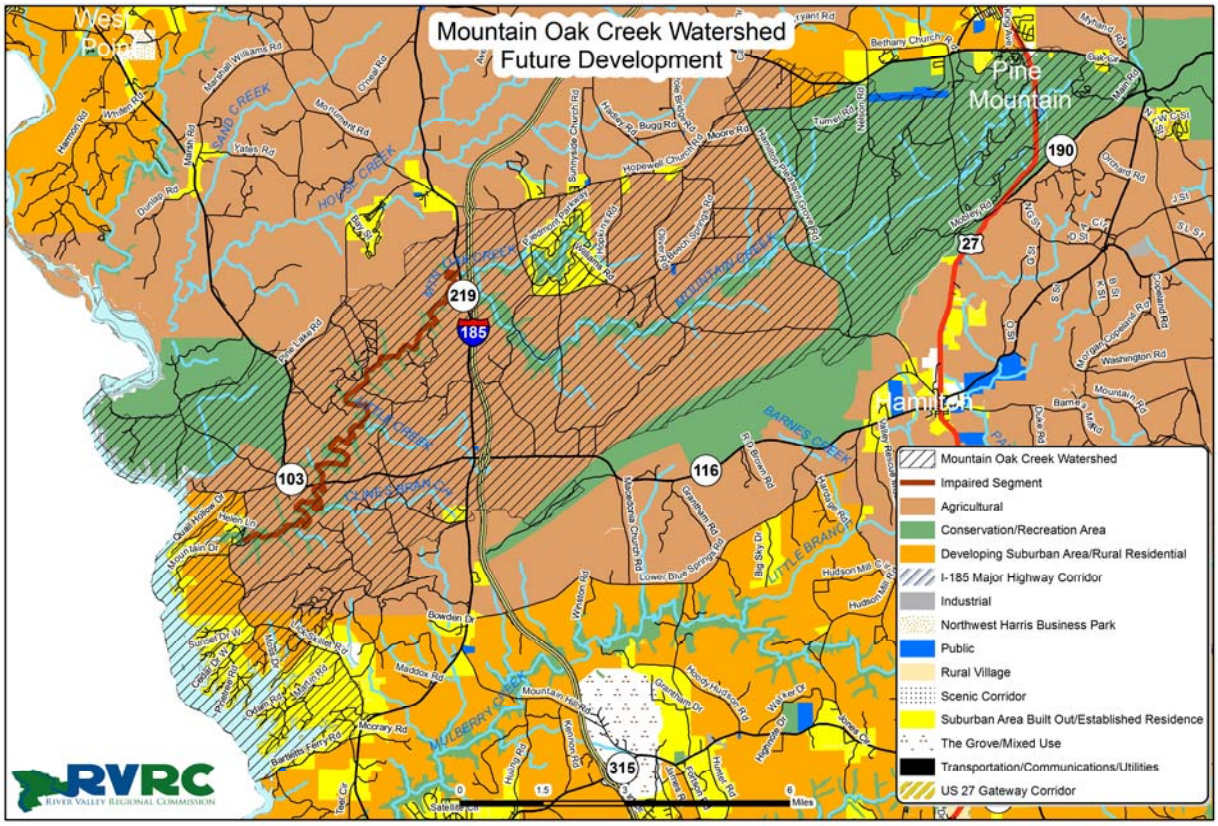
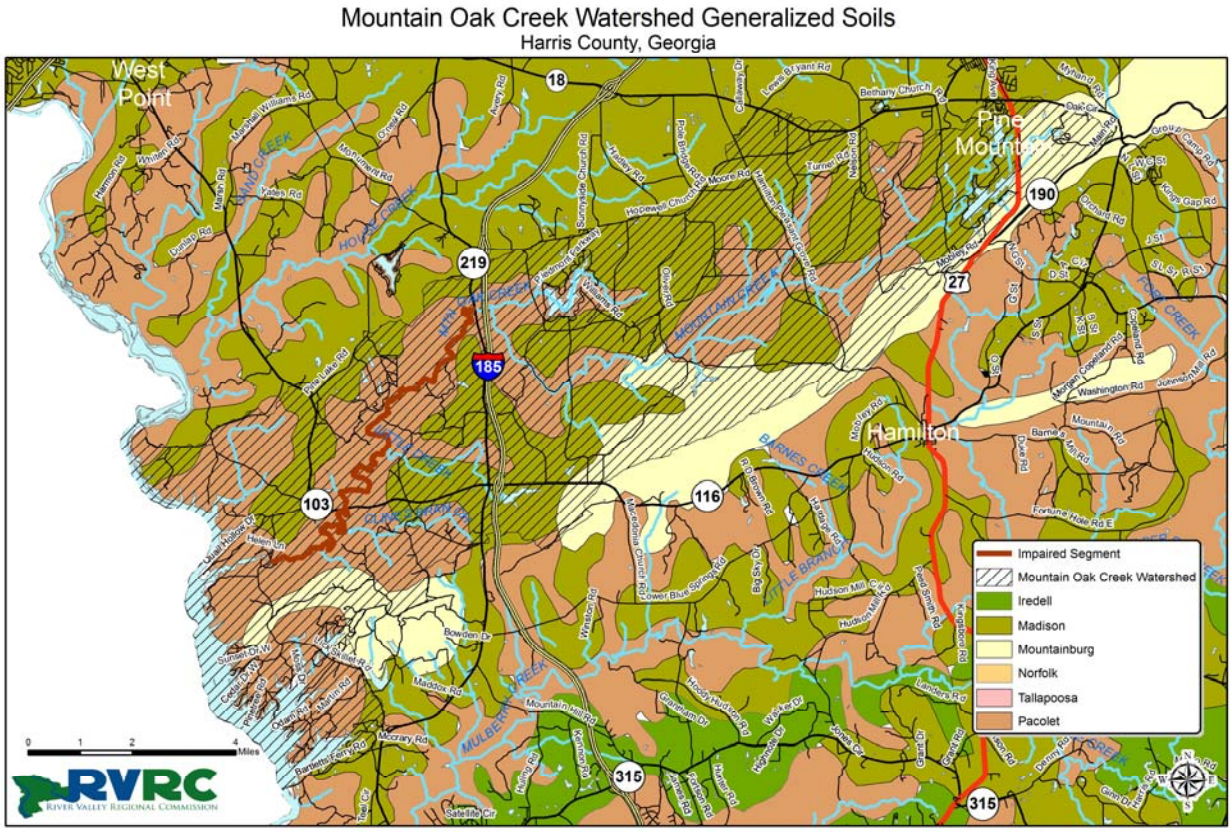


TABLE 1. SOIL ASSOCIATIONS OF HARRIS COUNTY.

Soil Association	Soil Description
Iredell	Moderately well drained, very slowly permeable soils.
Madison	Dominantly very gently sloping to undulating, deep to moderately deep, well drained, shallow soils that have a loamy surface layer and reddish clayey subsoil.
Mountainburg	Shallow, well drained, moderately rapidly permeable soils that formed in residuum of sandstone. These nearly level to very steep soils are upland ridge tops, plateaus and mountainsides.
Norfolk	Very deep, well drained moderately permeable soils.
Tallapoosa	Steep, well drained to excessively drained, moderately deep to shallow, stony soils that have a sandy or loamy surface layer and reddish or yellowish clayey or loamy subsoil, on hilly uplands and mountains.
Pacolet	Steep, well drained to excessively drained, moderately deep to shallow, stony soils that have a sandy or loamy surface layer and reddish or yellowish clayey or loamy subsoil, on hilly uplands and mountains.

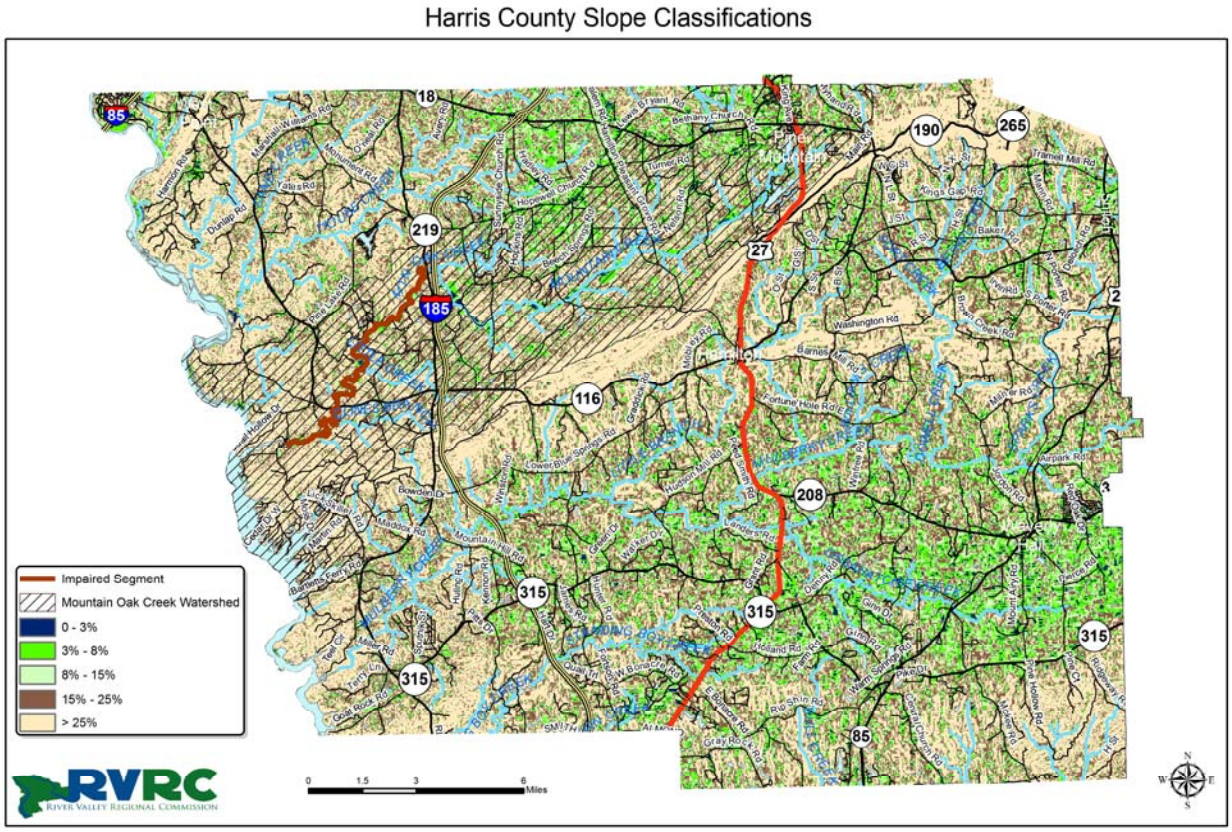
FIGURE 4. MOUNTAIN OAK CREEK WATERSHED GENERALIZED SOILS.



Harris County's topography is characterized by the steep sided linear ridges of Pine Mountain and Oak Mountain and by the rolling and level hills of the Piedmont Plateau. Pine Mountain, at either end, is only 150 to 200 feet above the Piedmont Plateau and juts to 400 feet above the plateau in the middle section of the ridge. Pine Mountain is about three miles wide at the base, and its summit is about 1,400 feet in elevation. The short ridges that make up Oak Mountain rise only 300 feet above the Plateau. The valley between the two ridges, known as Pine Mountain Valley, is two to three miles wide.

Land in the southern portion of the County range from slopes of less than 5 percent to slopes greater than 25 percent. The southwestern area of the County consists of substantial amounts of land with slopes greater than 25 percent. Figure 5 shows the slope classifications for Harris County.

FIGURE 5. HARRIS COUNTY SLOPE CLASSIFICATIONS.



On slopes, which are suitable for development, soil erosion and sedimentation control measures are required. The County has adopted a soil erosion and sedimentation control ordinance, which is enforced locally. In addition, the subdivision regulations recommend that new streets be planned to conform to existing topographic conditions and establish maximum grades for new streets. Since development in the area of steep slopes has been relatively rare, present procedures have been adequate. As the more easily developable land in the County is utilized, the pressure to develop areas of steep slopes will increase.

Land disturbing activities in areas of steep slopes are likely to result in soil erosion. Development of these areas also involves a substantial increase in the cost of land preparation and construction. For these reasons, use of these areas should be avoided.

4.0 WATER QUALITY IMPAIRMENTS AND TOTAL MAXIMUM DAILY LOADS (TMDLS)

Water quality standards address the federal requirement "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Federal Clean Water Act §101). The

broad term "water quality standards" encompasses the adoption of "designated uses" and specific "criteria" that indicate whether or not the uses are being achieved.

The Georgia 2010 305(b)/303(d) draft list of waters was prepared as a part of the Georgia assessment of water quality prepared in accordance with Sections 305(b) and 303(d) of the Federal Clean Water Act and guidance from the U.S. Environmental Protection Agency. Assessed water bodies are classified according to a comparison of water quality monitoring results to water quality standards and other pertinent information. Table 2 depicts the 2010 list of impaired streams located within the Mountain Oak Creek Watershed. There are not any streams within this watershed listed on the 305(b) list of supporting streams.

TABLE 2. MOUNTAIN OAK CREEK WATERSHED 2010 303(D) LIST.

Waterbody Name	Location	County(s)	Impairment	Miles Impacted	Category
Mountain Oak Creek	Approximately 10 miles west of Hamilton	Harris	FC	5	4a

Source: Georgia Department of Natural Resources, Environmental Protection Division, 2010

Mountain Oak Creek (5 miles) was placed on the Section 303(d) list by the GA EPD for violating the state standards for fecal coliform (FC). Based off of information provided in GA EPDs 2008 *Revised Total Maximum Daily Load Evaluation for Seventy-Nine Stream Segments in the Chattahoochee River Basin for Fecal Coliform*, a TMDL called for a 5% reduction in fecal coliform for Mountain Oak Creek. Georgia's instantaneous standard specifies that fecal coliform concentration in the stream water shall not exceed the 30 – day geometric mean of 200 cfu/100 ml for the months of May through October, and 1,000 cfu/100 ml for the months of November through April.

This TMDL has an implicit margin of safety embodied in the endpoint identification. By defining the endpoint in the same units as the impairment, concentration in mg/L, at a geographic point within the drinking water source, the TMDL assures that successfully meeting the endpoint will also eliminate the impairment. Units of percent can be used to quantify the standard TMDL equation: LA + WLA = TMDL. This equation describes both the allocation of allowable loading and the allocation of responsibility for reducing loading to the extent necessary to achieve the endpoint. There is minimal utility in attempting to define a precise target for loading when concentration is the important and controlling factor. However, using the data set resulting in the violation, suggests that a load reduction of approximately 5 percent would result in attainment of the standard.

As a result of the water quality impairment, Mountain Oak Creek was assessed as "not supporting" the Federal Clean Water Act's fishing use support goal. In order to remedy the water quality impairment pertaining to fecal coliform, a TMDL has been developed, taking into account all sources of fecal coliform. Upon implementation, the TMDL for Mountain Oak Creek shall ensure that the water quality standard relating to fecal coliform will be in compliance with the geometric mean standard.

It should be noted that Georgia Environmental Protection Division is considering listing Mountain Oak Creek on the 303(d) list of impaired streams for having an abundance of sediment within the stream. This assessment is pending a biological assessment of the biota within the stream. Upon visiting sites north and north east of the streams data collection site, one may notice forestry to be a common practice in the area. Aerial imagery confirms this by displaying many acres of rows of trees, suggesting that they have been planted after a previous crop was harvested. As a whole, aerial imagery confirms that there are tree buffers along the duration of Mountain Oak Creek. However, erosion can still occur into the stream despite stream buffers. Currently, no governmental entities, including the Georgia Forestry Commission, have documented such progress within the area. According to the Georgia Forestry Commission, watersheds with TMDL plans are the focus for the BMP Assurance Exam program. Since this stream does not have a TMDL plan for sediment, forestry activities within this watershed has not been inspected.

5.0 Visual Field Surveys and Targeted Watershed Monitoring Data Results

A visual survey of Mountain Oak Creek is very important. The purpose of a visual survey is to determine if there are observable problems on the river and to characterize the environment the river flows through. The visual survey helps pinpoint areas that may be the source of water quality problems and helps to familiarize the overall condition of the river. The Visual Field Survey was conducted on July 14, 2009. See Appendix D for field notes and pictures.

Monitoring for fecal coliform was conducted for Mountain Oak Creek during Year 2 of the Watershed Improvement Plan. Monitoring was carried out through two stages of testing. During Stage 1, the watershed was tested for fecal coliform at several locations to geographically isolate major sources of impairment. This testing was conducted on August 14, 2010. River Valley Regional Commission (RVRC) partnered with Dr. John Davis, a microbiologist at Columbus State University, to conduct this study. Methods, results, and pictures of the study can be found in Appendix G.

Stage 2 consisted of a more exhaustive testing procedure that followed SQAP Monitoring Guidelines. This data was submitted to EPD and can be found in Appendix H.

6.0 Ranking and Prioritizing of Significant Sources of Impairments

In the 2001 Mountain Oak Creek Implementation Plan, several sources of impairment were identified. Advisors and Stakeholders agree that a new evaluation of the sources of impairment needs to be conducted. The Advisors/Stakeholders have provided input on potential sources listed in the last Implementation Plan at the Advisory/Stakeholder meetings held in September of 2011 (See meeting minutes in Appendix F). Table 3 addresses fecal coliform sources of impairment and its contributor (1 being little or no contribution and 5 being great contribution).

TABLE 3. SOURCES OF FECAL COLIFORM CONTAMINATES FOR MT. OAK CREEK.

Source	Extent (Miles, acres, etc.)	Permitted (Y/N)	Estimated Contribution (Rank 1 – 5)	Stakeholder Opinion (1 – 5)	Comments
Agricultural Uses	0	NA	1	1	There are too few "Hobby Farms" in this area to have a significant impact
Urban runoff	0	NA	1	1	Most of this watershed is rural; there is very little urban activity to contribute
Wildlife	11 miles	NA	2	2	Wildlife waste should be considered natural "background" levels
Septic Systems	0	Y	1	1	The few houses within this watershed are relatively new and do not need septic repairs
Wastewater Treatment Plant	0	Y	1	1	The effluent at Callaway Gardens is treated and tested every day and the plant discharges under a NPDES permit; this is not a source of pollution

7.0 IDENTIFICATION OF APPLICABLE EXISTING MANAGEMENT MEASURES

Several Best Management Practices exist for the Mountain Oak Creek Watershed. Harris County strives to keep its waterways clean and has implemented several ordinances to reduce the pollution levels within its watersheds. Table 4 describes these ordinances and their responsible entity.

TABLE 4. EXISTING MANAGEMENT MEASURES FOR MOUNTAIN OAK CREEK.

Regulation/Ordinance or Management Measure	Responsible Government, Organization or Entity	Description
Soil Erosion and	Harris County	Protects water quality through

Sedimentation Control Ordinance		sedimentation and erosion control by establishing BMPs and regulating land-disturbing activities.
Wetland Protection Ordinance	Harris County	Establishes boundaries around wetlands within the county and limits types and density of development to protect water quality and habitats in these areas.
Wetland Protection Ordinance	Town of Pine Mountain	Establishes boundaries around wetlands within the town and limits types and density of development to protect water quality and habitats in these areas.
Groundwater Recharge Ordinance	Harris County	Establishes requirements to manage land use within significant groundwater recharge areas.
Groundwater Recharge Ordinance	Town of Pine Mountain	Establishes requirements to manage land use within significant groundwater recharge areas.
River Corridor Protection Ordinance	Harris County	Establishes measures to guide and control growth in areas along the Chattahoochee River to protect the water quality and the river corridors' plant and wildlife habitats.
Monitoring	Callaway Gardens Wastewater Treatment Plant	Treatment plant must monitor Mountain Creek on a regular basis and report the results on monitoring.
Part V Environmental Planning Criteria Ordinance	Harris County	New wetlands, groundwater, and river corridor protection standards.

Sediment and erosion ordinances are in place and are effective. All of the locations the RVRC staff visited within the Mountain Oak Creek Watershed had sediment control measures in place. Bridges had either riprap or planted vegetation on the embankments to prevent any sediment from washing into the creek.

The Wetland Protection Ordinance prevents the formation of densely populated areas. Throughout this watershed, and immediately around Mountain Oak Creek, there are no heavily populated areas.
A major groundwater recharge area lies where Mountain Oak Creek crosses GA Highway 219. Protection of this area is vital in the prevention of contamination for Mountain Oak Creek. This ordinance is currently in place and functioning to prevent contamination within this watershed.

River corridors are the strips of land that flank major rivers in Georgia. These corridors are of vital importance to Georgia because they help preserve those qualities that make a river suitable as a habitat for wildlife, a site for recreation, and a source for clean drinking water. River corridors also allow the free movement of wildlife from area to area within the state, help control erosion and river sedimentation, and help absorb flood waters. For these reasons, a River Corridor Protection Ordinance was established to maintain the plant and animal life within a 150 foot buffer zone along the Chattahoochee River.

Monitoring at the Callaway Gardens Wastewater Treatment Plant is an on-going process. Samples are taken each day at the outfalls of the plant where it empties into Mountain Creek, a tributary to Mountain Oak Creek. Every sample taken from the treatment plant outfalls is in compliance with the required National Pollutant Discharge Elimination System (NPDES) permit.

8.0 RECOMMENDATIONS FOR ADDITIONAL MANAGEMENT MEASURES

Prior to sampling conducted in 2010, the most current monitoring for Mountain Oak Creek was conducted in 1995, where GA Highway 103 crosses the creek. This data was significantly outdated, and therefore, new data was needed. Also, the data collected in 1995 was found to only need a 5% reduction of fecal coliform. From meetings held in August of 2009, advisors and stakeholders believed that this data should be updated, and there was uncertainty as to whether or not the stream was still impaired.

RVRC staff started and completed SQAP monitoring of Phase II of the Watershed Improvement Plan beginning in January 2010 and ending in September 2010. Samples were taken at the previous trend station – EPD #12201901 (coordinates: 32.741111° N, 85.068889° W) – to determine if Mountain Oak Creek was impaired. After analyzing samples obtained by RVRC and EPD, both RVRC staff and EPD staff have determined that the stream is still indeed impaired and should remain on the 303(d) list of impaired streams for a violation of fecal coliform. Samples taken during the months from September through November of 2010 yielded counts beyond the fecal coliform limit. The results of both EPD's and RVRC's sampling can be found in Appendix H.

Now that it is certain that the stream is impaired with fecal coliform, there is some uncertainty as to where the impairment is coming from. Therefore, targeted watershed monitoring is recommended as a management practice in order to determine the sources of contamination and to assist in determining what Best Management Practices are needed in order to mitigate the pollution levels. Funding for this monitoring may be obtained through Section 319(h) of the Federal Clean Water Act.

9.0 PARTNERSHIP ADVISORY COUNCIL AND PARTNER ORGANIZATIONS

An Advisory Group recruitment from a number of working group partners were prioritized to also serve to provide input for this Watershed Improvement Plan. Representatives include agriculture, members of local government, and landowners. Table 5 shows the final Advisory Group of major Stakeholders and community participants.

TABLE 5. ADVISORY GROUP FOR MOUNTAIN OAK CREEK.

Name	Address	City	State	ZIP	Organization
John Bain	P.O. Box 2000	Pine Mountain	GA	31822	Callaway Gardens
Jack L. McClung	10185 Hwy 116	Hamilton	GA	31811	United States Department of Agriculture
Jim Woods	758 River Road	West Point	GA	N/A	Harris County Commissioner
Ralph Callaway	N/A	N/A	N/A	N/A	Callaway Gardens
Lance Renfrow	1428 2nd Avenue	Columbus	GA	31902	River Valley Regional Commission
Tina Rust	1428 2nd Avenue	Columbus	GA	31902	River Valley Regional Commission
John Davis	4225 University Avenue	Columbus	GA	31907	Columbus State University

The TMDL Advisory Group is a collection of individuals who bring unique knowledge and skills which complement the knowledge and skills of the public in order to more effectively accomplish this revision. The purpose of the TMDL Advisory Group is to provide a forum for the public, partners, etc. to discuss potential concerns and solutions that will impact Mountain Oak Creek, and to make recommendations relative to TMDLs.

The Advisory Group's key responsibilities were to:

- **Advise** on matters of concern to the community;
- **Contribute to the education** of the residents of the watershed on water quality issues;
- **Help identify** contributing pollution sources;
- **Assist** in arriving at equitable pollution reduction allocations among contributors;
- **Recommend specific actions** needed to effectively control sources of pollution; and
- **Help develop** and set in motion an extended plan.

The Advisory Group meetings were held on August 11, 2009 at 2:00 pm, September 14, 2010 at 6:00 pm and on September 8, 2011 at 6:00 pm at the 4-H building in Hamilton to discuss potential ways to assess the watershed of Mountain Oak Creek. See Appendix F for meeting minutes.

10.0 SCHEDULE OF SEQUENTIAL MILESTONES

The main goal of this Watershed Improvement Plan is to bring Mountain Oak Creek into compliance with water quality standards, which will result in its removal from the 303(d) list of impaired waters. This goal may be achieved through successful implementation of Best Management Practices. However, before BMPs are installed, it is important to isolate sources of pollution. Therefore, RVRC staff will attempt to procure matching funds in order to prepare and submit an application under Section 319(h) of the Federal Clean Water Act before the October 31, 2011 deadline. If funded, a targeted watershed monitoring protocol will be used in order to determine sources of fecal coliform. The project will last approximately one year after initial funding.

11.0 PUBLIC INVOLVEMENT

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals and special interest groups. Stakeholder participation and support is essential for achieving the goals of this TMDL effort. Table 6 shows a list of interested Stakeholders within the Mountain Oak Creek Watershed.

TABLE 6. STAKEHOLDER GROUP FOR MOUNTAIN OAK CREEK.

Name	City	State	ZIP
Robert Wolford	Pine Mountain	GA	31822
Fred Feaster	West Point	GA	31833
Chuck Evans	Hamilton	GA	31811
Frank Raines	Pine Mountain	GA	31822
Rob Kindrick	NA	GA	N/A
Bill Bowling	Pine Mountain	GA	31822
Cecil Wallace	Fortson	GA	31808
R. Wallace	Fortson	GA	31808
Sherri Clark	Hamilton	GA	31811
Carol Woods	West Point	GA	N/A
Earnest F. Koone III	Pine Mountain	GA	31822
George Clark	Hamilton	GA	31811
Jim Straub	Pine Mountain	GA	31822
Linda Straub	Pine Mountain	GA	31822
Julia Keating	Pine Mountain	GA	31822
Pat Keating	Pine Mountain	GA	31822

Building partnerships was a key component in order to declare input from the Stakeholder perspective in evaluating the Watershed Improvement Plan; and to provide an opportunity for Stakeholders to understand how the peer review process contributes to the development of TMDL plans and results. As a result of their participation, Stakeholders became knowledgeable advocates for the role to help manage or decrease non-point source pollution impacts.

Stakeholders' key responsibilities were to:

- **Provide** technical support and assistance;
- **Distribute** and share information;
- **Identify** opportunities and common concerns; and
- **Develop** public support.

RVRC staff encouraged public participation in the development of this TMDL Plan by inviting Stakeholders to participate in a meeting throughout the development stages. The objective of this meeting was to obtain feedback from Stakeholders about the concerns and composition of watershed activities. The Stakeholder Group meetings were held on August 13, 2009 at 6:00 pm, September 14, 2010 at 6:00 pm, and on September 8, 2011 at 6:00 pm at the 4-H building in Hamilton to discuss potential ways to assess the watershed of Mountain Oak Creek. See Appendix F for meeting minutes.

Examples of Stakeholder recommendations include:

- Additional monitoring to verify effectiveness of measures implemented;
- Review of all existing development codes, ordinances, and policies to identify where revisions could be made to reduce non-point source water pollution;
- Design and implement a citizen education program to make citizens aware of the non-point source water pollution problem and their role in improving the water quality;
- Encourage the continuing formation of volunteer groups to conduct community based stream protection efforts such as restoring vegetative cover within riparian areas, stream clean-up, and reporting of problems;
- Conduct screening level analyses of structural and non-structural BMPs;
- Investigate grant and funding opportunities to fund these efforts;
- Propose best management practices (BMPs) or other ways to correct problems at each location; and
- Evaluate technical assistance needed and how to administer assistance.

12.0 RECOMMENDATIONS FOR MONITORING AND CRITERIA FOR MEASURING SUCCESS

The River Valley Regional Commission collected water samples from Mountain Oak Creek using the prescribed methods outlined by the EPD approved *Sampling and Quality Assurance Plan* (SQAP). This data, found in Appendix H, did not result in a delisting and further confirmed that Mountain Oak Creek should remain on the 303(d) impaired streams list.

A watershed monitoring plan needs to take place for this stream segment. *E. Coli* will be monitored as it is a good indicator of fecal coliform and the testing is more economically

feasible. The results of this assessment will influence what actions local governments and the RVRC can take to reduce pollutant loads. Funding for this management practice will be sought through Section 319(h) of the Federal Clean Water Act. Table 7 demonstrates the estimated cost to perform targeted monitoring throughout the Mountain Oak Creek watershed.

TABLE 7. ESTIMATED COST FOR TARGETED MONITORING.

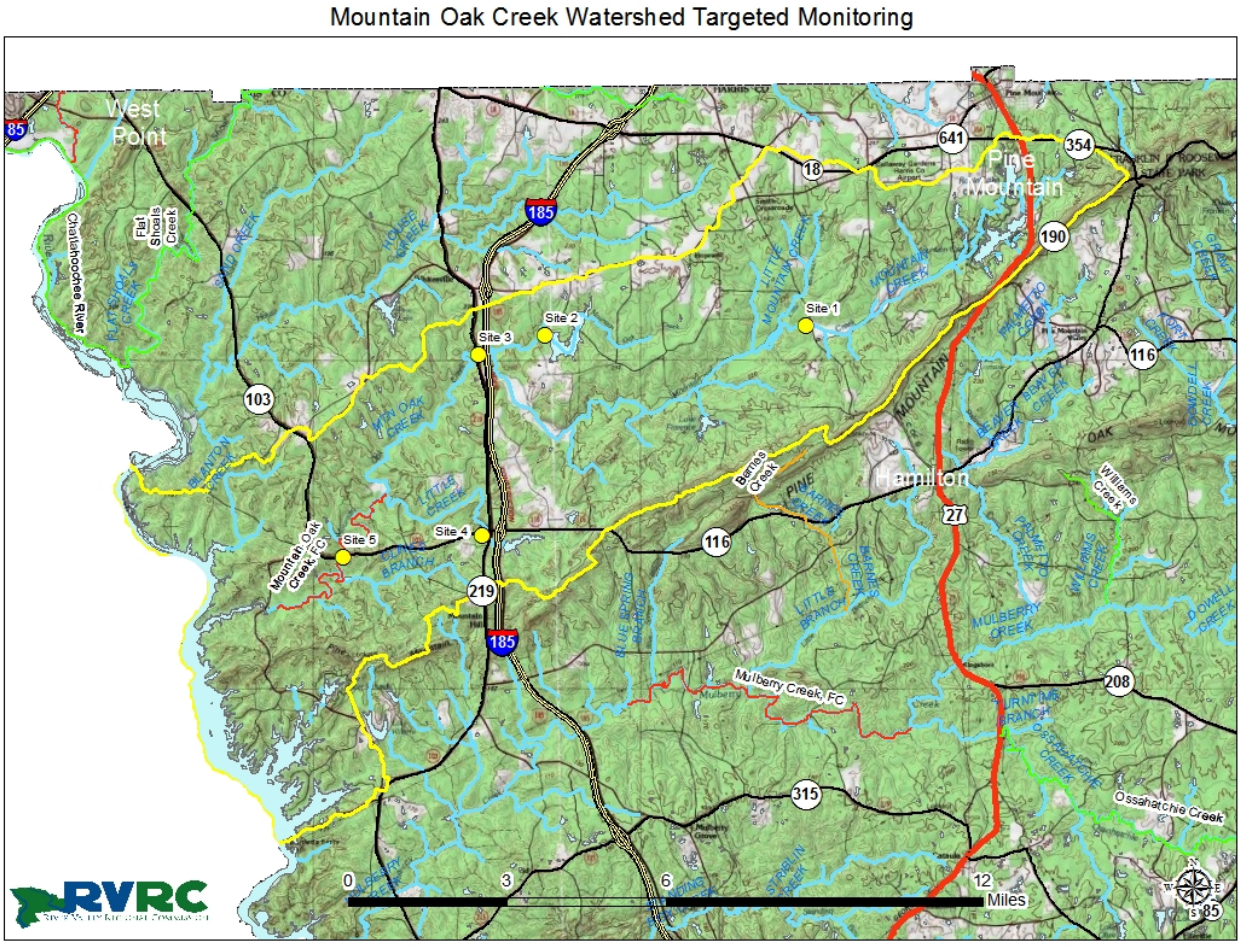
BMP	Cost (Per unit)	Est. Total Cost	Impairment Addressed	Load Reduction (%)	Stakeholder Support (1 – 5)	Benefits
Targeted Watershed Monitoring	$77	$4,620	FC	0%	5	Sources of contamination will be acknowledged

Tentative sampling locations were identified while considering stakeholder opinion to best assess sources of pollution within the watershed. Specific sampling locations and GPS coordinates for each site are listed below in Table 8. A map of the sampling locations may be found in Figure 6. Samples will be collected on the upstream side of the bridge at the road crossings.

TABLE 8. SAMPLING STATIONS.

Station Number	General Location	Sampling Site Coordinates		Sample Parameters
		Longitude	Latitude	
1	Hamilton Pleasant Grove Road and Mountain Creek crossing	-84.921920°	32.801498°	*E. coli*
2	West of Piedmont Lake	-85.005272°	32.799493°	*E. coli*
3	Highway 219 and Mountain Oak Creek crossing	-85.024451°	32.796174°	*E. coli*
4	Highway 103 and Little Creek crossing	-85.022414°	32.747211°	*E. coli*
5	Highway 103 and Mountain Oak Creek crossing	-85.068889°	32.741111°	*E. coli*

FIGURE 6. MOUNTAIN OAK CREEK WATERSHED SAMPLING SITES.



The following outlines the procedures for *E. Coli* monitoring:

A. 5 sites will be monitored.
   1. Dates for sampling will be determined following an accepted 319(h) application.
   2. 1 sample will be collected per site per month over a 12-month period
   3. There will be a total of 5 samples per month and 60 samples over a 12-month period

B. Samples will be collected and analyzed by EPD-trained volunteers. Staff who will collect *E. coli* samples were trained by GA EPD Adopt-A-Stream personnel on March 7, 2011 in *E. coli* sampling and testing.

C. Equipment used for sampling and testing is as follows:
   1. 3M™ *E. coliform* Count Plates, product #6404. 3M Company, http://solutions.3m.com/wps/portal/3M/en_US/Microbiology/FoodSafety/products.petrifilm-plates/e-coli-count

2. Genesis Hova-Bator Incubator with circulation fan, product #1588, calibrated to 35° C. G.Q.F. Manufacturing, http://www.gqfmfg.com/store.comersus_viewItem.asp?idProduct=77
3. Fixed-volume pipettor 1000µL, product #EW-21600-06. Cole Parmer, http://www.coleparmer.com/catalog/product_view.asp?sku=2160006
4. Pipette tips, 200 - 1300µL, product #EW-25711-50, Cole Parmer, http://www.coleparmer.com/catalog/product_view.asp?sku=2571150&pfx
5. MicroLite USB Temperature Data Logger, product #LITE5008. The Data Logger Store, http://microdaq.com/fourier/microlite_usb_logger.php
6. Armored Thermometer, LaMotte, http://www.lamotte.com/pages/aqua.sampling.html
7. Whirl-Pak® sterile sampling bag, 18 oz., product #EW-06499-60, Cole Parmer
8. 90% Isopropyl Alcohol
9. Latex Gloves
10. Bleach
11. Distilled Water

D. Georgia Adopt-A-Stream *E. coli* Data Form – to record official field notes for current weather, air and water temperature, previous 48 hours rainfall (yes or no), date, and time.

The following outlines the Quality Assurance Plan for sampling Mountain Oak Creek:

A. Pending funding, the River Valley Regional Commission will track potential pollutant sources within the watershed. The watershed assessment and monitoring data results will influence what actions local governments can take to reduce pollutant loadings.

B. Field Quality Assurance

1. The following sampling protocol will be used for each sample:
    a. The grab samples for quantification of *E. coli* bacteria will be collected at 5 locations on Mountain Oak Creek and its tributaries.
    b. Prior to sample collection:
        1) 1 Whirl-Pak® bag per site plus a bag for the "Blank"
        2) Using a Sharpie, label each bag as follows:
            a) Stream name of for the blank, label the bag "Blank"
            b) Collection site number
            c) Date of collection
            d) Time of collection
            e) Collector
    c. Record the following on the Field Notes Form at each sample site (See Appendix I for Field Notes Form):
        1) Current weather conditions (overcast, partly cloudy, clear/sunny)
        2) Air temperature
        3) Water temperature
        4) Date and time

5) Previous 48 hour rainfall (yes or no).
6) Conductivity

d. Sample Collection
   1) Put on latex gloves for protection and to limit sample contamination
   2) Tear off top of bag along perforation. Avoid touching the inside of the bag
   3) Before first sample is collected from the stream, fill one Whirl-Pak® bag with distilled water. This will be the "blank." Twist the yellow ties to seal the top and place the bag in a cooler with ice or frozen ice packs
   4) Select a location in the middle of the flow channel. The flow channel may not be in the middle of the stream. Stand downstream from the flow
   5) Collect sample from mid-depth of the flow channel
   6) Open the Whirl-Pak® bag by taking hold of the white tabs on either side of the bag, one in each hand. Use a different bag if the inside is accidentally touched
   7) Keep the bag upright and use a scooping motion to submerge the top under the water
   8) At mid-depth, pull both white tabs apart to open the mouth. Allow water to pour into the mouth until the bag is ¾ full
   9) Pull the bag out of the water, take the yellow ties on either side, one in each hand, and flip of fold the top of the bag twice to wrap up the top
   10) Twist the yellow ties to seal the top and place the bag in a cooler with ice or frozen ice packs

2. Sample Handling and Custody Requirements
   a. *E. coli* samples will be stored for no longer than 24 hours after collection in a cooler with ice or frozen packs
      1) Within 24 hours of collection, RVRC staff will utilize the Adopt-A-Stream Bacterial Monitoring methods and procedures to process and analyze the samples and the blank
      2) Petrifilm plates for each sample, including the blank, shall be labeled with a Sharpie pen as follows:
         a) Stream name, or in the case of the blank, "Blank"
         b) Site number
         c) Date of collection
         d) Collector
      3) The Georgia Adopt-A-Stream *E. coli* Data Form found in Appendix I will be completed by RVRC staff for petrifilm results
      4) Utilizing a fixed volume pipette, a sample from each site will be placed on 3 petrifilm plates according to the instructions in the GA EPD Adopt-A-Stream Bacterial Monitoring Manual

5) Utilizing a fixed volume pipette, a sample from the "Blank" will be placed on 1 petrifilm plate
6) Plates will be stacked and placed in the Hova-Bator incubator calibrated to 35° C for 24 hours
7) Incubator temperature will be monitored over a 24-hour period with a Microlite USB Temperature Data Logger
8) After 24 hours, plates (3 per site plus the blank will be removed from the incubator and *E. coli* colonies will be counted. The sum of colonies found on 3 plates prepared for each site as well as the 1 plate prepared for the blank, will be multiplied by 33.3333 to calculate the total colony count per 100 mL for each site

b. RVRC staff will collect the samples with equipment obtained by the River Valley Regional Commission. Staff will be trained by GA EPD staff prior to any collection. To ensure safety, staff will choose a sample collection technique on site. If waters are safe for wading, staff will use the "grab sampling while wading technique" for *E. coli* bacteria. However, if the water appears to be unsafe for wading, then the *E. coli* sample should be collected by lowering a sampling container from a bridge or culvert, or the grab sampling technique should be employed from the safety of the stream bank. If rainfall in the preceding 24 hours is between 1" and 2", then sampling should not occur until 48 hours after the rain event. Sampling is postponed, however, if weather conditions make sampling unsafe for field personnel.

Records will be maintained by the Planning Division of the River Valley Regional Commission located at 1428 2nd Avenue, Columbus, Georgia 31902 for a period of three years from the conclusion of the project and will be available for review. Additionally, data will be posted by the Regional Commission to the Georgia Adopt-A-Stream database.

13.0 PLAN IMPLEMENTATION

The objective of TMDL Watershed Improvement Plan is to restore impaired water quality to meet water quality standards. From a broader perspective, Georgia's water quality management strategy addresses three things:

1. Protection: Prevent the degradation of healthy waters.
2. Restoration: Develop and execute plans to eliminate impairments.
3. Maintaining Restored Waters: Institutionalize technical and administrative procedures to prevent or offset new pollutants.

The monitoring plan is scheduled to be implemented as soon as funding is available. RVRC staff will attempt to secure funding by submitting an application for Section 319(h) of the

Federal Clean Water Act by the October 31, 2011 deadline, assuming matching funds are in place. This project will take approximately one year to finalize the results.

14.0 PLAN APPENDICES

A. NINE (9) – KEY ELEMENT SUMMARY
B. MOUNTAIN OAK CREEK WATERSHED MAP (HUC 0313000211)
C. LAND USE MAPS: TRENDS AND FUTURE
D. FIELD NOTES AND PICTURES
E. COPIES OF PUBLIC NOTICES AND OTHER LITERATURE
F. MEETING MINUTES
G. TARGETED MONITORING METHODS AND RESULTS
H. SQAP AND EPD MONITORING RESULTS
I. FORMS

APPENDIX A. NINE (9) – KEY ELEMENT SUMMARY

Element 1 – An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level.

The sources of pollution suggested in the 2001 Implementation Plan for Mountain Oak Creek were from agricultural uses, urban runoff, wildlife, septic systems, and effluent from the wastewater treatment plant in Callaway Gardens. Contamination is not coming from agricultural purposes or "hobby farms" because there are too few "fenced" animals within this watershed to have a significant impact. Most of the land in this area is rural, so there are too few urban areas to have a significant impact. The houses in the area have not reported enough septic repairs to contribute significantly to fecal coliform contamination. The effluent at Callaway Gardens is treated and tested every day, so this in not a source of pollution. The only source of fecal coliform to make a significant impact is the wildlife in the area, and this should be considered a natural "background" level.

Element 2 – An estimate of the load reductions expected for the management measures described under Element 3.

There will not be a load reduction of fecal coliform as a result of implementation of this plan. Rather, targeted watershed monitoring will isolate sources of impairment so that Best Management Practices can be established during future implementation stages.

Element 3 – A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards.

The next step to establish improved water quality for Mountain Oak Creek is targeted watershed monitoring. Although this will not reduce the levels of fecal coliform, it will establish sources of contamination for future planning.

Element 4 – An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan.

Funding for targeted watershed monitoring will be sought through Section 319(h) of the Federal Clean Water Act. This grant provides sixty percent of all required funding needed to implement the monitoring. The remaining forty percent must be obtained through non-federal funds. Assuming a match is acquired, staff from the River Valley Regional Commission will carry out implementation of the WIP.

Element 5 – An information/education component that will be used to enhance public understanding of and participation in implementing the plan.

This Watershed Improvement Plan for Mountain Oak Creek document will be available for all persons who wish to obtain it. The RVRC will contact advisors and stakeholders to inform them of any necessary updates.

Element 6 – A schedule for implementing the management measures that is reasonably expeditious.

RVRC staff will commence the targeted monitoring once funding is secure. This monitoring will take place for the duration of one year and one sample from each site will be collected each month. Sampling will be delayed by two days should a rain event occur. Following the final sample date, RVRC staff will compile a report with the results.

Element 7 – A description of interim, measurable milestones for determining whether management measures or other control actions are being implemented.

The goal of this Watershed Improvement Plan is to bring Mountain Oak Creek into compliance with water quality standards, which may result in its removal from the 303(d) list of impaired waters. This goal will be measured by the concentration of fecal coliform samples tested during future sampling periods. In order to establish BMPs to mitigate the pollution levels, it is important to determine the sources of pollution. Therefore, RVRC staff has developed a watershed monitoring plan to determine the origin of sources of *E. coli*, which is a good indicator of fecal coliform.

Element 8 – A set of criteria that can be used to determine whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised.

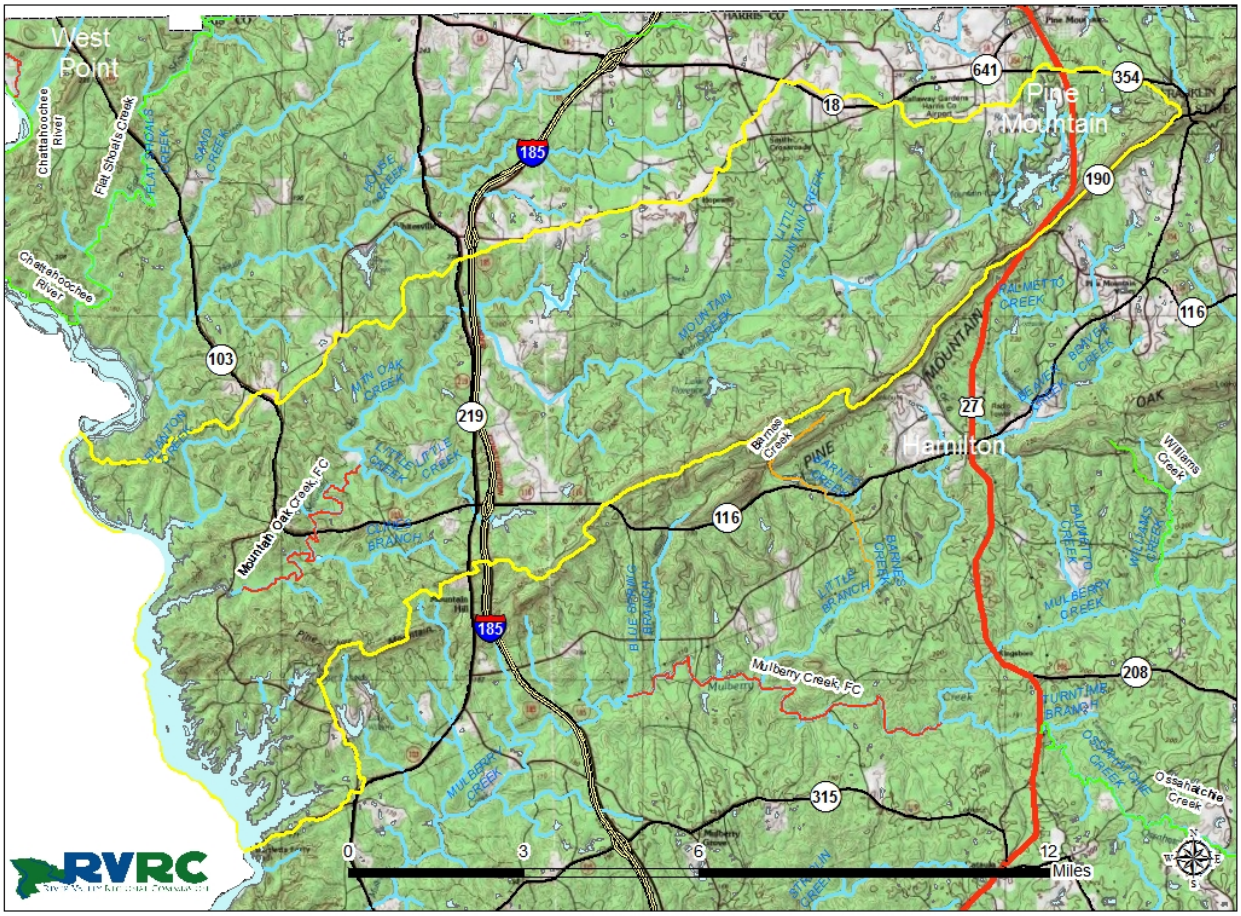
This plan will not reduce the level of fecal coliform within Mountain Oak Creek, but rather determine sources of impairment in order to establish needed Best Management Practices. During the course of sampling, RVRC staff will be in contact with advisors and stakeholders should additional management measures or sampling sites be needed.

Element 9 – A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under Element 8.

RVRC staff will perform the targeted watershed monitoring approach outlined in Section 12 of this WIP, pending funding. Monitoring will be conducted once per month at each sample site for the duration of one year; testing for *E. Coli*, a good indicator of fecal coliform. Having this data will enable RVRC staff, advisors, stakeholders, and the local governments to make educated decisions on establishing Best Management Practices.

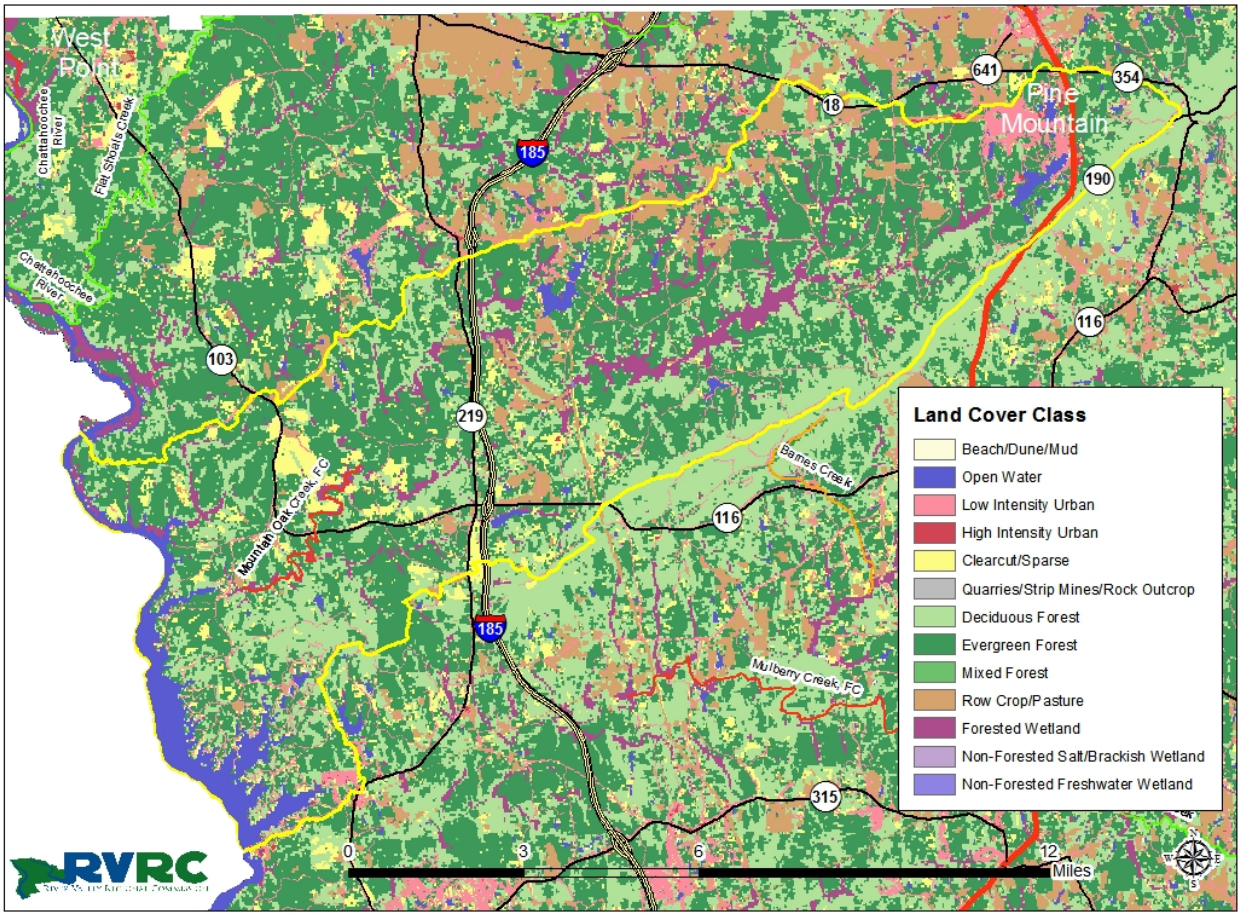
APPENDIX B. MOUNTAIN OAK CREEK WATERSHED (HUC 0313000211)

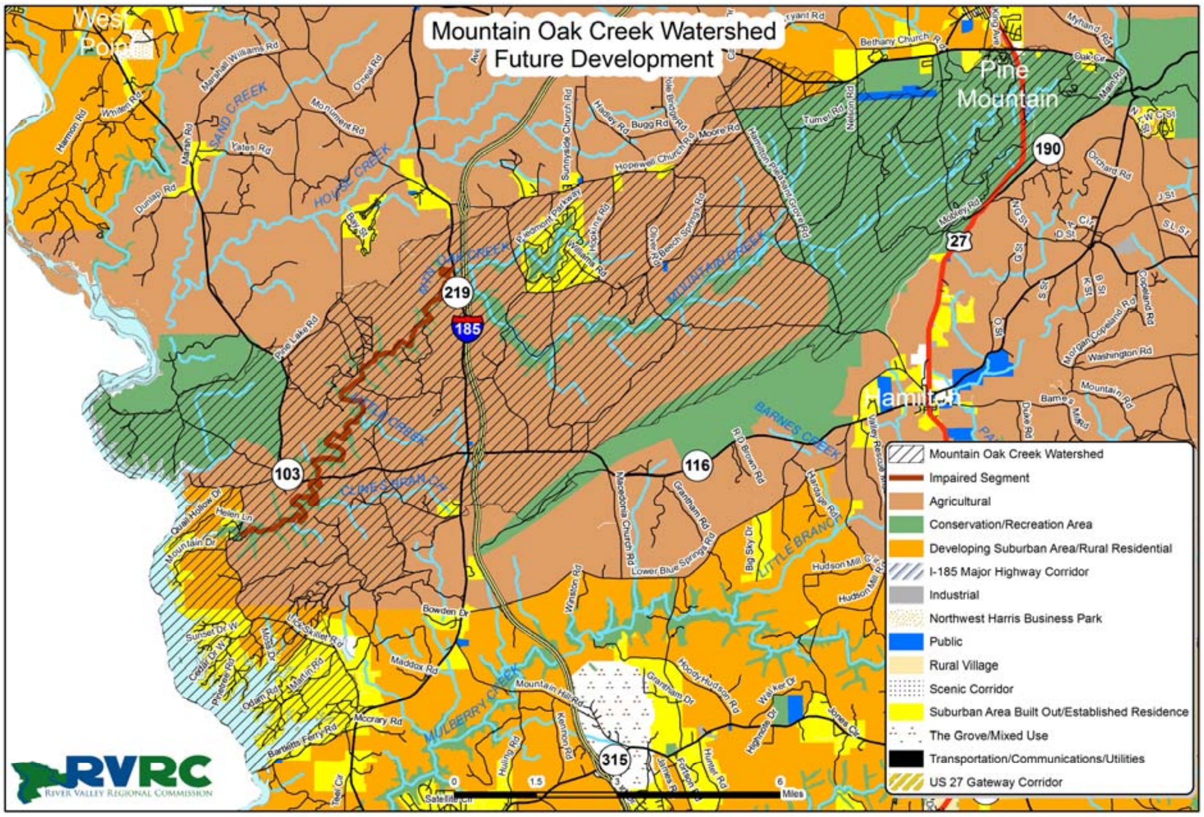
Mountain Oak Creek Watershed (HUC 0313000211)



Appendix C. Land Use Maps: Trends and Future

Mountain Oak Creek Watershed Land Use Trends




Mountain Oak Creek Watershed
Future Development
West Point
Pine Mountain
Hamilton
Mountain Oak Creek Watershed
Impaired Segment
Agricultural
Conservation/Recreation Area
Developing Suburban Area/Rural Residential
I-185 Major Highway Corridor
Industrial
Northwest Harris Business Park
Public
Rural Village
Scenic Corridor
Suburban Area Built Out/Established Residence
The Grove/Mixed Use
Transportation/Communications/Utilities
US 27 Gateway Corridor
RVRC
River Valley Regional Commission

APPENDIX D. FIELD NOTES AND PICTURES

Show stream or road segment & landmarks (crossing stream or road) or distances marking the upper & lower end of segment. If a stream, show the direction of flow, ponds or swampy areas, & estimate the width of the riparian corridor from each bank. Use an arrow to show the approximate direction of north. Show & describe (in the notes section) major adjoining land activities (see attached table) & show the location of specific potential sources & describe in the notes section. Show the direction and number of photographs taken.

Stream or Road Segment Map Or Drawing

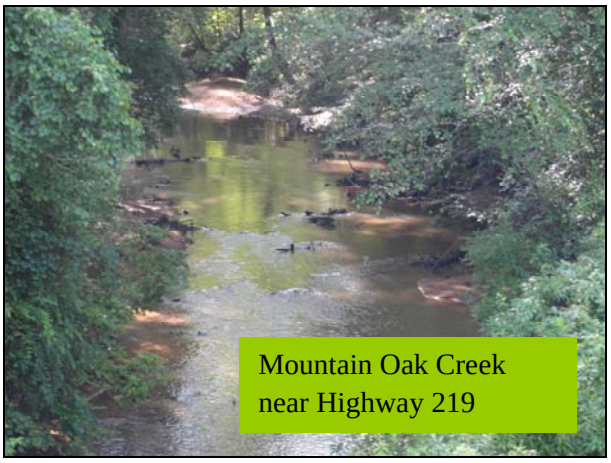
Mountain Oak Creek **Visual Field Survey**
Date: July 14, 2009 **Arrival Time:** 9:45 AM
Site Location Hwy 219 bridge cross to Chattahoochee River
GPS Coordinates (if taken) 32.796218 & -85.024565
Current Weather overcast/dry **Time Since Last Rain** 24 hr
Team Members: Lance Renfrow and Tina Rust

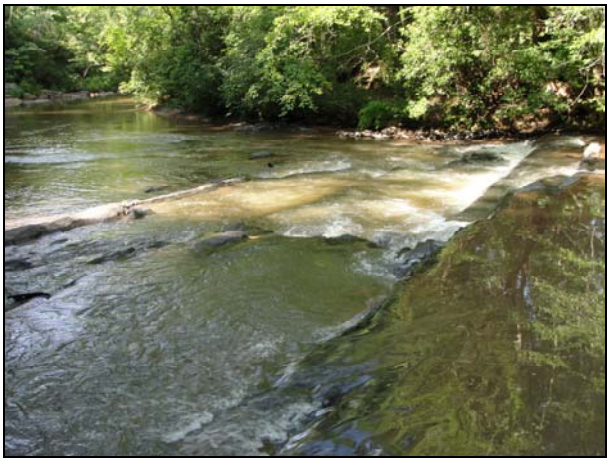
Notes (point to/reference applicable activity on map):

There were no visible signs of pollution for Mountain Oak Creek. The Creek was accessed from four locations. There were no signs of pollution at the Hwy 219 bridge crossing and BMPs (rip rap, retaining wall, and vegetation) were in place to prevent erosion. The stream was accessed just north of Hwy 103 at a resident's home. Again, no signs of pollution. BMPs (rip rap and vegetation) were in place at the Hwy 103 crossing to prevent erosion. The stream was also accessed at a resident's home near Lick Skillet Rd (no signs of pollution). A horse farm was located north of the stream on Lick Skillet Rd, but there were not enough horses to cause FC impairment. North of Lick Skillet Rd and east of Pine Lake Rd development can be found. Large areas were cleared and this can lead to possible sediment transport into Mountain Oak Creek, however, this does not contribute to increased fecal coliform levels.

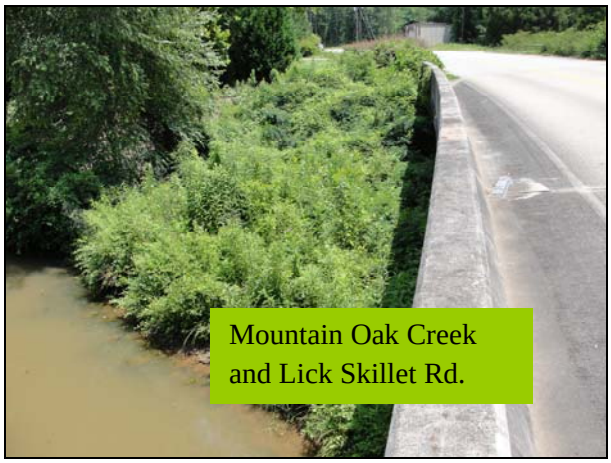
STREAM CONDITIONS @ ROAD CROSSINGS (Check as appropriate)
Channel Type: Swamp ☐; pool ☐; run ☐, riffle☒; other_____.
Flow Stage: High☐; medium ☐; low ☒; dry☐.
Odors: None/normal ☒; sewage ☐; petroleum ☐; chemical ☐; chlorine ☐; rotten egg ☐; animal waste ☐; other_____.
Water Clarity: Clear ☐; tea-colored ☒; cloudy ☐; opaque ☐; red or brown from sediment ☐; other_____.
Water Surface: None ☒; slick ☐; oil sheen ☐; oil sheen—breaks into plates ☐; globs ☐; flecks ☐; foam ☐; other _____.
Algal Growth—Description & Extent: moderate
Sediment: Eroded banks ☒; mid-channel bars ☐; recent sediment deposition on banks ☐; other

VISUAL FIELD SURVEY - JULY 14, 2009






Mountain Oak Creek near
Highway 103


Mountain Oak Creek
and Lick Skillet Rd.

APPENDIX E. COPIES OF PUBLIC NOTICES AND OTHER LITERATURE

River Valley
REGIONAL Commission

1428 SECOND AVENUE P.O. BOX 1908
COLUMBUS, GEORGIA 31902-1908
(706) 256-2910
FAX (706) 256-2908

228 WEST LAMAR STREET
AMERICUS, GEORGIA 31709
(229) 931-2909
FAX (229) 931-2745

July 13, 2009

Dear Community Leader:

The Georgia Department of Natural Resources – Environmental Protection Division (GA DNR – EPD) has contracted with River Valley Regional Commission (RVRC) to monitor and prepare new implementation plans for the decrease in Total Maximum Daily Load (TMDL) of the levels of fecal coliform in Mountain Oak Creek. As part of the contract, the RVRC must form a Technical Advisory Group to make recommendations and/or provide key information and materials to the RVRC staff. The purpose of the Advisory Group is to provide a forum for the public, partners, etc. to discuss potential concerns and solutions that will impact Mountain Oak Creek, and to make recommendations relative to TMDLs.

This committee will assist in developing a plan to restore Mountain Oak Creek to its designated use of fishing. The Advisory Group will help identify contributing pollution sources, assist in arriving at equitable pollution reduction allocations, and recommend specific actions needed to effectively control sources of pollution. These groups of people are critical to the successful restoration and protection of Mountain Oak Creek.

The Advisory Group's key responsibilities are to:

- **Advise** on matters of concern to the community;
- **Contribute to the education** of the residents of the watershed on water quality issues;
- **Help identify** contributing pollution sources;
- **Assist** in arriving at equitable pollution reduction allocations among contributors;
- **Recommend specific actions** needed to effectively control sources of pollution; and
- **Help develop** and set in motion an extended plan.

Since you may have a better understanding of the interests in your area, we are asking for you or someone of interest to please serve on this Advisory Group. Our first meeting will be held on **August 11, 2009** at **2:00 pm** at the **4-H Youth Development Center**, located at 121 North College Street in Hamilton, across from the courthouse and county office. If you have any questions please call me at 706.256.2910 or email at lrenfrow@rivervelleyrc.org. Together, we can ensure our waters will be clean and safe for everyone to enjoy!

Sincerely,

Lance Renfrow
Environmental Planner

SERVING . . . CHATTAHOOCHEE CRISP CLAY DOOLY HARRIS MACON MARION MUSCOGEE QUITMAN RANDOLPH SCHLEY STEWART SUMTER TALBOT TAYLOR WEBSTER . . . COUNTIES

River Valley
REGIONAL Commission

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COLUMBUS, GEORGIA 31902-1908
(706) 256-2910
FAX (706) 256-2908

228 WEST LAMAR STREET
AMERICUS, GEORGIA 31709
(229) 931-2909
FAX (229) 931-2745

July 13, 2009

Dear Stakeholder/Landowner:

I am writing to inform you that the State of Georgia is conducting a study for Mountain Oak Creek. This study, known as a TMDL (or Total Maximum Daily Load) study, will determine and address the levels of pollutants in Mountain Oak Creek. This study will also propose the means to reduce the amount of pollutants in the waters.

It is important that the State include input from landowners in the immediate area, local government authorities, and concerned citizens concerning any possible actions or decisions. This input will be included in the resulting TMDL Implementation Plan, as well as plans for further stakeholder participation, both in the restoration and/or maintenance of this river segment.

The primary impairment identified in this stream is fecal coliform. The major sources of fecal coliform are runoff of adjacent land, point contributions, and unauthorized contributions. This impairment is an indicator of other possible health threats. This impact can be reversed or marginalized.

The State of Georgia's TMDL protocol process is most effective when the stakeholder, landowner, and local authorities are encouraged to participate and make suggestions. The process is meant to be a coordinated effort among all parties to ensure success of the program.

As a landowner/stakeholder, your participation is needed. On **August 13, 2009** at **6:00 pm**, a stakeholder meeting will be held at the **4-H Youth Development Center** (located at 121 North College Street, in Hamilton, across from the courthouse and county office) where you may express and hear other people's concerns. We encourage you to attend this meeting. If you have any questions, please feel free to contact me at the following:

Lance Renfrow
River Valley Regional Commission
1428 2nd Ave
Columbus, GA 31902
(706) 256-2910
lrenfrow@rivervalleyrc.org

SERVING . . . CHATTAHOOCHEE CRISP CLAY DOOLY HARRIS MACON MARION MUSCOGEE QUITMAN RANDOLPH SCHLEY STEWART SUMTER TALBOT TAYLOR WEBSTER . . . COUNTIES

For Immediate Service Announcement in the Harris County Journal:
August 6, 2009

Contact: Lance Renfrow
Phone: 706-256-2910
Fax: 706-256-2908
Email: lrenfrow@rivervalleyrc.org

Public Hearing on Water Quality Concerns in Mountain Oak Creek

A community hearing will be held to discuss the monitoring and preparation of new implementation plans for the decrease in Total Maximum Daily Loads (TMDL) in Mountain Oak Creek. A TMDL is the maximum amount of a pollutant that a river can receive and still be safe and healthy.

Stakeholders will have the opportunity to assist in developing a plan to restore Mountain Oak Creek to its designated use. Also, you will be able to help identify and discuss contributing pollution sources, assist in arriving at equitable pollution reduction allocations, and recommend specific actions needed to effectively control sources of pollution. In order to make recommendations and/or provide key information and materials from your local community the River Valley Regional Commission is asking all interested residents to attend and provide input. This group of people will be critical to the successful restoration and protection of Mountain Oak Creek.

Our community hearing will be held on **August 13, 2009** at **6:00 pm** at the **4-H Youth Development Center** located at 121 North College Street in Hamilton, across from the courthouse and county office. If you have any questions please call Lance Renfrow at 706.256.2910 or email at lrenfrow@rivervalleyrc.org.

RVRC
River Valley Regional Commission

Columbus Office
1428 Second Avenue
P. O. Box 1908
Columbus, GA 31902
Phone (706) 256-2910
Fax (706) 256-2908

Americus Office
228 West Lamar Street
Americus, GA 31709
Phone (706)256-2910
Fax (229) 931-2745
Fax (229) 931-2917

www.rivervalleyrc.org

Toll Free (877)819-6348

August 25, 2010

Dear Sir/Madam:

Analysis of water samples taken from Mt. Oak Creek in 1995 by the Department of Natural Resources indicated the presence of fecal coliform bacteria at a level which exceeded state water quality standards. Consequently, an eleven mile segment of the creek was placed on the federal 303(d) list of impaired waterways, and a Total Maximum Daily Load evaluation of the creek was performed. A formal procedure must now be followed to remove Mt. Oak Creek from the impaired waterways list.

The general water quality criteria for fecal coliform bacteria states, "All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses." The state's water use classification for Mt. Oak Creek is fishing, and previous studies report adverse impacts on fish in waters with elevated fecal coliform bacteria levels.

A Total Maximum Daily Load Implementation Plan was previously developed for Mt. Oak Creek. In order to further efforts for the removal of Mt. Oak Creek from the 303(d) list of impaired streams, a meeting has been scheduled to conclude a secondary Tier II Implementation Plan. This plan addresses the general characteristics of the watershed, the sources of non-point pollution, stakeholders and public involvement, and educational/outreach activities. Additionally, the plan describes regulatory and voluntary practices and control actions, known as Best Management Practices (or BMPs), for reducing non-point sources of pollutants, developing milestone schedules for the BMPs, and creating a monitoring plan to measure BMP effectiveness.

You may recall a similar letter and meeting addressing this issue last August. You are asked to attend and participate in the follow-up meeting because, (1) a review of county tax records indicates you own property fronting that segment of Mt. Oak Creek reported to have a fecal coliform level in excess of current water quality standards, or (2) you have otherwise been determined to have a stake or interest in the quality of water in this creek.

The meeting is scheduled for 6:00 p.m., Tuesday, September 14, in the 4-H Youth Development Center, located at 121 North College Street, in Hamilton, across from the courthouse and county office. You are asked to support your watershed and attend this meeting. If you have any questions in the interim, you may call Lance Renfrow or Gerald Mixon at 877-819-6348.

Sincerely,

Lance Renfrow
Environmental Planner

RVRC
RIVER VALLEY REGIONAL COMMISSION

Columbus Office
1428 Second Avenue
P. O. Box 1908
Columbus, GA 31902
Phone (706) 256-2910
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228 West Lamar Street
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Fax (229) 931-2745
Fax (229) 931-2917

www.rivervalleyrc.org

Toll Free (877)819-6348

August 22, 2011

Dear Sir/Madam:

Analysis of water samples taken from Mt. Oak Creek in 1995 by the Department of Natural Resources indicated the presence of fecal coliform bacteria at a level which exceeded state water quality standards. Consequently, an eleven mile segment of the creek was placed on the federal 303(d) list of impaired waterways, and a Total Maximum Daily Load evaluation of the creek was performed. A formal procedure must now be followed to remove Mt. Oak Creek from the impaired waterways list.

The general water quality criteria for fecal coliform bacteria states, "All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses." The state's water use classification for Mt. Oak Creek is fishing, and previous studies report adverse impacts on fish in waters with elevated fecal coliform bacteria levels.

A Total Maximum Daily Load Implementation Plan was previously developed for Mt. Oak Creek. In order to further efforts for the removal of Mt. Oak Creek from the 303(d) list of impaired streams, a meeting has been scheduled to conclude a Watershed Improvement Plan. This plan addresses the general characteristics of the watershed, the sources of non-point pollution, stakeholders and public involvement, and educational/outreach activities. Additionally, the plan describes regulatory and voluntary practices and control actions, known as Best Management Practices (or BMPs), for reducing non-point sources of pollutants, developing milestone schedules for the BMPs, and creating a monitoring plan to measure BMP effectiveness.

You may recall a similar letter and meeting addressing this issue last August. You are asked to attend and participate in the follow-up meeting because, (1) a review of county tax records indicates you own property fronting that segment of Mt. Oak Creek reported to have a fecal coliform level in excess of current water quality standards, or (2) you have otherwise been determined to have a stake or interest in the quality of water in this creek.

The meeting is scheduled for 6:00 p.m., Thursday, September 8, in the 4-H Youth Development Center, located at 121 North College Street, in Hamilton, across from the courthouse and county office. You are asked to support your watershed and attend this meeting. If you have any questions in the interim, you may call me at 706-256-2910.

Sincerely,

Lance Renfrow
Environmental Planner

APPENDIX F. MEETING MINUTES

TMDL Advisory Committee Meeting Minutes
August 11, 2009

Persons Attending

Lance Renfrow, RVRC
Tina Rust, RVRC
Lu Ann Craighton, Callaway Gardens
John Bain, Callaway Gardens
Jack L. McClung, USDA/NRCS
Jim Woods, Harris Chamber of Commerce
Ralph Callaway

This meeting was held at 2:00 pm at the 4-H building in Hamilton to discuss potential sources and solutions for the fecal coliform pollution in Mountain Oak Creek.

Lance Renfrow provided an overview of the Total Maximum Daily Load Implementation Plan that is being written for Mountain Oak Creek and the role that the Advisory Committee has in providing input into the plan.

- Lance provided information on potential sources of pollution written in the latest plan. Sources included deer/wildlife, faulty septic tanks, outfall from Callaway Gardens, and non-point surface runoff.
- The question of housing was brought up, “Are there really that many houses in the area?” The group concluded that there are very few homes in the area so septic tanks are probably not the problem.
- Jack McClung stated that testing was performed for this segment back in 1990 at Highway 103. Back then, he went to a similar presentation where they found that there was not very much farm land to contribute to a problem.
- Lance explained the need for more than one sample. EPD regulates that 16 samples be taken throughout the year at certain intervals in order to be certified testing.
- Jim Woods explained the need for more than one sample location. Testing at different locations will yield an assessment to the sources of fecal contamination. Jim suggested that samples can be taken at Highway 219 and Highway 103, or more locations.
- Jim Woods offered to take samples to Auburn to be tested or the RVRC can take them to Columbus State University.
- Jim Woods stated that there were no more houses build on Highway 18 since the 1960s and that the number of livestock has since declined dramatically.
- Advisory Committee suggested a plan of action. Rather than spending a lot of money on testing multiple sites, spend a little bit of money on preliminary, uncertified testing. CSU may be the place to do the preliminary testing.
- It was suggested to see if the lab can test for animals versus human feces to determine the background levels of wildlife fecal coliform.
- Another suggestion was made to see if students at CSU want to participate in this project.

- Ralph Callaway and Jack McClung stayed after the meeting to discuss potential monitoring sites. These sites were noted on a large map.

Meeting was adjourned at 3:30 pm.

TMDL Stakeholder Committee Meeting Minutes
August 13, 2009

Persons Attending

Lance Renfrow, RVRC
Katie Howard, RVRC
Jim/Carol Woods, Harris Chamber of Commerce
Ralph Callaway
Robert Wolford
Fred Feaster
Chuck Evans
Frank Raines
Rob Kindrick
Bill Bowling
Cecil Wallace
R. Wallace
Sherri Clark
Ernest F. Koone III

This meeting was held at 6:00 pm at the 4-H building in Hamilton to discuss potential sources and solutions for the fecal coliform pollution in Mountain Oak Creek.

Lance Renfrow provided an overview of the Total Maximum Daily Load Implementation Plan that is being written for Mountain Oak Creek and the role that the Stakeholder Committee has in providing input into the plan.

- Introductions were made by all who attended. Mr. Renfrow explained the purpose of the meeting. The River Valley Regional Commission has a contract with the Department of Natural Resources, Environmental Protection Division, to write Total Maximum Daily Load plans for impaired streams in the region. One of the impaired streams to be included in the plan is Mountain Oak Creek. Persons invited to the meeting are Stakeholders who own property along the stream.
- The Federal Clean Water Act established an impaired list for the entire country. Every three (3) years each creek is Georgia is required to be tested. Mountain Oak Creek is just one stream on the list. The total maximum daily load level is set by the government.
- The implementation plan will include methods to lower pollution levels in Mountain Oak Creek. Levels were measured in 1994 and were found to be 5% above the maximum

level for fecal coliform. Potential sources recorded in the latest plan include urban runoff, wildlife, and the Callaway Gardens outfalls sewerage treatment plant.

- Urban runoff is very unlikely because the area has a very low population with few houses. There are few roads and septic tanks nearby. Callaway Gardens tests their sewage outfalls daily and is in compliance. This leaves wildlife as the most likely cause.
- The implementation plan can suggest that the creek be de-listed. This will require testing following a strict methodology approved by EPD. The RVRC is proposing to do testing in Phase II of this plan to determine what the level of contamination is and if it is over the total daily maximum load. This can be used for general assessment only and not for de-listing. The RVRC is proposing to apply for a 319(h) grant to do testing using the approved methodology. This could potentially allow the stream to be de-listed.
- A landowner suggested that each property owner pay for testing on their land using the approved methodology. This would speed up the process. Another suggestion was made to allow Mr. Renfrow to test on each of the property owners' land. The group was encouraged to give the RVRC their contact information if they will allow him to test on their property.
- Mr. Renfrow thanked everyone for attending and assured them they would receive a report once it was completed.

Meeting was adjourned at 7:15 pm.

TMDL Stakeholder/Advisory Committee Meeting Minutes
September 14, 2010

Persons Attending

Lance Renfrow, RVRC
Katie Howard, RVRC
Barbara Stitt-Allen, EPD
Jim Woods, Harris County Commissioner
John Davis, Columbus State University
George Clark

- Lance Renfrow from the River Valley Regional Commission opened the meeting at 6:00 p.m. at the Harris County Cooperative Extension office. He briefly explained the history of the TMDL designation for Mountain Oak Creek.
- In 1995 USGS, under a contract with EPD, sampled Mountain Oak Creek. Levels found were 5% over the TMDL for fecal coliform. Fifteen (15) years later the RDC/RC became involved. The advisory group for this project recommended two studies. The first study was to resample the spot at the Highway 103 crossing and submit this information to EPD. The second was to do a watershed study of the area.

- From January to September of 2010, using the EPD approved methodology; fourteen (14) samples were taken over a 30 day period. All of the samples were good except the last

two which were taken in September. These samples were slightly over the limit. Barbara Stitt-Allen from EPD stated that she was surprised that the numbers were higher and assumed that it was from the heat. She stated that 25% of all samples have to violate limit before a stream is listed. She recommended that more testing be conducted. She also stated that she will take this information back to her office for review. The goal for this project is to have the creek delisted by EPD.

- Stage two of the sampling was conducted with assistance from Dr. John Davis from Columbus State University. After the sampling was conducted, it was determined that the amounts of water used were too low. The counts are not statistically significant because of this. While the data indicates that the stream is good, the data is not valid at this point. A bigger sample is needed using more water. The group recommended revising the target shed area and taking more samples which would allow the data to be valid.
- Barbara stated that a SQAP would need to be revised and the method approved by EPD. She shared that some people had been able to delist a portion of a stream using sample data, which is the process this group is taking.
- The group discussed the possibility that wildlife is causing the data to spike. There are very few cattle, emus and horses but there is wildlife, i.e. deer. Barbara stated that the standard allows for natural causes of coliform like wildlife and temperatures. Barbara strongly recommended more sampling because the testing results are so low. Lance Renfrow agreed to do two more samples in the creek. The contract with EPD ends on September 30 and more testing cannot take place until the contract is renewed.
- The group discussed alternative fund sources such as 319(h) funding. Dr. Davis has an idea beyond identification of existing fecal coliform. His project would see what happens to other bacteria in a stream if fecal coliform exists. He also wants to identify what a normal stream looks like so it can be compared to a stream with fecal coliform. The perfect site would have two branches of a stream with one branch highly impacted and the other not impacted. The two streams would eventually come back together. Barbara reminded the group that the goal of 319(h) funding is to delist a stream. Dr. Davis wants to find sources from a tributary that are impacting a stream.
- Conclusion – Lance Renfrow will continue to isolate the problem by taking more samples. In approximately 10 days, the group will know if the samples are okay. If they are not okay, Lance will continue sampling. If they are good, he will find another creek to sample and delist this section of the Mountain Oak Creek.

Meeting was adjourned at 7:00 pm.

TMDL Advisory Committee Meeting Minutes
September 8, 2011

Persons Attending

Lance Renfrow, RVRC
Allison Slocum, RVRC
Jack McClung, NRCS
Jim Woods, County Commissioner
Carol Woods, resident
Jim Straub, resident
Linda Straub, resident
Julia Keating, resident
Pat Keating, resident

- This meeting was held at 6:00 pm at the 4-H building in Hamilton to discuss potential sources and solutions for the fecal coliform pollution in Mountain Oak Creek.
- Lance Renfrow provided an overview of the Total Maximum Daily Load Implementation Plan that is being written for Mountain Oak Creek and the role that the Stakeholder and Advisory Committee has in providing input into the plan.
- Discussed sources of fecal coliform impairment
  - Deer or wildlife
  - No urban runoff, no cities within watershed
  - Callaway Gardens wastewater treatment plant is tested everyday and operates under a NPDES permit
- In 1995, a 5% reduction of fecal coliform was needed
- Began collecting data to submit to EPD to de-list during last funded year
  - 16 samples throughout the year
  - Most samples were lower than the allowed 200 cfu/ 100 mL
  - September results were high
- Steam is still considered impaired although no significant source other than wildlife
- Considered impaired as long as it is dangerous to human health
- Should've done targeted monitoring to isolate sources of impairment
- EPD wants this type of monitoring
- EPD contract is nearing an end
- No funds from EPD to do targeted monitoring
- 319(h) grant for non-point source pollution
- Applications due October 31, 2011
- Needs 40% non-federal match or in-kind services
- Does County or residents want targeted monitoring
- Can lead to government actions (BMP installation)
- Cost = travel + time + equipment = $4,600 to monitor 5 sites in watershed 12 times out of the year
- Match = $1,840 for 319(h)
- How much to install BMPs? Up to $100,000
- Team up with NRCS to use their BMPs and cost figures
- NRCS is limited to agricultural BMP

- Sediment in water, biota issues at Hwy 103
- Investigation by EPD to determine biota counts, if counts are too low then creek will be listed for impairment due to sedimentation
- Timber operations follow SMZ (Stream Management Zone)
- Samples need to be collected on same day or 48 hours after a rain event
- Will County spend money to improve Mountain Oak Creek if pollution is caused by wildlife
- Donation of people time and travel as in-kind match
- Donation of RVRC materials and incubator
- County will let Lance know if they wish to apply for a 319(h) grant

Meeting was adjourned at 7:00 pm.

APPENDIX G. TARGETED MONITORING METHODS AND RESULTS

Materials and Methods

On August 24, 2010, samples of approximately 500ml were collected from the five locations of the Mountain Oak Creek watershed as indicated on Figure 1. Water samples at Site #1 were taken downstream from Callaway Gardens on Mountain Creek (32.801297° N, 84.921677° W). Samples at Site #2 were not taken due to inaccessibility to the property. Samples at Site #3 were taken just west of Piedmont Lake (32.799493° N, 85.005272° W) to determine if contamination is coming from the residential homes around the lake. Samples at Site #4 were taken after Mountain Oak Creek and Mountain Creek merge near Highway 219 (32.796174° N, 85.024451° W). Samples at Site #5 were taken where Mountain Oak Creek crosses Highway 103 (32.741111° N, 85.068889° W). Samples at Site #6 were taken toward the end of Mountain Oak Creek near Lick Skillet Road (32.727256° N, 85.091315° W) to determine if any contamination has entered after Highway 103.

The samples were collected in sterile screw-cap plastic bottles and placed on ice for transport to the lab, and processed within 6 hours. Three subsamples of 0.01, 0.1 and 1.0ml from each site were transferred aseptically to sterile screw-cap tubes containing 10ml of sterile water. The tubes were mixed by inversion three times and the contents were filtered by aspiration through sterile 0.45m filters (Fisher Scientific, Pittsburgh, PA). The filters were removed from the filter apparatus with sterile forceps and placed into sterile 47mm Petri plates (Fisher Scientific, Pittsburg, PA) containing a pad which was soaked the contents of one ampoule of m-FC/Rosolic acid broth medium (Hach Co., Loveland, CO). The plated samples were incubated 24hr at 44.5 ± 0.2ºC in a closed plastic container in a dry air incubator. Temperature was monitored with a 4137 Traceable® Double Thermometer and recorded and saved to a desktop computer at five minute intervals using the Computer Data Acquisition System (Control CO., Friendswood, TX). After incubation, the plates were removed and the purple colonies that indicate fecal coliform bacteria were counted.

Results and Discussion

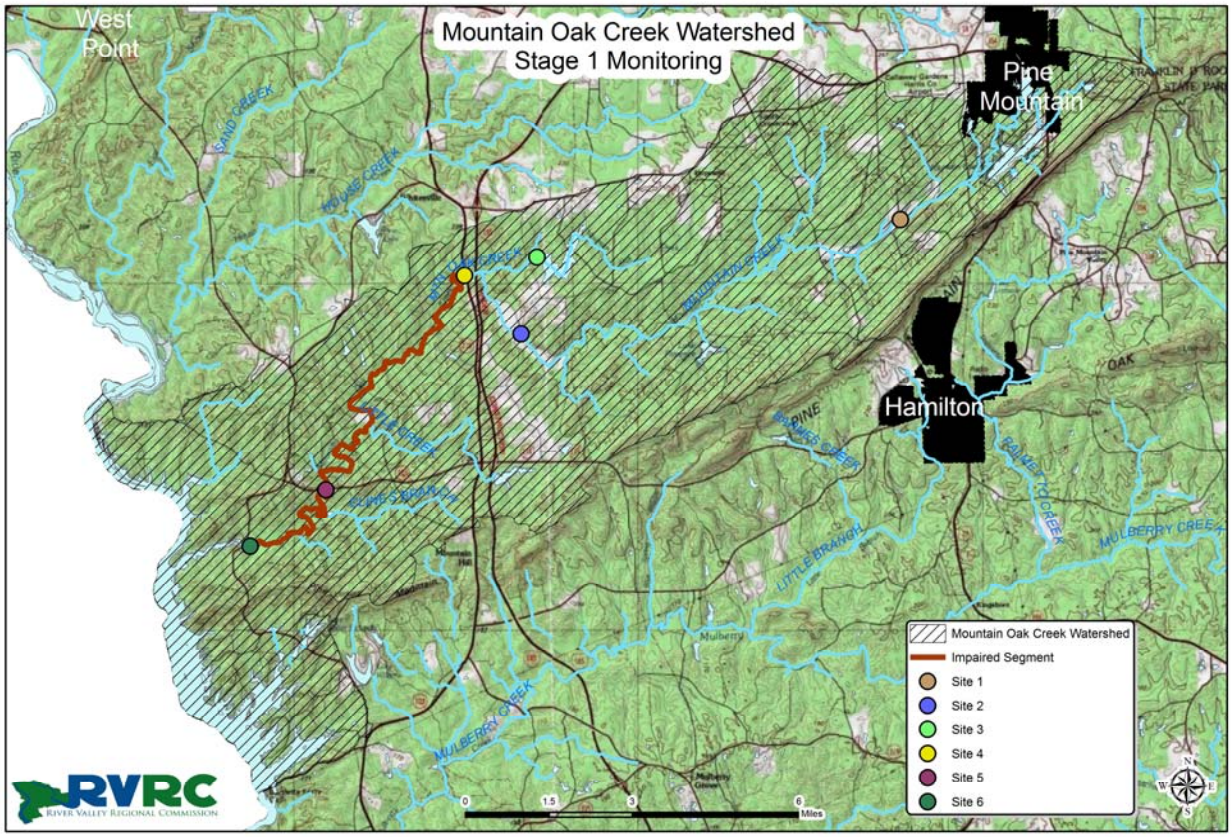
Numbers of fecal coliform bacteria recorded in each sample are presented in Table 1.

Table 1. Numbers of fecal coliform colonies in water samples from various locations of the Mountain Oak Creek watershed.

		Sample volume		
Site	Replicate	0.01ml	0.1ml	1.0ml
1	1	0	0	2
	2	0	0	0
	3	0	1	3
3	1	0	0	0
	2	0	0	0
	3	0	0	0
4	1	0	0	3
	2	0	0	0
	3	0	0	2
	1	0	0	2

	3	0	0	1
6	1	0	0	0
	2	0	0	0
	3	0	0	0

Figure 1. Mountain Oak Creek Watershed Monitoring Sites. Site #2 was omitted due to inaccessibility to the property.



Only filters between 20 and 60 colonies are considered countable. Though the sample volumes used were those recommended for farm ponds and rivers in Table 9222: III of Standard Methods for the Examination of Water and Wastewater, they failed to produce countable plates for any of the samples tested.

Using the results for the 1ml samples are used to calculate a geometric mean of total fecal coliform numbers according to section 9222B.6 of Standard Methods for the Examination of Water and Wastewater, the results are 167 coliform bacteria/100ml for sites 1 and 4, 67 coliforms/100ml at site 5, and no detectable coliforms at sites3 and 6.

It must be stressed that these numbers are unreliable because the plates contained fewer that 20 purple colonies, however these results indicate that the samples are at or below the acceptable TMDL level. In the future, it is necessary to test 10 and 100ml samples, while the 0.01ml sample could be eliminated.

TARGETED MONITORING – AUGUST 24, 2010


Mountain Creek near Callaway Gardens


Mountain Oak Creek and Lake Piedmont


Dr. Davis from Columbus State University analyzing samples of fecal coliform

APPENDIX H. SQAP AND EPD MONITORING RESULTS

Table 1. Mountain Oak Creek fecal coliform water samples for 2010. Samples were taken at trend station – EPD #12201901 (coordinates: 32.741111° N, 85.068889° W) – upstream from the GA Hwy 103 crossing.

Sample Date	Fecal Coliform		E. Coli	
	Abundance (cfu/100mL)	Geometric Mean (cfu/100mL)	Abundance (cfu/100mL)	Geometric Mean (cfu/100mL)
1/8/2010	90	71.79699461	90	71.79699461
1/15/2010	27		27	
1/22/2010	243		243	
1/29/2010	45		45	
3/5/2010	117	94.52513574	117	94.52513574
3/12/2010	117		117	
3/19/2010	54		54	
3/26/2010	108		108	
6/4/2010	162	153.6427429	162	130.3039325
6/11/2010	117		117	
6/18/2010	140		130	
6/25/2010	210		117	
9/3/2010	280	264.5751311	280	264.5751311
9/10/2010	250		250	
9/17/2010	see September results section in Table 2			
9/24/2010	see September results section in Table 2			

Water quality samples collected within a thirty (30) day period that have a geometric mean in excess of 200 counts per 100 milliliters during the period May through October, or in excess of 1,000 counts per 100 milliliters during the period November through April, are in violation of the bacteria water quality standard. A violation is indicated if "any single sample exceeds 4,000 counts per 100 milliliters during the period of November through April.

Table 2. Mountain Oak Creek fecal coliform water samples for September 2010.

Date of Sample	Site Number	Site Location	Estimated Water Depth	Concentration of FC (# colonies/100mL)
9/17/2010	1	approximately 35 yards up stream of bridge in pool area just before riffle area	2 ft +, can not see the bottom	99
9/17/2010	2	approximately 20 yards up stream of bridge in 2 ft diameter pool area surrounded by riffle area	0.5 ft	250
9/17/2010	3	approximately 10 yards up stream of bridge in pool area just before riffle area	2 ft	99
9/17/2010	4	approximately 20 yards down stream of bridge in pool area just after ripple area	2 ft	290

9/24/2010	1	approximately 35 yards up stream of bridge in pool area just before riffle area	2 ft +, can not see the bottom	620
9/24/2010	2	approximately 20 yards up stream of bridge in 2 ft diameter pool area surrounded by riffle area	0.5 ft	364
9/24/2010	3	approximately 10 yards up stream of bridge in pool are just before riffle area	2 ft	171
9/24/2010	4	approximately 20 yards down stream of bridge in pool area just after ripple area	2 ft	210

During the month of September 2010, the Mountain Oak Creek watershed experienced very little precipitation. As a result, the water level for Mountain Oak Creek was very low, which may have contributed to higher counts of fecal coliform. After high counts were confirmed on September 3 and 10, three additional sample sites were chosen in order to investigate the stream segment more thoroughly. Figure 1 shows sample locations and Table 2 shows the results for each site. Figure 2 provides the results obtained by EPD.

Figure 1. Mt. Oak Cr. near Hwy 103 and 4 sample locations taken on Sept. 17 and 24 of 2010.

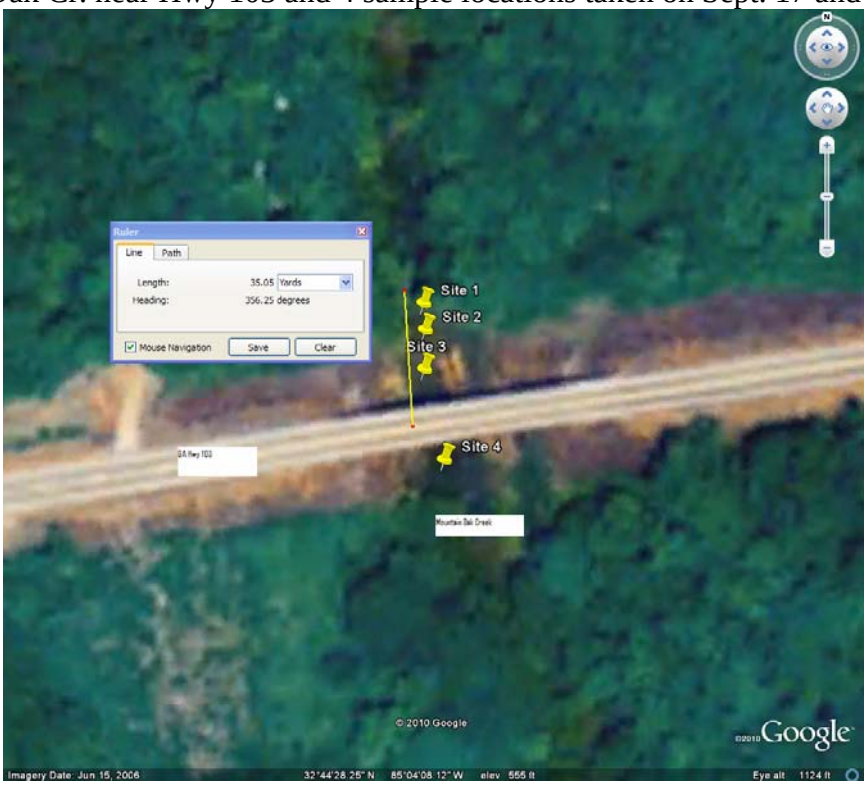
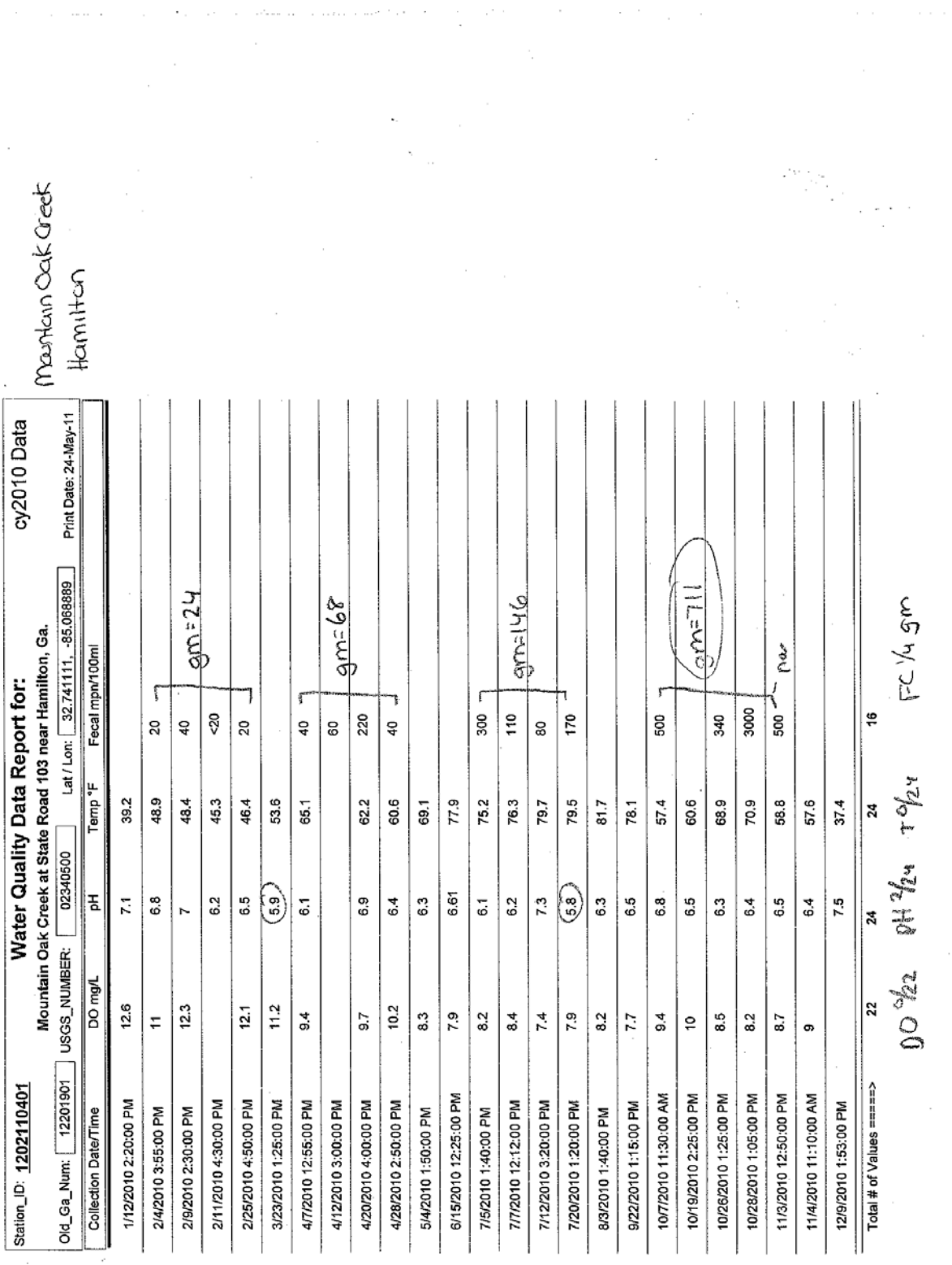


Figure 2. Mountain Oak Creek fecal coliform water samples from Georgia Environmental Protection Division.



Station_ID: **1202110401** **Water Quality Data Report for:** cy2010 Data

Mountain Oak Creek at State Road 103 near Hamilton, Ga.

Old_Ga_Num: 12201901 USGS_NUMBER: 02340500 Lat / Lon: 32.741111, -85.068889 Print Date: 24-May-11

Mountain Oak Creek
Hamilton

Collection Date/Time	DO mg/L	pH	Temp °F	Fecal mpn/100ml	
1/12/2010 2:20:00 PM	12.6	7.1	39.2		
2/4/2010 3:55:00 PM	11	6.8	48.9	20	
2/9/2010 2:30:00 PM	12.3	7	48.4	40	gm=24
2/11/2010 4:30:00 PM		6.2	45.3	<20	
2/25/2010 4:50:00 PM	12.1	6.5	46.4	20	
3/23/2010 1:25:00 PM	11.2	5.9	53.6		
4/7/2010 12:55:00 PM	9.4	6.1	65.1	40	
4/12/2010 3:00:00 PM				60	gm=68
4/20/2010 4:00:00 PM	9.7	6.9	62.2	220	
4/28/2010 2:50:00 PM	10.2	6.4	60.6	40	
5/4/2010 1:50:00 PM	8.3	6.3	69.1		
6/15/2010 12:25:00 PM	7.9	6.61	77.9		
7/5/2010 1:40:00 PM	8.2	6.1	75.2	300	
7/7/2010 12:12:00 PM	8.4	6.2	76.3	110	gm=146
7/12/2010 3:20:00 PM	7.4	7.3	79.7	80	
7/20/2010 1:20:00 PM	7.9	5.8	79.5	170	
8/3/2010 1:40:00 PM	8.2	6.3	81.7		
9/22/2010 1:15:00 PM	7.7	6.5	78.1		
10/7/2010 11:30:00 AM	9.4	6.8	57.4	500	
10/19/2010 2:25:00 PM	10	6.5	60.6		gm=711
10/26/2010 1:25:00 PM	8.5	6.3	68.9	340	
10/28/2010 1:05:00 PM	8.2	6.4	70.9	3000	
11/3/2010 12:50:00 PM	8.7	6.5	58.8	500	no
11/4/2010 11:10:00 AM	9	6.4	57.6		
12/9/2010 1:53:00 PM		7.5	37.4		
Total # of Values =====>	22	24	24	16	

DO 9/22 pH 7/24 T 9/24 FC 1/4 gm

APPENDIX I. FORMS

Field Notes Form

Stream and Site Number	Present Weather Conditions (circle the condition)	Air Temp °C	Water Temp °C	Date	Time	Previous 48 hour rainfall	Amount of Rainfall (see note 1)	Conductivity
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		
	overcast partly cloudy clear/sunny					Y N		

Note 1: Amount of rainfall for last 24 hours can be found at:
http://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx.

Adopt-A-Stream *E. coli* data form

Sampling Date:

Stream:

Site	Air Temp	Water Temp	1	2	3	Total # Colonies	CFU/ 100ml	Conductivity	Date	Time	Weather Conditions	Previous 48 hour rainfall	Amount of rainfall
1						0	0						
2						0	0						
3						0	0						
4						0	0						
5						0	0						
6						0	0						
Blank						0	0	na					
		TIME IN		TIME OUT									
INCUBATOR													
INCUBATOR TEMP													