Coahulla Creek Watershed Management Plan

A local stakeholder and Georgia EPD approved plan that outlines the framework for improving water quality in Coahulla Creek and its tributaries

December, 2013

Acknowledgements

Limestone Valley Resource Conservation and Development Council, Inc., would like to express its appreciation to the many organizations and individuals that assisted with the research and compilation of information presented in this plan. First and foremost, Limestone Valley wishes to thank the Environmental Protection Agency and the Georgia Environmental Protection Division for funding the preparation of this document. Additionally, the council would like to thank the many individuals associated with the Natural Resources Conservation Service and Dalton Utilities that contributed many hours by providing resource information and guidance. Other organizations that contributed to this plan include the City of Cohutta, City of Dalton, City of Varnell, Conasauga River Alliance, Dalton State College, Georgia Department of Natural Resources, Georgia Soil and Water Conservation Commission, The Nature Conservancy, Prater's Mill Foundation, University of Georgia Cooperative Extension, Whitfield County Commission, Whitfield County Environmental Health Department, and Whitfield Soil and Water Conservation District. It is the hope of Limestone Valley RC & D that the information presented here, as well as the cooperative partnerships formed during this process, will work to improve the water quality in the Coahulla Creek Watershed in Georgia.

Prepared by:
Limestone Valley RC & D Council
Daniel Huser
Joshua Smith
105 Laurel Creek Road
Suite 6
Calhoun, GA 30701

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Contents

Executive Summary

Several stream segments within the Coahulla Creek Watershed fail to meet criteria set by the State of Georgia for pathogens and biotic integrity, which respectively tend to be impairments that stem from excessive fecal contamination and sediment loading. Due to these impairments, load reductions of these nonpoint source pollutants are necessary in many areas within the watershed. The need for a further effort to identify consistent sources of these pollutants and work towards addressing the load reductions led to the creation of this Watershed Management Plan. The plan includes the Nine Elements as recommended by the Environmental Protection Agency, and outlines a process for implementing the load reductions necessary for watershed restoration. Development of the plan also featured a stakeholder-driven process to build momentum and partnerships with the local community that could assist in its implementation. The plan has been written by Limestone Valley Resource Conservation and Development Council as a deliverable associated with a Environmental Protection Agency Clean Water Act (§319) grant administered by the State of Georgia.

This Watershed Management Plan recommends a multi-faceted Coahulla Creek Watershed Restoration Program in order to focus on load reductions of fecal coliform bacteria and sediment from agricultural, residential, and urban sources. The idea was conceptualized in an effort to play on the strengths of the various project partners, and could complement existing conservation programs (e.g., Environmental Quality Incentives Program, Dalton Utilities Stormwater Program). Smaller projects, however, could be devised that address individual components of the recommended program should an organization seek funding. As part of the recommended program, agricultural lands were identified for targeting load reductions through cost-shares with landowners for the installation of Best Management Practices. The agricultural practices implemented will vary according to the interests of the farmers, but will likely include heavy use area protection, streambank stabilization, stream access control for cattle coupled with alternative watering systems, and stream buffer enhancement. Natural Resource Conservation Service will be a key contributor to the success of this program component. Residential lands could also be targeted to reduce the contributions of fecal coliform bacteria from human sources by addressing septic system issues. This will include cost-shares on septic system repairs focused near streams and intermittent conveyances, and elsewhere in the watershed to build further momentum. For this program component, it is anticipated that North Georgia Health District will play a key role. Additional "on-the-ground" conservation could likely to be achieved through the implementation of stormwater practices such as streambank stabilization in urban areas. Depending on location, these practices may be implemented in collaboration with Dalton Utilities.

In addition to actual "on-the-ground" projects, this document outlines outreach activities for volunteers that were identified by the stakeholder group as having the potential to contribute toward the reduction of pollutant loads and/or further educate the community about watersheds and the importance of water quality, as well as soil and water conservation. The success of outreach and education efforts will be maximized through effective partnerships with several groups. This Watershed Management Plan recommends that these educational and "on-the-ground" management measures be implemented collectively across several grants, with each grant also involving monitoring to reevaluate watershed conditions.

As part of the development process for this watershed management plan, estimates were prepared to consider the time and funding from 319 sources likely needed to accomplish restoration goals. These estimates were based on the assumption that the recommended multi-faceted watershed restoration effort would be pursued, as opposed to a piecemeal approach. Other sources of funding (mainly anticipated in the form of in-kind donations from stakeholders, agencies, and non-governmental organizations) were not estimated, but were assumed to contribute significantly to the program. In order to come up with a financial estimate, the extent of work within the watershed needed for complete watershed treatment was first conceptualized using Geographic Information Systems analysis and inspection of aerial photography. Next, the extent of the total watershed treatment that would likely be necessary to result in the de-listing of the majority of impaired stream segments was estimated. Finally, the stakeholder recommended projects that these funds would finance were arranged in an implementation schedule that spans several years (including grant proposal submission periods). The proposed implementation schedule includes all grant activities including water quality monitoring, education and outreach activities, and conservation activities (e.g., agricultural Best Management Practices, septic system repairs, streambank stabilization, etc). Each of these activities were assumed to continue through each grant implementation period. The stakeholders recommended four consecutive grant implementation periods to be pursued, with the belief that it may allow for significant improvements within the watershed. After this period of time, it is expected that some impaired stream reaches will have been de-listed and others will at least be improved and approaching compliance with state criteria. Success in this endeavor would depend on a number of variables, and priorities will be evaluated and altered throughout the multiple year periods to maximize results.

1. Plan Preparation and Implementation

The following section will serve as an overview of the purpose of the Watershed Management Plan, the objectives it aims to accomplish, some of the details of the plan development and stakeholder process, and ultimately how the plan will be implemented.

This Watershed Management Plan (WMP) has been developed to outline a feasible prescription and timeline on which to implement the restoration of the Coahulla Creek Watershed. The document is not regulatory in nature, but should serve as guidance for implementation efforts. The preparation process calls on stakeholders to come together in recognizing the sources of impairing pollutants and provide feedback on how to ameliorate them, as well as assist in building momentum and contributing to the restoration process whenever possible. The ultimate goals of the planning and restoration process are for impaired segments to eventually be and remain de-listed and for the integrity of other segments to be maintained so that they continue to meet the criteria for each designated use. Ultimately, a broader goal is to make stakeholders and landowners in the watershed more knowledgeable concerning watershed issues and how to go about managing the landscape to minimize water and soil resource concerns.

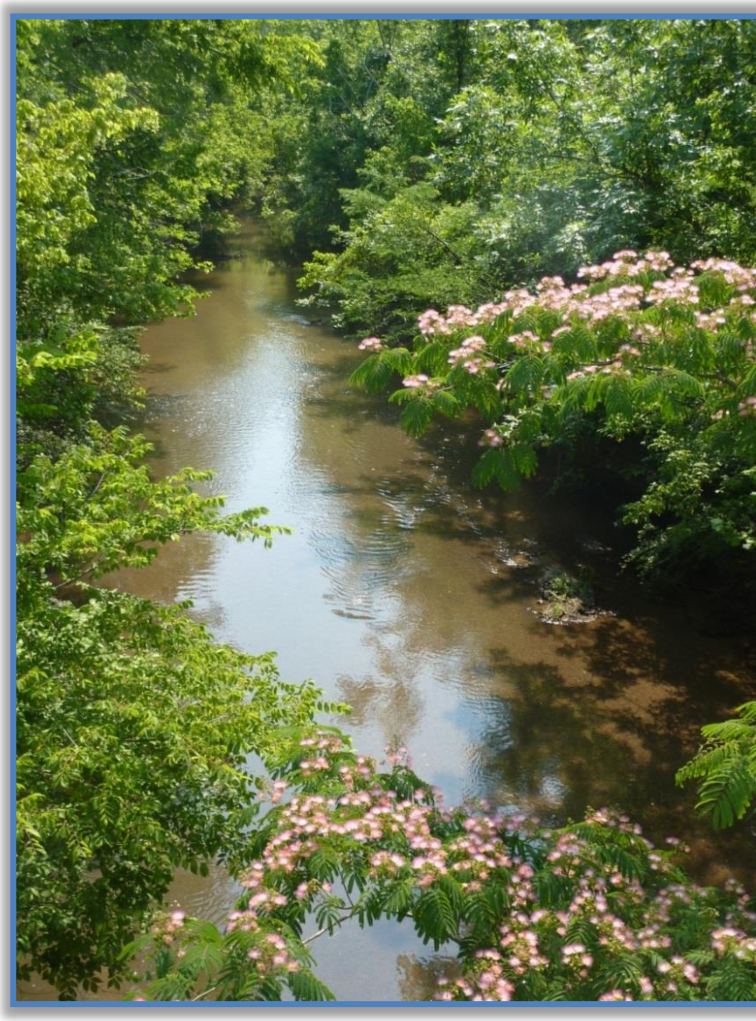


Figure 1.1.a. Coahulla Creek from a road crossing in the upper watershed in Georgia in spring 2012.

The development of this WMP coincides with a state-wide effort by Georgia Environmental Protection Division (EPD) to update Total Maximum Daily Load (TMDL) Implementation Plans to include the nine elements (listed below) as recommended by the U.S. Environmental Protection Agency (EPA). The nine elements are a recommended addition to these documents to help ensure stakeholder involvement and approval lead to an explicit prescription to eventually meet watershed restoration objectives. Specifically, the nine elements are as follows:

1. An identification of the sources or groups of similar sources contributing to nonpoint source (NPS) pollution to be controlled to implement load allocations or achieve water quality standards.

2. An estimate of the load reductions needed to de-list impaired stream segments;

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;

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

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

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

7. A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

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; and;

9. A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item (8) above.

Limestone Valley Resource Conservation and Development (RC&D) Council has developed this WMP to include each of the nine elements as part of an EPA Clean Water Act (§319) grant administered by Georgia Environmental Protection Division. The document is meant to be a more extensive update of previous TMDL Implementation Plans for the Coahulla Creek Watershed in Georgia. In addition, several EPA Clean Water Act (§319) grants have already been implemented by Limestone Valley RC&D in the Conasauga Watershed in Georgia, which includes the entirety of the Coahulla Creek Watershed. Success had been achieved with regard to participation in programs and the development of excellent partnerships. However, likely due to the size of the implementation area of the Conasauga Watershed (approximately 400,000 acres), water quality improvements have not yet been sufficient to result in the de-listing of impaired segments. A more finite focus in the smaller Coahulla Creek Watershed may allow for more expedient improvements, while capitalizing on well-established relationships in the area. Developing the WMP on the front end of such an effort will allow us to reassess the successes and failures of previous efforts in a constructive way to improve upon the strengths and make changes in strategies that may have been weaknesses in previous restoration efforts.

This WMP, in comparison to the TMDL Implementation Plans, is intended to focus more effort on specific watershed details, as well as offer a more comprehensive Geographic Information Systems analysis that investigates several factors that exert an influence on non-point source (NPS) pollutant loads. More focus on these details should lead to a greater understanding of the local physical and social environment and help ensure greater success. Compiling more extensive data should help us better define priorities in the watershed for targeting Best Management Practice (BMP) installations, allow for better long-term land use and riparian comparisons, and assist in the development of more discreet objectives and milestones.

The process used to construct this document was fairly complex and utilized extensive research on the watershed, including water quality monitoring and GIS analysis. Data regarding water quality, fish assemblages, geology, soils, and land use were considered when conducting research on the watershed. However, we have included only data sets and summaries of the parameters most relevant to the purpose of the WMP. The GIS component focused on analyzing riparian buffers, land use percentages, and housing densities. GIS and water quality monitoring are also tools to identify broad areas of likely NPS pollution sources and priority areas for installation of BMPs.

A Watershed Advisory Committee (Table 1.1.a.), consisting of members of local, state, and Federal government, local utilities and universities, nonprofit groups, and the private sector, also contributed to the development of the plan. Most members were invited to take part in the process due to their professional expertise and interest in relevant disciplines and familiarity with previous stakeholder efforts regarding water quality concerns and restoration efforts. Local governments were also made aware of this stakeholder process and given the opportunity to participate on the committee.

Table 1.1.a. Watershed Advisory Committee members that participated in the Coahulla Creek Watershed Management Plan development process.

Name	Position	Main Affiliation
Ty Ross	City Administrator	City of Dalton
Jason Hall	City Administrator	City of Varnell
Nathan Vance	President	Conasauga River Alliance
Gretchen Lugthart	Instructor of Environmental Studies	Dalton State College
John Lugthart	Professor of Biology	Dalton State College
Dena Haverland	Manager of Regulatory Complince	Dalton Utilities
Bill Phillips	Senior Partner and Chief Ecologist	Envision Ecology
Larry Carter	Junior Partner and Ecologist	Envision Ecology
John Loughridge	Regional Representative	Georgia Soil and Water Conservation Commission
Doug Cabe	Former Coordinator	Limestone Valley RC&D Council
Wes Fogle	SWCD Supervisor	Limestone Valley Soil and Water Conservation District
Cindy Askew	District Conservationist	Natural Resource Conservation Service
Nick Mooneyham	Soil Conservationist	Natural Resource Conservation Service
Bill Henderson	Soil Conservation Technician	Natural Resource Conservation Service
Judy Alderman	Executive Director	Prater's Mill Foundation
Katie Owens	Upper Coosa River Program Director	The Nature Conservancy
Brenda Jackson	UGA Extension Agent	University of Georgia Cooperative Extension
Mark Gibson	Administrator	Whitfield County
Mike Babb	Chairman	Whitfield County Commission
Chad Mulkey	Environmental Health County Manager	Whitfield County Environmental Health Department

A series of public meetings (conducted in 2013) were held with the Watershed Advisory Committee to engage the public in the process of providing input for an implementation plan. All members were informed of what was expected of them throughout the process, and asked if they had resources that they could contribute to the WMP development and/or restoration process. A few stakeholders were consulted more regularly due to their expertise and willingness to provide additional support in the process of developing the plan. It was also anticipated that some stakeholders may become project partners and contribute significantly in the restoration process. Meetings focused on gathering input about potential problems and solutions, discussing sampling data, developing priorities, evaluating what BMPs may be received locally with the best public reception, and obtaining insight on the WMP document itself. Finally, approval was sought for the document to serve as the plan on which implementation efforts follow to restore and maintain the watershed.

As described in this WMP, plan implementation could focus to improve the watershed through several specific project components. These include reducing NPS pollution from agricultural lands and residential properties, as well as more urbanized areas in the watershed. Also outlined in the WMP are potential volunteer events that will be focused on watershed improvements and educating the public about NPS pollution and watershed processes. More focus on agricultural and stormwater practices (in the more urbanized Dalton area) appears necessary in the restoration process as past 319 efforts in the watershed have focused largely on septic repairs and education. Stakeholder assistance in some aspects of the restoration effort will be a key factor in success. Plan implementation should occur with respect to private property rights and rely on voluntary conservation, which involves participation from landowners in cost-shares to put in practices that reduce NPS pollution on/from their properties. Most practices are mutually beneficial to the landowner and water quality, which helps incentivize participation further. Although management of individual parcels is key to watershed restoration, discussions regarding individual parcels have been avoided herein so as not to discourage participation, which could occur if directed criticisms over the management of specific private lands were included. Instead, the general NPS issues associated with specific land uses which predominate within the watershed are discussed, and the proposed project components are meant to address a number of NPS pollutant sources that occur on the landscape.

Successful implementation that includes accomplishing all the objectives of the plan through the voluntary conservation approach could be a difficult endeavor. However, by building momentum through a phased approach, and developing relationships in the community, the process could cumulatively achieve significant NPS pollution reduction. To increase the chance of successful watershed restoration, a reassessment of the plan is scheduled every five years. This iterative process will allow for adaptive management where citizens and stakeholders can analyze project successes and failures, and provide opportunities for changes in restoration priorities.

2. Coahulla Creek Watershed Description

For making effective watershed planning decisions extensive knowledge regarding the watershed is paramount. This section will focus on providing an extensive background to the watershed as it relates to the development of a WMP for the Coahulla Creek Watershed in Georgia. The section is organized into three parts. First, a description of landscape features is given that includes the local watershed geography, geology, and the relevant climate, precipitation, and hydrology in the area. The second part focuses on the local forests, wildlife, and fishes. The last describes anthropogenic features in the watershed (e.g., political boundaries, community water resources, etc.). Much of the following information regarding the Coahulla Creek Watershed was written with the assistance of the historical TMDL Implementation Plans and the Soil Survey of Murray and Whitfield Counties, Georgia. Additional sources are referenced within the text.

2.1 Landscape Features

Watershed Geography

The Coahulla Creek Watershed originates in Bradley County, Tennessee, just south of the City of Cleveland, where it drains more than 40,000 acres of mostly rural lands prior to crossing the state-line into Georgia. Extending southward, the watershed then drains approximately 71,000 acres in Northwest Georgia prior to its confluence with the Conasauga River. Altogether the Coahulla Creek Watershed drains approximately 113,000 acres, which by drainage area classifies it as a "HUC 10" watershed (specifically Hydrologic Unit Code #0315010103; Figure 2.1.a). In the Georgia portion, according to previous TMDL Implementation Plans, significant agricultural activity (45.8% when including forests) occurs throughout the middle and upper watershed, and moderate levels of development are present on the landscape overall (25.3% single family residential). Much of this development is concentrated in the lower portion of the watershed in the area surrounding the City of Dalton. Although the Coahulla Creek Watershed also drains a small portion of Walker County, the majority of the watershed in Georgia lies within Whitfield County.

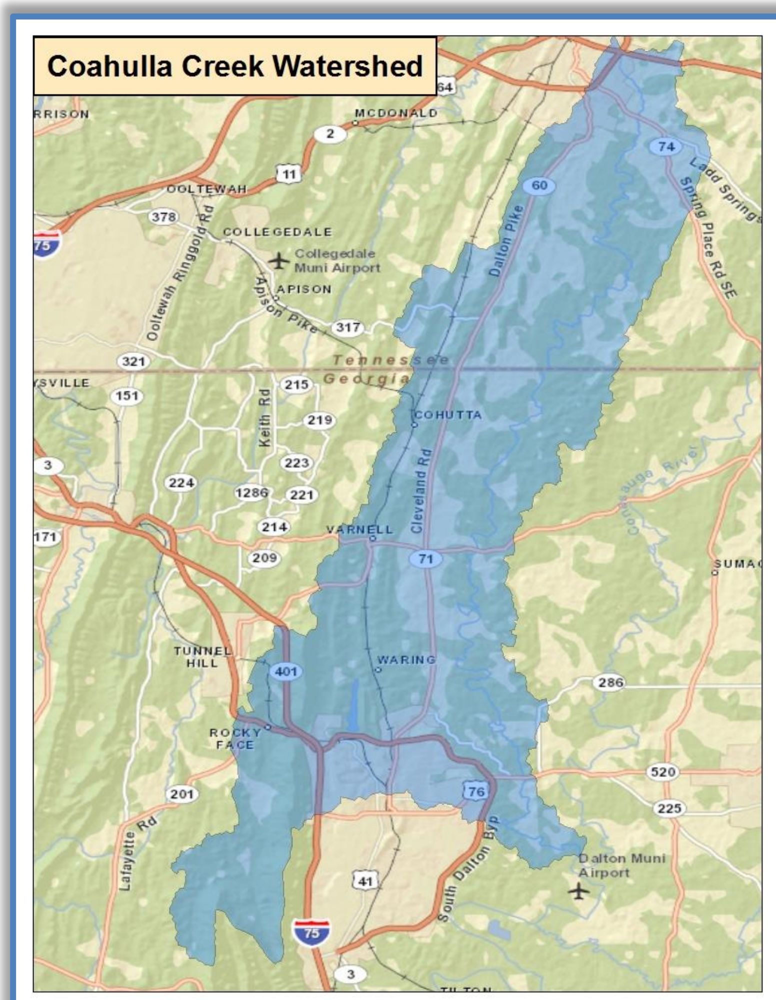


Figure 2.1.a. The Coahulla Creek Watershed (HUC #0315010103).

The long, narrow southward-trending nature of the northern portion of the watershed in Georgia is dominated by the sinuous mainstem of Coahulla Creek. Much of the land in this northern portion of the watershed is utilized for agriculture. Most tributaries are small and originate on the ridges that make up the Tennessee Valley Divide and enter Coahulla Creek from the West. Not far to the East throughout the watershed in Georgia is the Conasauga River.

One major tributary exists in the watershed, Mill Creek, which originates in the Southwest portion of the watershed in Walker County, west of Rocky Face Mountain. The headwaters of Mill Creek are more dominated by forest than much of the remainder of the Coahulla Creek Watershed. However, Mill Creek eventually drains much of the more urbanized Dalton area. Mill Creek altogether drains approximately 33,000 acres and enters Coahulla Creek just east of Dalton. Five miles downstream of the confluence with Mill Creek, Coahulla Creek enters the Conasauga River.

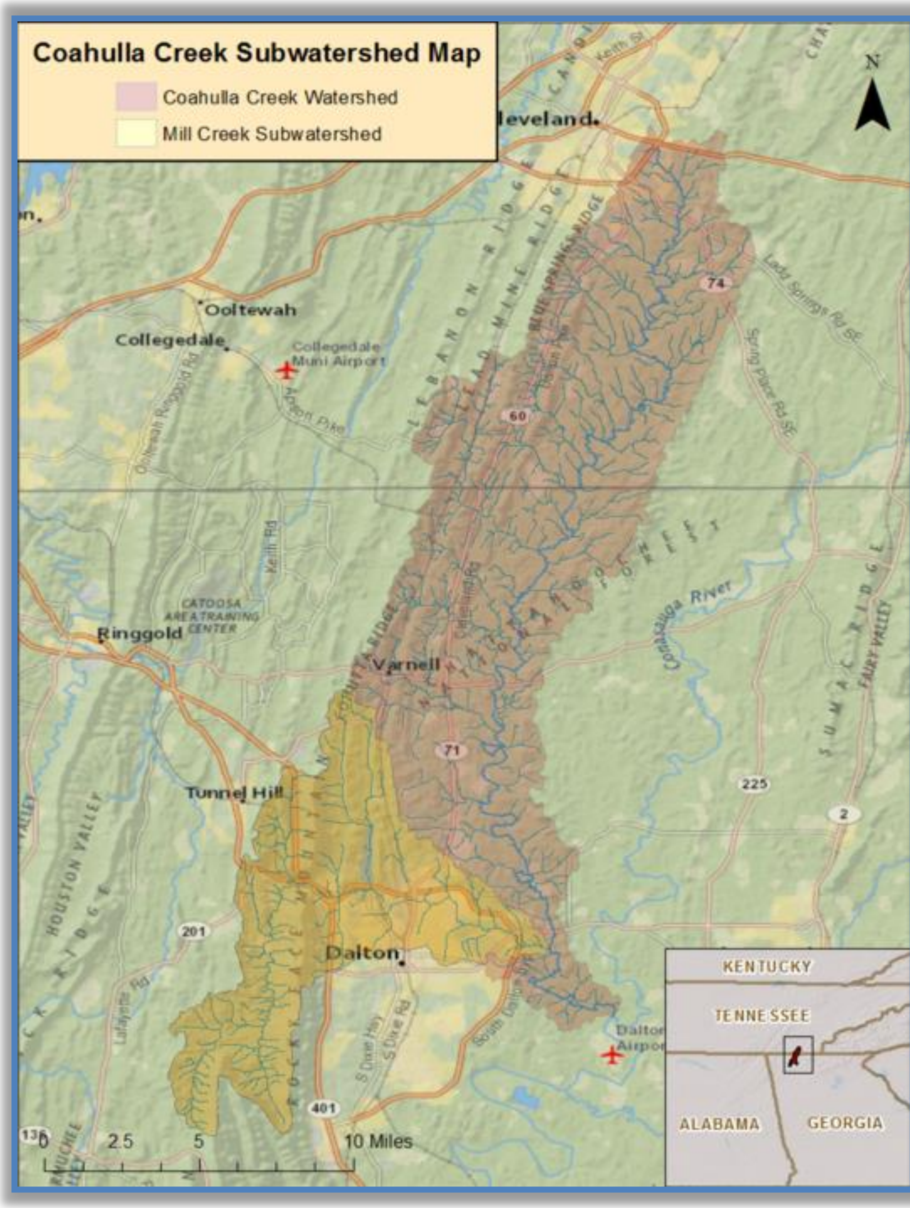


Figure 2.1.b. The Coahulla Creek Watershed and the Mill Creek Subwatershed contained within its boundaries.

Other less significant tributaries that contribute to Coahulla Creek in Georgia include Mills Creek (which drains parts of Georgia and Tennessee), Wildcat Creek, Little Creek, and Kenyon Creek. Mill Creek has three significant tributaries known as North Fork Mill Creek, McClellan Creek, and Haig Mill Creek.

Watershed Geology and Soils

The geology and soils of the Coahulla Creek Watershed are relevant to restoration efforts, and thus were considered during the formation of this WMP. These landscape characteristics are often a predominant factor in determining the areas utilized for agricultural production, forestry practices, and residential developments, as well as the underlying reason that certain areas in the watershed (e.g., ridges and escarpments) have been left relatively undeveloped. Soils are used to determine the suitability of an area for crops and septic systems. Residential areas with less suitable soils for septic systems tend to have higher failure rates, which can contribute to fecal coliform loading into streams and other water bodies. Soils also can be used can elucidate the areas that may be more susceptible to erosion and sediment loading to streams.

Figure 2.1.c. Much of Coahulla Creek's substrate is limestone rock.

The Coahulla Creek Watershed is located within the Ridge and Valley Ecoregion. Rocks in this physiographic province range from early Cambrian to Mississippian age. Northward-trending valleys separated by low, rounded ridges and high, steep-sided ridges dominate the landscape. The ridges tend to be composed of chert and capped sandstone, while the valleys are most often limestone or shale. The most common underlying rocks are shale, slate, dolomite, limestone, and sandstone. The faulting and cracking of dolomite and limestone (karst) topography in the mountain building process has led to sinkholes and springs in the region.

In the Coahulla Creek Watershed, the most significant topographic feature is a long, narrow ridge called Rocky Face Mountain, which reaches approximately 1,600 feet in elevation at its highest point. The Tennessee Valley Divide is less prominent, only occasionally reaching around 1,000 feet, but serves as the western border for the watershed. In comparison, the eastern watershed border appears to frequently be around only 800 feet in elevation, often not more than 100 feet in elevation more than Coahulla Creek. Coahulla Creek eventually enters the Conasauga River at approximately 660 feet above sea level.

Important geologic formations in the watershed are the Red Mountain Formation, the Bays Formation, and Conasauga Formation. The Red Mountain Formation is the dominant formation of Rocky Face Mountain in the watershed. This formation is comprised mainly of sandstone and shale with small amounts of fossil iron ore and limestone. The Bays Formation is the main formation in Mill Creek Valley, west of Dalton, and under much of downtown Dalton. The red and yellow soils of this formation are derived from weathered sandstone, siltstone, quartzite, and minor conglomerate. The Conasauga Formation is also extensive throughout much of Whitfield County east of Dalton. This formation is made up of alternating units of shale and limestone at various thicknesses.

Soils within the Coahulla Creek Watershed are described in detail in the Soil Survey of Whitfield and Murray Counties, Georgia. Soils along the Red Mountain Formation often have extensive gravel and can range from very deep to shallow on ridges and steeper slopes. These soils are often characterized as stony soils or stony surface soils (e.g., Tidings, Allen, Enders, Hector, etc.). Soils derived from the Bays Formation are red and yellow and include Enders, Nauvoo, and Panama. Soils from the Conasauga Formation, where limestone and shale are the dominant bedrock, are often Conasauga, Docena, Montevallo, and Townley.

Thicker, more fertile soils typically form in the valleys from the weathering of parent material and erosion of soil at higher elevations as well as alluvial deposition processes. Along the Coahulla Creek corridor, the prevalence of loamy soils that have been deposited over time has resulted in characterization of much of the area in close proximity to the floodplain as prime farmland or farmland of statewide agricultural importance. Prime farmland is land with soils that produce the highest crop yields with minimal energy expenditure, economic resources, and environmental damage. Additional farmland of statewide importance is important for agriculture in the county, yet is less productive, more difficult to cultivate, seasonally wet, and more erodible.

Climate/Precipitation

The climate of Whitfield County, where the vast majority of the Coahulla Creek Watershed in Georgia is located, has been characterized by cool winters and hot summers with a relatively lengthy growing season. According to the Soil Survey for Murray and Whitfield Counties, Georgia, the average and maximum temperatures per day for the summer season are relatively warm (77.1º and 87.9º, respectively), and the sun shines much of the daylight hours (approximately 64% of the time). The winter is less sunny (44% of the daylight hours), and the average and minimum temperatures per day are relative cool (41.8º and 31.5º, respectively).

Precipitation is generally plentiful in the area and is spread somewhat evenly throughout the seasons. Winter and Spring, however, tend to be the wettest seasons of the year, and more precipitation in these seasons results in a higher water table. Annual precipitation averages approximately 56 inches, yet snow is rare, averaging about 2 inches per season. Most precipitation has been recorded by US Geological Survey (USGS) at a stream gage site on Coahulla Creek near Dalton, Georgia, since October of 2007. These more recent precipitation data from within the Coahulla Creek Watershed are displayed below in Figure 2.1.b.

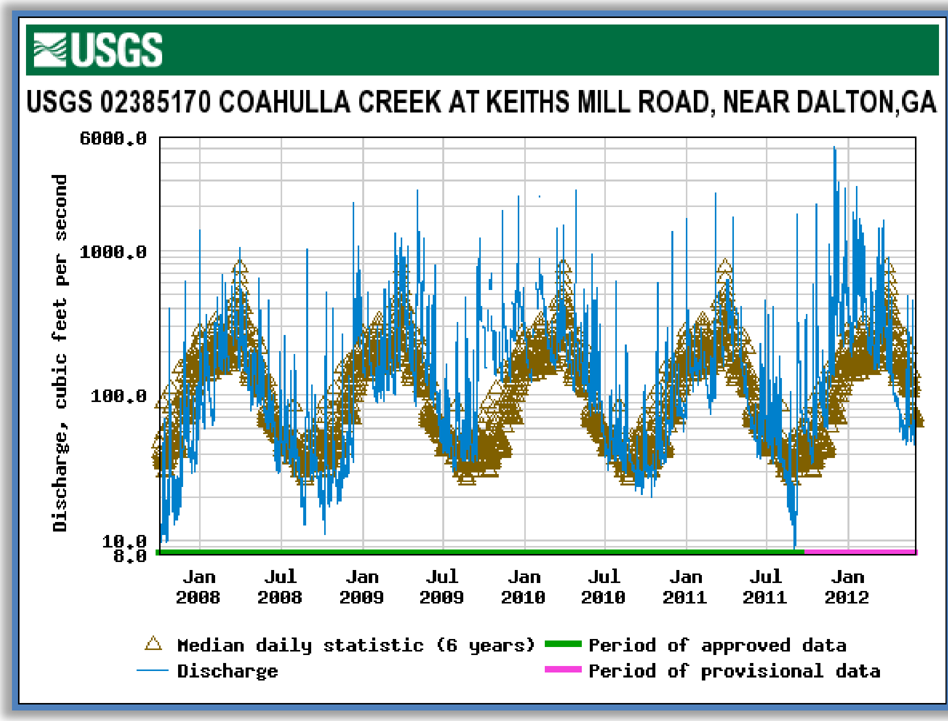


Figure 2.1.d. Precipitation data (in inches) recorded by USGS from October of 2007 to early 2012 in Dalton, Georgia, at the Coahulla Creek Stream Gage.

Local stream flows reflect seasonal precipitation, which is an important factor when considering water quality concerns and obligate aquatic fauna. Stream flow data has been recorded at the Coahulla Creek USGS stream gauge site since October of 2007 and has been displayed in Figure 2.1.c. These data reveal some of the temporal variation in stream flows that occurs in the watershed near the confluence of Coahulla Creek and the Conasauga River.

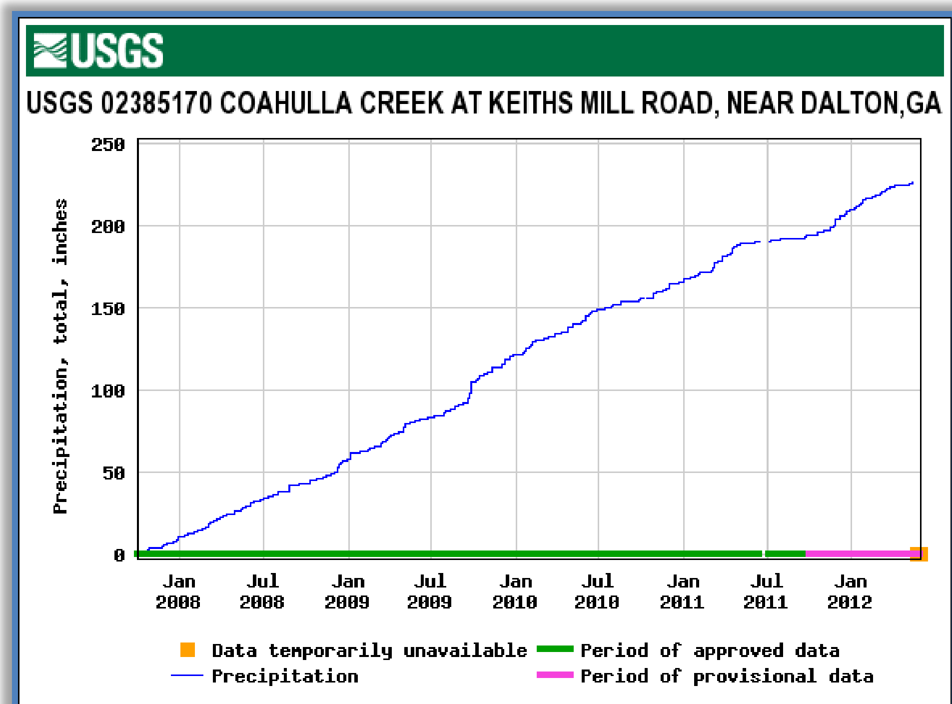


Figure 2.1.e. Discharge data (in cf/s) recorded near Dalton, Georgia, at the Coahulla Creek Stream Gage by USGS from October of 2007 to early 2012.

2.2 Important Flora and Fauna

Forest Ecosystems

During the development of this plan, the percentage of forest that exists in the entire Coahulla Creek Watershed was determined to be approximately 49 % overall. Upland slopes, floodplains, and depressions tend to be where these forests are located. Specifically, most forestlands in the Georgia portion of the watershed occur in rural areas of the middle and upper watershed, on the steeper slopes of the Tennessee Valley Divide, and in the headwaters of Mill Creek along Rocky Face, Mill Creek, and Hurricane Mountains. Most appear to be on private lands in small holdings, although the Hiwassee Land Company has a significant holding in the headwaters of Mill Creek. Most forest is characterized as mixed oak-hickory-pine and loblolly-shortleaf pine forest, which occupy similar percentages of the landscape within Whitfield County. Approximately 3% of timberlands in the county are logged annually, according to the Coosa River Basin Plan.

Wildlife and Habitat

Local wildlife populations exert effects on water quality within the Coahulla Creek Watershed. The middle and upper watershed is primarily a rural environment with an abundance of pasture and forest that provide decent habitat for wildlife. Although adjacent to Whitfield County where Coahulla Creek lies, The Soil Survey of Catoosa County, Georgia, describes the wildlife of the area and their habitats in great detail. Wildlife in woodland habitats can include wild turkey (*Meleagris gallopavo*), American woodcock (*Scolopax minor*), thrushes *(Turdidae* family*)*, woodpecker (*Picidae* family), and American black bear (*Ursus americanus).* Pine and hardwood forests surrounding pasture make good habitat for white-tailed deer (*Odocoileus virginianus*), mourning dove (*Zenaida macroura*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis virginiana*), and fox (*Vulpes sp.*). Cropland, pasture, meadows, and other open areas with suitable food and cover are inhabited by Eastern cottontail rabbit (*Sylvilagus floridanus*), bobwhite quail (*Colinus virginianus*), meadowlark (*Sturnella magna*), field sparrow (*Spizella pusilla*), and red fox (*Vulpes vulpes*). Deer, rabbit, fox, quail, and other wildlife gain food and cover in the abundant native woody and herbaceous plants that occur in unmanaged pasture, old fields, young pine plantations, and thin woodland tracts. Waterfowl, otter (*Lontra canadensis*), beaver (*Castor canadensis*), bobcat (*Lynx rufus*), and raccoon inhabit forested wetlands, which occur mostly along streams. More open wetlands attract ducks and geese (*Anatidae* family), herons (*Ardeidae* family), shorebirds, and beaver.

Figure 2.2.a. Great blue heron (*Ardea herodias*) are commonly seen within the streams of the Coahulla Creek Watershed.

Listed and Sensitive Aquatic Species

According to Georgia Department of Natural Resources (DNR), the Coahulla Creek Watershed also is home to a few federally listed species and several state listed species, some of which may be influenced by changes in the watershed. Known occurrences of federally listed species in the watershed include the following mussels: Alabama Moccasinshell (*Medionidus acutissimus*), finelined pocketbook (*Hamiota altilis*), and Southern clubshell (*Pleurobema decisum*); and a snail, cylindrical lioplax (*Lioplax cyclostomataformis*). Each of these obligate aquatic species is also protected by the State of Georgia.

Figure 2.2.a. Finelined pocketbook (Lampsilis altilis) mussels are a Federally Listed Species that is present within the Coahulla Creek Watershed.

Other non-federally listed aquatic species protected by the State of Georgia known to occur in the Coahulla Creek Watershed include the burrhead shiner (*Notropis asperifrons*), coldwater darter (*Ethiostoma ditrema*), freckled darter (*Percina lenticula*), trispot darter (*Etheostoma trisella*), and Alabama map turtle (*Graptemys pulchra*). All of the species discussed would likely benefit from continued water quality improvement efforts.

Fisheries

The most upstream portion of the Coahulla Creek Watershed in Georgia has also been characterized as trout fishing waters over the years. According to Georgia DNR, Coahulla Creek and tributaries, upstream of County Road 183 (Beaverdale-Cohutta Road), are designated by Georgia DNR as year-round trout streams, which are stocked several times per year and open to trout fishing all year. Trout species stocked in designated streams can include brown (*Salmo trutta*), rainbow (*Oncorhynchus mykiss*), and/or brook trout (*Salvelinus fontinalis*). Such designations result in more strict regulations intended to minimize sedimentation and maintain forest buffers for temperature control. Current state regulations require the maintenance of a 50 foot vegetated buffer on either side of a trout stream with permits required for modifications within the buffer areas. People can also be seen regularly fishing downstream of Prater's Mill in the middle portion of the watershed. They likely catch various sunfish (*Lepomis* sp.) and basses (*Micropterus* sp.).

2.3 Anthropogenic Features

Political Boundaries

The Coahulla Creek Watershed drains portions of two counties in Georgia, as well as one in Tennessee (Figure 2.3.a.). The vast majority of the Georgia portion of the watershed is in Whitfield County; however, a small portion of Walker County is also located in the watershed. The Coahulla Watershed also extends into Bradley County, Tennessee, where it begins just south of Cleveland and eventually drains more than 40,000 acres that contribute to flows in Georgia. Several segments within the Coahulla Creek Watershed in Tennessee are also listed as impaired for pathogens, according to Tennessee's 2010 303(d) List; however, this section of the watershed is not considered in this management plan since its development was funded through the State of Georgia.

Low density development is consistent across the upper and middle portions of the watershed with some medium density development around the towns of Cohutta and Varnell. During the 2010 census, these towns had populations of over 600 and 1,700 individuals, respectively. Each of these towns lacks a sewer system, and residents rely on septic systems for wastewater management.

Medium and even higher density development is present in and around the Dalton area in the Mill Creek Subwatershed, in the southern portion of the Coahulla Creek Watershed. According to City-Data.com, census data from 2010 revealed the population of Dalton at around 33,000 individuals, although a small portion of Dalton is located outside the watershed.

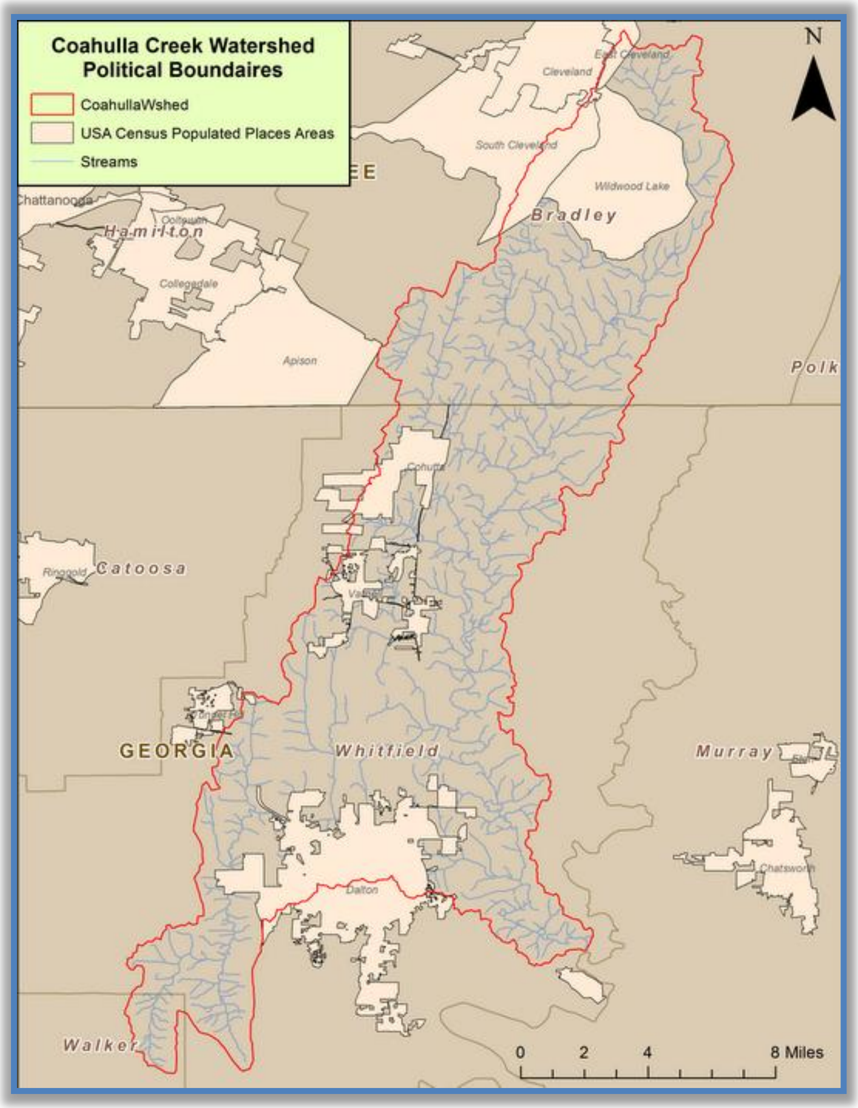


Figure 2.3.a. A map displaying the political boundaries in the area surrounding the Coahulla Creek Watershed.

Community Water Resources

According to Dalton Utilities, which provides drinking water to Whitfield County and portions of three adjacent counties, two sources of drinking water exist in the watershed. These sources include Coahulla Creek and Mill Creek, which are respectively designated as large and small drinking water supply watersheds by the Department of Community Affairs. Haig Mill Reservoir within the Mill Creek subwatershed also serves as a supplemental source of water, and is one of a few reservoirs in the area that can supplement stream flows during low-flow and/or drought events.

People in some areas in the watershed also rely on wells as a water source, which are used for both domestic and livestock purposes. Livestock water sources also include streams and ponds, which is a topic of discussion found later in this document.

Active Groups Within the Watershed

Several groups with a local presence are relevant to the conservation of the Coahulla Creek Watershed and/or the larger Conasauga River Watershed. Federal entities relevant to the WMP development process and/or conservation efforts in the area include the EPA, the Farm Services Agency (FSA), and the Natural Resources Conservation Service (NRCS). State entities relevant to the conservation efforts in the area include Dalton State College, the Georgia Association of Regional Commissions, Georgia Department of Natural Resources (DNR), Georgia Department of Public Health, Georgia Environmental Protection Division (EPD), Georgia Soil and Water Conservation Commission (GSWCC), the Tennessee Department of Agriculture (TDA), and the Tennessee Department of Environment and Conservation (TDEC). In addition, non-governmental organizations that contribute to local watershed conservation include the Conasauga River Alliance, Dalton Utilities, Limestone Valley RC&D Council, The Nature Conservancy (TNC), and the Tennessee Aquarium Conservation Institute (TNACI). Most of these groups have already conducted actions relevant to conservation within the Conasauga River Watershed, and others have improved local education regarding watershed science and water pollution. Groups conducting long-term programs, conducting monitoring, installing "on-the-ground" projects, implementing nonstructural practices, or those predicted to play a significant role in the implementation of this WMP are discussed further within the document.

3. Watershed Conditions

The section that follows will focus on introducing the state water quality standards and their importance, as well as impairments in the Coahulla Watershed, and sampling data from past and current monitoring endeavors. Assessments representative of current watershed conditions are also included.

3.1 Water Quality Standards and Impairments within the Coahulla Creek Watershed

Georgia Water Quality Criteria

Georgia's water quality standards are made up of two different groups of criteria. The general criteria apply to all waters, and certain specific criteria exist for each of six designated uses. The general criteria are more qualitative in nature, and include:

- Waters shall be free of materials, oils, and scum associated with municipal or domestic sewage, industrial waste or any other waste which will settle to form sludge deposits, produce turbidity, color, or odor, or that may otherwise interfere with legitimate water uses.

- Waters shall be free from toxic, corrosive, acidic, and caustic substances in amounts which are harmful to humans, animals, or aquatic life.

The six designated uses in Georgia, which can vary in strictness of standards, are:

- Drinking Water Supply
- Fishing
- Wild River
- Recreation
- Coastal Fishing
- Scenic River

The waters of the Coahulla Creek Watershed are designated for Drinking Water Supply and Fishing. Mill and Coahulla Creeks have both designations, whereas the remainder of the watershed is designated solely for the use of fishing. Despite differences in designations within the watershed, the numeric criteria associated with these designated uses are the same and are found in Table 3.1.a. The water quality parameters associated with the numeric criteria are important for several reasons including minimization of human health risk and protection of aquatic fauna. When streams fail to meet water quality criteria for a given designated use, they are listed as impaired on the Georgia Integrated 303(d)/305(b) List.

Table 3.1.a. A description of the quantitative water quality criteria for waters designated for the uses of drinking water supply and fishing.

Fecal Coliform Bacteria	Dissolved Oxygen	pH	Temperature
May – Oct < 200 colonies/100 ml as geometric mean* Nov – April < 1000 colonies/100 ml as geometric mean < 4,000 as instantaneous max	< 5 mg/l daily average Not < 4 mg/l at all times	Between 6.0 and 8.5	< 90° F

Impairments in the Coahulla Creek Watershed

Sampling of water quality and biota, specifically fecal coliform counts and fish assemblages in this case, in the Coahulla Watershed has resulted in the placement of four stream segments on the Georgia Integrated 303(d)/305(b) List for failure to meet state criteria. These impaired stream segments account for approximately 18 miles of streams in the watershed. On Coahulla Creek, the impaired segments are due to fecal coliform violations and occur in the lower watershed (Figure 3.1.a.; Table 3.1.b.). On Mill and Haig Mill Creeks, impacted biota impairments stem from poor Index of Biotic Integrity scores, which were revealed during fish sampling endeavors.

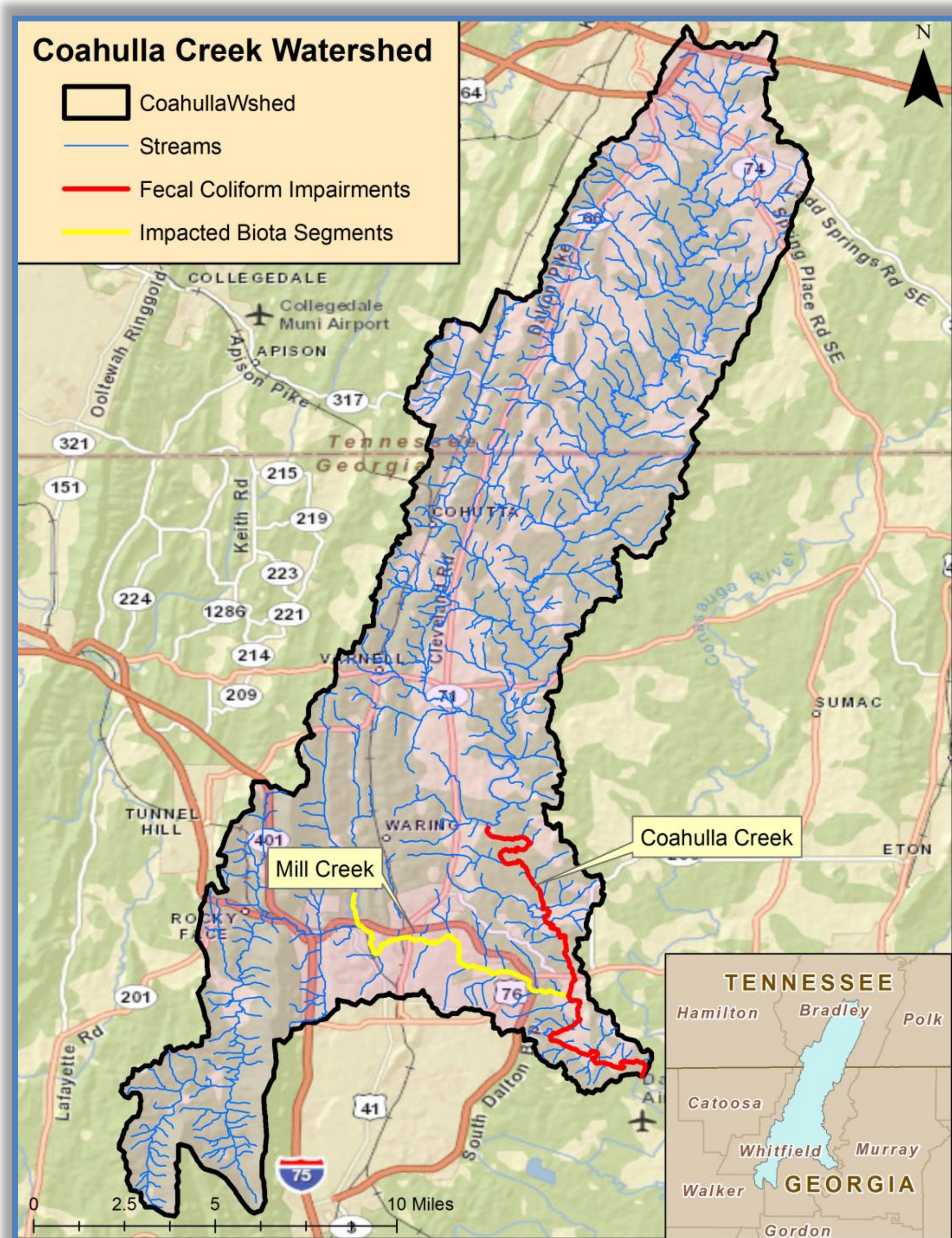


Figure 3.1.a. A map displaying all impaired segments found within the Coahulla Creek Watershed.

Table 3.1.b. A table displaying the location and criterion violated for each impaired segment found within the Coahulla Creek Watershed.

COAHULLA CREEK WATERSHED IMPAIRED SEGMENTS		
Waterbody (Impaired Miles)	**County**	**Criterion Violated***
Coahulla Creek (5 miles)	Whitfield	Fecal Coliform
Coahulla Creek (5 miles)	Whitfield	Fecal Coliform
Haig Mill Creek (1 mile)	Whitfield	Bio (F)
Mill Creek (7 miles)	Whitfield	Bio (F)

Bio (F) = Impacted biota characterization resulting from fish sampling.

Fecal Coliform Impairments

The two impaired segments on the mainstem of Coahulla Creek in the Coahulla Creek Watershed have failed to meet state criteria due to having high concentrations of fecal coliform bacteria. Downstream of the watershed the same issues persist, as the mainstem Conasauga River is also impaired for high fecal coliform counts. Although generally present in the environment and not alarming at low levels, high fecal coliform bacteria (and *Escherichia coli*) concentrations in streams are used as an indicator for significant fecal contamination and more importantly the human health risks and pathogens that often coincide with fecal contamination. For this reason, impairments are often described as pathogen impairments even though they result from high fecal coliform bacteria counts.

Fecal coliform bacteria include the species *Escherichia coli* (*E. coli*), which makes up between 60 and 80% of fecal coliform bacteria in streams according to Georgia EPD. The U.S. EPA and many states have switched to *E. coli* as the indicator of fecal contamination and potential pathogen presence due to its correlation with gastrointestinal illnesses associated with swimming. The EPA views human health risk to pathogens associated with fecal contamination at an acceptable risk level if fewer than 9 people out of 1,000 get sick from using the resource. Generally, at higher levels of indicator bacteria (fecal coliform and *E. coli*), the risks of gastroenteritis, as well as respiratory, eye, ear, nose, throat, and skin infections become more prevalent. Higher levels of indicator bacteria also suggest the potential presence of more harmful bacteria [e.g., *E. coli* 0157, *Salmonella*, *Shigella* (which often causes gastrointestinal illnesses), and *Pseudomonas aeruginosa* (which can cause swimmer's ear or dermatitis)]. In addition to harmful bacteria, waters with high fecal coliform counts can harbor protozoans (e.g., *Crytosporidium* and *Giardia*) and viruses (e.g., hepatitis A).

Although high fecal coliform bacteria concentrations can indicate a human health hazard, they are unlikely to exert negative effects on aquatic species. However, the nutrient enrichment that coincides with fecal contamination may result in indirect effects leading toward eutrophication of waterbodies. Nutrient enrichment can result in heavy algal growth that can alter aquatic habitats and cause harmful dissolved oxygen fluctuations.

Sources of fecal coliform bacteria in streams include fecal contamination from humans, pets, livestock, and wildlife. More specifically, common causes of elevated fecal coliform counts in impaired watersheds include failing septic systems, livestock with direct stream access, applied manure, and natural areas with abundant wildlife. Relative proportions of contributors are watershed specific and difficult (as well as expensive) to determine.

Fecal coliform concentrations are variable, difficult to predict, and depend on a number of complex factors. According to Georgia EPD, fecal coliform counts can often be higher in the summer as a result of higher temperatures that increase bacteria survivorship. Fecal coliform concentrations are also affected by precipitation and the amount of time between rain events. Heavy precipitation after a dry period can result in very high concentrations of fecal coliform as a result of runoff delivering an abundance of previously deposited feces from the landscape into waterways. Runoff events (especially after dry periods) have a tendency to reflect fecal coliform sources conveyed from the landscape, and fecal coliform concentrations during dry periods tend to represent the direct introduction of fecal contamination into tributaries higher in the watershed. Other factors that affect fecal coliform concentrations include sediment pollution, riparian composition, and source proximity to waters.

Figure 3.1.b. Cattle with direct access to streams can contribute to a high fecal coliform load, such as the loads found in Coahulla Creek.

Impacted Biota Impairments

Within the Coahulla Creek Watershed, two segments, totaling eight miles, are designated as impaired due to impacted biota. These segments are located on Haig Mill Creek, from Haig Mill Reservoir to Mill Creek, and along Mill Creek, from the confluence with Haig Mill Creek until Mill Creek joins Coahulla Creek. A stream is considered impaired for impacted biota when sampling of fish or macroinvertebrates reveals negatively impacted assemblages as indicated by poor or very poor Index of Biotic Integrity or modified Index of Well Being scores.

Fish sampling efforts by Georgia DNR in 2001 revealed poor biotic integrity and resulted in these impairments. In general, low biotic integrity is caused by a lack of quality fish habitat that results from stream sedimentation. According to Georgia EPD, it is generally assumed that if the sediment loads are reduced to and maintained at acceptable levels, the streams will repair themselves over time. Other parameters (e.g., heavy metals, high temperatures, low dissolved oxygen levels) can adversely affect the aquatic communities, but the TMDL for these reaches have identified the probable impairing pollutant as sediment. Although there are qualitative descriptions in Georgia's water quality criteria that address restrictions on turbidity (a measurement of water clarity), there is no numeric criterion to identify discrete thresholds beyond which violations can be determined for sediment loading. Instead, indices of biotic integrity are used to represent stream health or various levels of degradation (generally stemming from sedimentation).

Sediment pollution can originate from many sources including, but not limited to: eroding streambanks, construction sites, agricultural heavy use areas, and cropland. In urban areas, the prevalence of impervious surfaces can lead to increased stormwater runoff, which often results in increased erosion of streambanks, channel incision (down-cutting), and eventually habitat homogeneity. Negative implications for aquatic fauna that often result from these types of erosion can include the deposition of fine sediment, which contributes to a loss of habitat diversity, as well as other issues. The deposition of fine sediment on the stream-bottom can result in a change in interstitial spaces (areas between substrate particles), which can have a negative effect on aquatic insect communities and the fish species which feed upon them. Fine sediments also tend to reduce habitat complexity and cover up gravels which are critical areas for fish to spawn. Altogether, significant increases in sediment loads adversely impact the biotic community.

In addition to wildlife concerns, sedimentation can cause other issues more relevant to local communities and other people living downstream. First, at the source of the erosion, soil loss can result in reduced productivity of the land. Additionally, increased sediment results in higher fecal coliform retention rates and serves as a source for increased bacteria in the water column during runoff events. Lastly, sediment in the water column can increase the cost of water treatment.

Figure 3.1.c. The Alabama hogsucker (Hypentelium etowanum) is native to streams in the Coahulla Creek Watershed and the larger Conasauga River Watershed. When present, Alabama hogsuckers are generally an indicator of relatively healthy water quality and habitat conditions.

3.2 Available Monitoring/Resource Data from Recent Years

During the formation of this WMP, a significant effort was undertaken to acquire any recent data collected in the watershed. In the past, Georgia EPD, Georgia Department of Natural Resources (DNR) Wildlife Resources Division (WRD), and Dalton Utilities have conducted relevant monitoring within the Coahulla Creek Watershed. A portion of monitoring data from these groups was made available for the purposes of this document, and a relevant subset is presented in this section.

Georgia Environmental Protection Division Monitoring Efforts

Georgia EPD periodically monitors water quality in this watershed to determine whether statewide criteria are being met. Data collected by Georgia EPD in 1996 at the Highway 76 site on Coahulla Creek had suggested the likelihood of impairment for fecal coliform bacteria violations. These data were collected on a once a month basis, rather than according to the present listing/de-listing protocol. We have included them below in Table 3.2.a.

Table 3.2.a. A display fecal coliform counts (in colony forming units/100 mL) collected and analyzed by Georgia EPD in 1996 from Coahulla Creek at Highway 76 (CC-4).

1996 Fecal Coliform Counts (CFU/100 mL) from Coahulla Creek at Highway 76 (CC-4)											
Sampling Dates and Associated Fecal Coliform Counts											
1/23/96	**2/8/96**	**3/7/96**	**4/4/96**	**5/9/96**	**6/6/96**	**6/27/96**	**8/8/96**	**9/5/96**	**10/10/96**	**11/7/96**	**12/5/96**
330	130	300	130	1300	270	1100	110	490	310	130	790

Data collected using the listing/de-listing protocol by Georgia EPD in 2001 and 2005 resulted in the listing of both Coahulla Creek stream segments on the 303(d)/305(b) list of impaired waters for fecal coliform violations. These data that resulted in impairments are displayed below in Table 3.2.b. and 3.2.c. In both cases, sampling between May and October confirmed the impairments, as well as a violation of the allowable maximum for a single event taken in March of 2001 on Coahulla Creek at Highway 76 at 35,000 colony forming units/100 mL.

Table 3.2.b. A display of geometric means of fecal coliform counts (in colony forming units/100 mL) calculated from samples collected by Georgia EPD in 2001 from Coahulla Creek at Highway 76 (CC-4).

FECAL COLIFORM GEOMETRIC MEANS				
	Feb./March	**May/June**	**Aug./Sept.**	**Oct.**
Coahulla Creek @ Highway 76 (CC-4) from 2001	685	308*	258*	93

**** These time periods had violations that resulted in impairment, in addition to a violation for exceeding the allowable maximum for a single event.***

Table 3.2.c. A display of geometric means of fecal coliform counts (colony forming units/100 mL) calculated from samples collected by GA EPD in 2005 from Coahulla Creek at Keith Mill Road (CC-5).

FECAL COLIFORM GEOMETRIC MEANS		
	June/July	**September/October**
Coahulla Creek @ Keith Mill Road (2005)	331*	372*

**** These time periods had violations that resulted in impairment.***

Georgia Wildlife Resources Division Monitoring Efforts

In addition to Georgia EPD's water quality monitoring efforts, Georgia WRD periodically monitors fish populations and lotic habitats (along with a few water quality parameters) to determine whether statewide criteria are being met. Data collected by WRD in 2001 in Haig Mill Creek and Mill Creek led to the impairments for impacted biota that are considered the likely result of sedimentation. The fish sampling indices and habitat scores from these sampling efforts are provided in Table 3.2.d.

Table 3.2.d A display of IBI and IWB scores from 2001 WRD fish assemblage assessments.

WRD Fish Sampling and Habitat Scores						
	Sampling Date	**IBI Score**	**IBI Category**	**IWB Score**	**IWB Category**	**Habitat Score**
Haig Mill Creek	6/28/01	26*	Poor*	7.6	Fair	109
Mill Creek	8/22/01	32*	Poor*	8.4	Fair	70.3

**** These IBI scores and their classification of poor biotic integrity led to the impacted biota impairments for these streams.***

IBIs, according to Georgia EPD, assess the biotic integrity of aquatic communities based on the functional and compositional attributes of fish communities. They consist of twelve metrics, which assess species richness and composition, trophic composition and dynamics, and fish abundance and condition. Each metric is scored by comparing its value to that particular scoring criterion of the regional reference site. Collectively, the metric scores are combined to reach an IBI score that can be classified as Excellent, Good, Fair, Poor, or Very Poor.

Comparatively, the modified IWB measures the health of the aquatic community based on the abundance and diversity of the fish community. The IWB is calculated based on the relative density of fish, the relative biomass of fish, the Shannon-Wiener Index of Diversity based on number, and the Shannon-Wiener Index of Diversity based on biomass. Similar to the IBI, these collective scores allow for a classification of Excellent, Good, Fair, Poor, or Very Poor.

Habitat assessments were also conducted at each sampling site to supplement and help clarify the results of the biotic indices. The habitat assessment utilized by WRD is broken into three levels that describe: in-stream characteristics, channel morphology, and the riparian zone surrounding the stream. The total habitat scores indicate optimal conditions from 166 to 200, suboptimal conditions from 113 to 153, marginal conditions from 60 to 100, and poor conditions from 0 to 44. Haig Mill Creek therefore lied in the range between suboptimal and marginal, and Mill Creek was in the lower end of the marginal range. Of note, the habitat assessment of Haig Mill Creek, in comparison to other Ridge and Valley Ecoregion impaired streams, revealed relatively high scores for the negative attributes of embeddedness and sediment deposition, whereas the Mill Creek habitat assessment revealed a riffle frequency of zero, indicating a lack of sufficient habitat variation.

Additional characteristics of the streams at the monitoring sites were measured during the fish sampling efforts including the number of pools, depth of the deepest pool, number of riffles, average stream depth, and average stream width. In addition, several water quality parameters (temperature, dissolved oxygen, pH, conductivity, etc.) were measured on the sampling dates. Noteworthy information included in these data are that Haig Mill Creek had one of the highest temperatures recorded anywhere that summer (26.4°C) and a corresponding dissolved oxygen measurement of only 5.53 mg/L, and that the Mill Creek data again reflected a lack of sufficient habitat variation. The data revealed they found only run and pool habitats, whereas riffle habitats were not present in the reach sampled.

Figure 3.2.a. Sampling with backpack electrofishing equipment.

<u>Dalton Utilities Monitoring Efforts</u>

Dalton Utilities (DU) is another group that periodically has conducted sampling in streams of the Coahulla Creek Watershed. In addition, they have donated analysis of samples in their lab for our contemporary water quality monitoring efforts. In 2001, DU had a Source Water Assessment Plan (SWAP) completed in accordance with Georgia's Source Water Assessment and Protection Implementation Plan for Public Drinking Water Sources. Sampling conducted for the SWAP included methods to detect both *Giardia* and *Cryptosporidium*, two of the greatest and most common public health threats to drinking water supplies. According to the EPA, C*ryptosporidium* and *Giardia* are both commonly found in waterways, but water sources influenced by agriculture (e.g., cattle or dairy farming) or wastewater discharges levels generally have higher levels. C*ryptosporidium* oocysts were identified in Coahulla Creek and Mill Creek samples at very low levels. *Giardia* cysts were detected in all 2001 sampling in the Coahulla Creek and Mill Creek sampling locations.

Other water quality sampling, as well as fish and macroinvertebrate sampling, was conducted for the SWAP. Summaries of some of these data were obtained, and they revealed that high fecal coliform counts were found on at least one occasion at Mill Creek, as well as elevated TSS levels in comparison to the reference site. Overall, good water quality conditions were documented. The overall susceptibility of threats to the public drinking water supply for Mill and Coahulla Creeks were rated medium and low, respectively, based on all the analyses conducted. Mill Creek received a medium susceptibility rating due to the density of potential pollutant categories in the watershed.

3.3 Monitoring/Resource Data Collected for the WMP

To collect more contemporary water quality data during the development of this plan, additional efforts were made to determine current watershed conditions. The sampling regimen developed was incorporated into a *Targeted Water Quality Monitoring Plan* (featured in Appendix A), which provided stakeholders with current water quality data and assist with the decision-making process (e.g., determining priority areas). This sampling focused on collection of fecal coliform count and total suspended solids (TSS) data. Fecal coliform counts in contrast to past EPD sampling were analyzed to Most Probable Number (MPN). Fecal coliform counts were determined to represent amounts of fecal contamination upstream of each site, and TSS was used to represent potential erosional/sediment issues upstream of each site. Samples were taken from eight sample sites (Figure 3.3.a.) to allow comparisons within the watershed. Samples were collected from these sites during both wet and dry periods of the summer and winter. This was orchestrated because wet weather samples better represent the NPS pollution flushed from the landscape during runoff events (and potentially when floodplains are inundated); whereas samples collected during dry events better reveal instream sources of NPS pollutants. Summer and winter samples were collected because state criteria change seasonally.

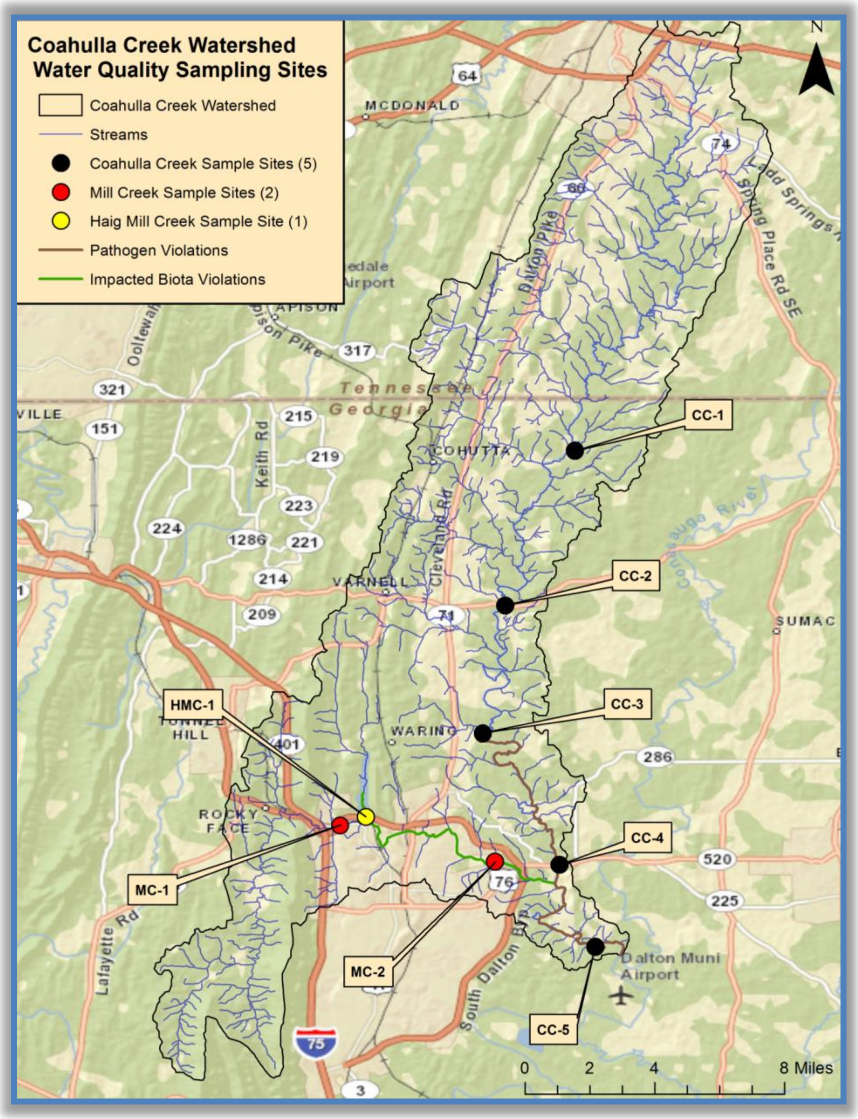


Figure 3.3.a. A display of the locations of the eight sample sites used during targeted monitoring in the Watershed.

Fecal Coliform Sampling

Sampling the eight sites revealed additional information regarding fecal coliform bacteria and sediment sources in the watershed. The fecal coliform sampling data (Table 3.3.a.) revealed a few potential trends. In general, greater fecal coliform counts were found in the lower segments of Coahulla Creek (where the fecal coliform impairments are located) and at the Mill Creek sites. The lowest fecal coliform counts on average were recorded at the Haig Mill Creek site. Also, despite impairments for pathogens in the Coahulla Creek Watershed in Tennessee, the fecal coliform numbers were generally quite low at the sites closest to the border. Mill Creek saw similar measurements despite not being impaired.

Table 3.3.a. A display of geometric means (n = 12) of fecal coliform counts (in Most Probable Number) calculated from samples collected in 2012 and 2013 in the Coahulla Creek Watershed.

GEOMETRIC MEANS OF FECAL COLIFORM COUNTS (2012-2013)	
Site (code)	**Mean Fecal Coliform Counts (MPN)**
Coahulla Creek Site 1 (CC-1)	100.7
Coahulla Creek Site 2 (CC-2)	96.3
Coahulla Creek Site 3 (CC-3)	152.9
Coahulla Creek Site 4 (CC-4)	111.2
Coahulla Creek Site 5 (CC-5)	159.7
Haig Mill Creek Site 1 (HMC-1)	17.2
Mill Creek Site 1 (MC-1)	125.7
Mill Creek Site 2 (MC-2)	126.8

Sampling was conducted during wet weather events on four of twelve sampling dates as sampling during wet weather tends to indicate where runoff issues lie on the landscape. Wet weather was characterized by more than 0.25 inches of precipitation within the last 48 hours. These wet-weather events often resulted in higher bacteria counts than when sampling during dry periods. The geometric means from these sampling events per site are documented in Table 3.3.b. below, along with the maximum fecal coliform counts per site, which were all recorded during wet weather events.

Table 3.3.b. A display of geometric means (n = 4) of fecal coliform counts (MPN) calculated from samples collected during wet weather events in 2012 and 2013 in the Coahulla Creek Watershed.

GEOMETRIC MEANS AND MAXIMUM FECAL COLIFORM COUNTS (2012-2013) FROM WET WEATHER SAMPLING EVENTS		
Site (code)	**Geometric Means (MPN)**	**Maximum Counts (MPN)**
Coahulla Creek Site 1 (CC-1)	328.6	1700
Coahulla Creek Site 2 (CC-2)	433.6	2400
Coahulla Creek Site 3 (CC-3)	417.5	1300
Coahulla Creek Site 4 (CC-4)	414.9	1600
Coahulla Creek Site 5 (CC-5)	493.8	1900
Haig Mill Creek Site 1 (HMC-1)	61.2	3500
Mill Creek Site 1 (MC-1)	421.9	1000
Mill Creek Site 2 (MC-2)	430.8	1000

On eight of twelve sampling dates, sampling was conducted during dry weather events, which is likely a better indicator of direct introduction of fecal contamination upstream. The data gathered from these events show relatively low levels of fecal coliform bacteria. The geometric means from these sampling events per site are documented in Table 3.3.b. below, along with the maximum fecal coliform counts from dry weather sampling per site.

Table 3.3.c. A display of geometric means (n = 8) of fecal coliform counts (MPN) calculated from samples collected during dry weather events in 2012 and 2013 in the Coahulla Creek Watershed.

GEOMETRIC MEANS AND MAXIMUM FECAL COLIFORM COUNTS (2012-2013) FROM DRY WEATHER SAMPLING EVENTS		
Site (code)	**Geometric Means (MPN)**	**Maximum Counts (MPN) From Dry Weather Sampling**
Coahulla Creek Site 1 (CC-1)	55.7	170
Coahulla Creek Site 2 (CC-2)	45.4	190
Coahulla Creek Site 3 (CC-3)	92.5	220
Coahulla Creek Site 4 (CC-4)	57.6	210
Coahulla Creek Site 5 (CC-5)	90.1	250
Haig Mill Creek Site 1 (HMC-1)	9.1	50
Mill Creek Site 1 (MC-1)	68.6	136
Mill Creek Site 2 (MC-2)	68.8	180

Due to the unpredictable nature of fecal coliform bacteria in streams, the recent fecal coliform count data are difficult to compare with the historic EPD data due to a lack of congruency in terms of units (CFU vs. MPN), sampling schedules, as well as a lack of data on precipitation, flows, and rainfall antecedent. Table 3.3.d. (below) does attempt to allow monthly data from the same site (CC4) to be compared visually, and it does appear that water quality improvements have been made. This is supported by the fact that none of the historical samples were below 100, whereas half of the contemporary samples were found to be below this value. In addition, the historical sampling effort revealed five samples above 200 versus only two above this threshold from the recent sampling effort. Despite these perceived improvements, however, it seems to appear that the stream segments impaired for fecal coliform count violations are not likely ready for de-listing.

Table 3.3.d. A display of fecal coliform counts (in CFU/100 mL) from 1996 EPD sampling efforts and fecal coliform counts (in MPN) from 2012-2013 at CC4 in the Coahulla Creek Watershed.

1996 Fecal Coliform Counts (CFU/100 mL) vs 2012-2013 Fecal Coliform Counts (MPN) from Coahulla Creek at Highway 76 (CC-4)											
Sampling Dates and Associated Fecal Coliform Counts											
1/23/96	**2/8/96**	**3/7/96**	**4/4/96**	**5/9/96**	**6/6/96**	**6/27/96**	**8/8/96**	**9/5/96**	**10/10/96**	**11/7/96**	**12/5/96**
330	130	300	130	1300	270	1100	110	490	310	130	790
1/19/13	**2/22/13**	**3/21/13**	**4/27/12**	**5/24/12**	**6/29/12**	**7/12/12**	**8/31/12**	**9/21/12**	**10/19/12**	**11/16/12**	**12/11/12**
450	1600	35	70	124	48	170	42	210	52	18	242

Sampling for Total Suspended Solids

The total suspended solids data (Table 3.3.e.) revealed TSS as generally higher in the downstream segments of Coahulla Creek than upstream segments, whereas as Mill Creek and especially Haig Mill Creek appear to have lower TSS levels than all Coahulla Creek sites. Appendix B reveals the raw data collected at each site per sampling period.

Table 3.3.e. A display of geometric means (n = 12) from samples collected by Limestone Valley in 2012 and 2013 in the Coahulla Creek Watershed and analyzed for Total Suspended Solids.

TOTAL SUSPENDED SOLIDS GEOMETRIC MEANS (2012-2013)	
Site (code)	**Total Suspended Solids (TSS)**
Coahulla Creek Site 1 (CC-1)	9.6
Coahulla Creek Site 2 (CC-2)	15.0
Coahulla Creek Site 3 (CC-3)	15.6
Coahulla Creek Site 4 (CC-4)	15.0
Coahulla Creek Site 5 (CC-5)	15.6
Haig Mill Creek Site 1 (HMC-1)	3.7
Mill Creek Site 1 (MC-1)	6.4
Mill Creek Site 2 (MC-2)	5.1

Sampling was conducted during wet weather events on four of twelve sampling dates to try to capture where sediment enters the system during runoff events. Wet weather was characterized by more than 0.25 inches of precipitation within the last 48 hours. The geometric means from these sampling events per site are documented in Table 3.3.f. below, along with the maximum TSS measurements per site, which were all recorded during wet weather events.

Table 3.3.f. A display of geometric means (n = 4) of TSS measurements calculated from samples collected during wet weather events in 2012 and 2013 in the Coahulla Creek Watershed.

GEOMETRIC MEANS AND MAXIMUM TSS MEASUREMENTS (2012-2013) FROM WET WEATHER SAMPLING EVENTS		
Site (code)	**Geometric Means**	**Maximum TSS**
Coahulla Creek Site 1 (CC-1)	24.6	99
Coahulla Creek Site 2 (CC-2)	27.6	107
Coahulla Creek Site 3 (CC-3)	28.1	104
Coahulla Creek Site 4 (CC-4)	23.5	74
Coahulla Creek Site 5 (CC-5)	27.2	77
Haig Mill Creek Site 1 (HMC-1)	6.6	9
Mill Creek Site 1 (MC-1)	13.4	41
Mill Creek Site 2 (MC-2)	15.0	73

On eight of twelve sampling dates, sampling was conducted during dry weather events. The same trends were present as overall, with the lower Coahulla Creek sites have higher TSS than the other sites. TSS measurements were also markedly lower on average, likely as a result of a lack of sediment introduction from runoff and reduced velocity that allows increased suspension of sediment. The raw data have been included in Appendix B.

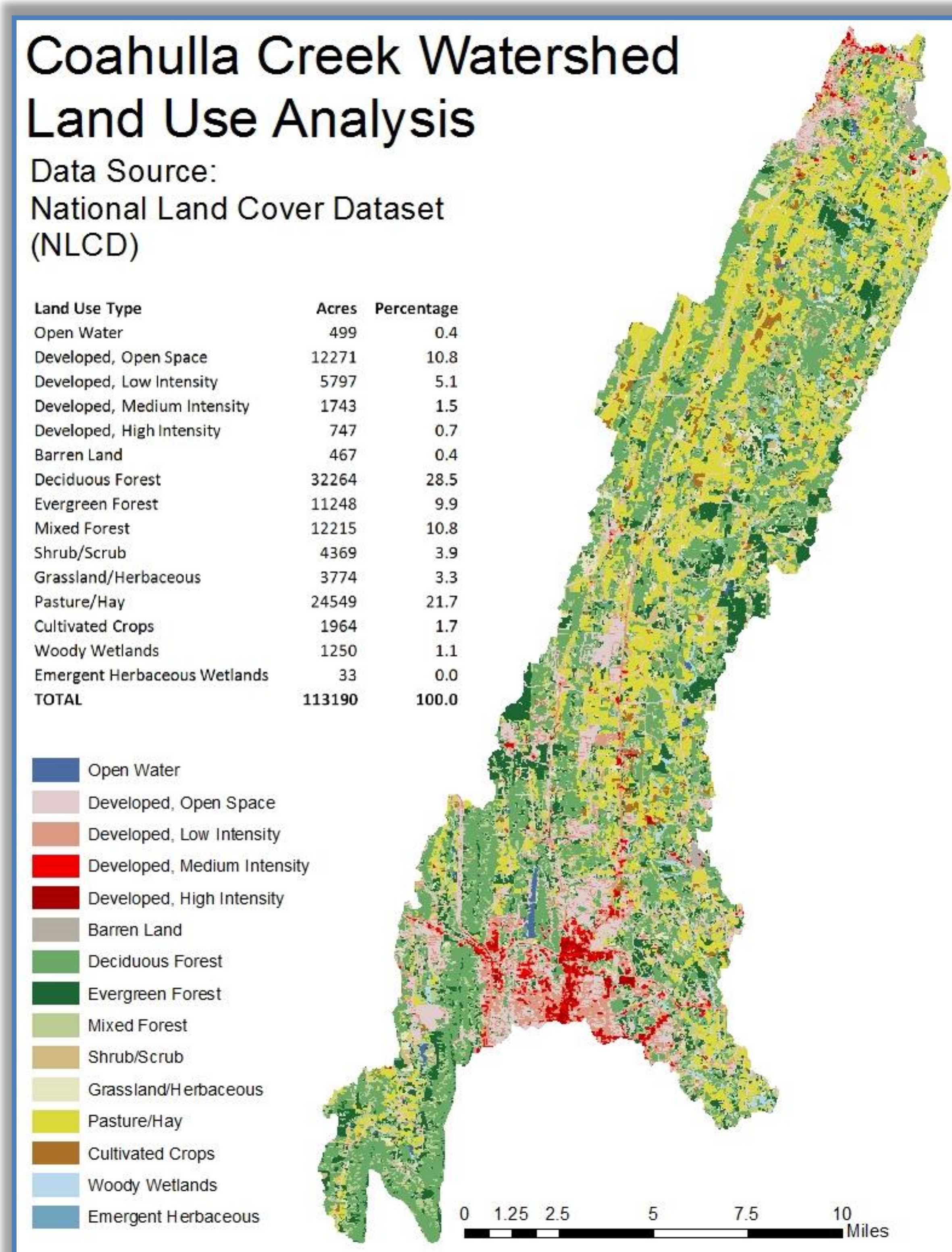
Additional Observations

Fish sampling was not conducted for the purpose of the WMP planning process due to a lack of equipment. In addition, sampling biota by a non-government organization cannot result in the de-listing of an impaired segment, which reduces the value of a hypothetical effort by other groups. Sampling by Georgia EPD as part of their rotation may be frequent enough that changes in aquatic biota are revealed in sufficient intervals without the need to duplicate their efforts.

Despite not sampling for biota along the two segments impaired due to impacted biota, observations have made the biotic issues a little more transparent. Mill Creek has very few riffles, and for the most part appears to be a shallow, homogeneous run with only occasional pools. A lack of habitat diversity, presumably caused by sediment and excessive stream-flows from stormwater, is likely responsible for the poor biotic integrity. In addition, the impacted fish assemblage from the Haig Mill Creek impairment is likely affected by the lack of continuous habitat in the upstream direction where the dam rests, as well as poor habitat in the adjacent Mill Creek reach.

3.4 Land Use Analysis

An investigation into land uses within the Coahulla Creek Watershed revealed that they are variable (Figure 3.4.a.), yet primarily reflect its rural nature with the exception of the area around Dalton, the largest city in Whitfield County. Parcels managed as forest appear relatively common in the watershed, especially on steeper slopes and along floodplains. A large percentage of land and its resources are also devoted to agricultural production in the upper and middle portions of the watershed in Georgia. Most agricultural lands are used for cattle and horse grazing; however, poultry and crop production (mostly corn and soybeans) also occurs within the drainage. Single family households make up approximately 25% of land use. Although widespread and scattered along county roads, much of this residential land use occurs in the areas in and surrounding Dalton, Varnell, and Cohutta. Industrial and other urban lands, while small in comparison to other land uses, are mostly found in the lower portion of the Coahulla Creek Watershed near Dalton, most of which is actually in the Mill Creek Subwatershed. In addition, Interstate 75, a six lane highway connecting Chattanooga and Atlanta runs through the Western portion of Dalton and the Mill Creek Subwatershed from North to South. All of the land use types outlined likely exert some contribution to the current water quality conditions in the watershed, although significant variation in NPS contributions per land use exists from parcel to parcel depending on management.



Land Use Type	Acres	Percentage
Open Water	499	0.4
Developed, Open Space	12271	10.8
Developed, Low Intensity	5797	5.1
Developed, Medium Intensity	1743	1.5
Developed, High Intensity	747	0.7
Barren Land	467	0.4
Deciduous Forest	32264	28.5
Evergreen Forest	11248	9.9
Mixed Forest	12215	10.8
Shrub/Scrub	4369	3.9
Grassland/Herbaceous	3774	3.3
Pasture/Hay	24549	21.7
Cultivated Crops	1964	1.7
Woody Wetlands	1250	1.1
Emergent Herbaceous Wetlands	33	0.0
TOTAL	**113190**	**100.0**

Figure 3.4.a. A map displaying the Coahulla Creek Watershed's more prominent land uses and their percentages within the watershed. More detailed definitions of land uses are listed in Appendix C.

3.5 Riparian Buffer Analysis

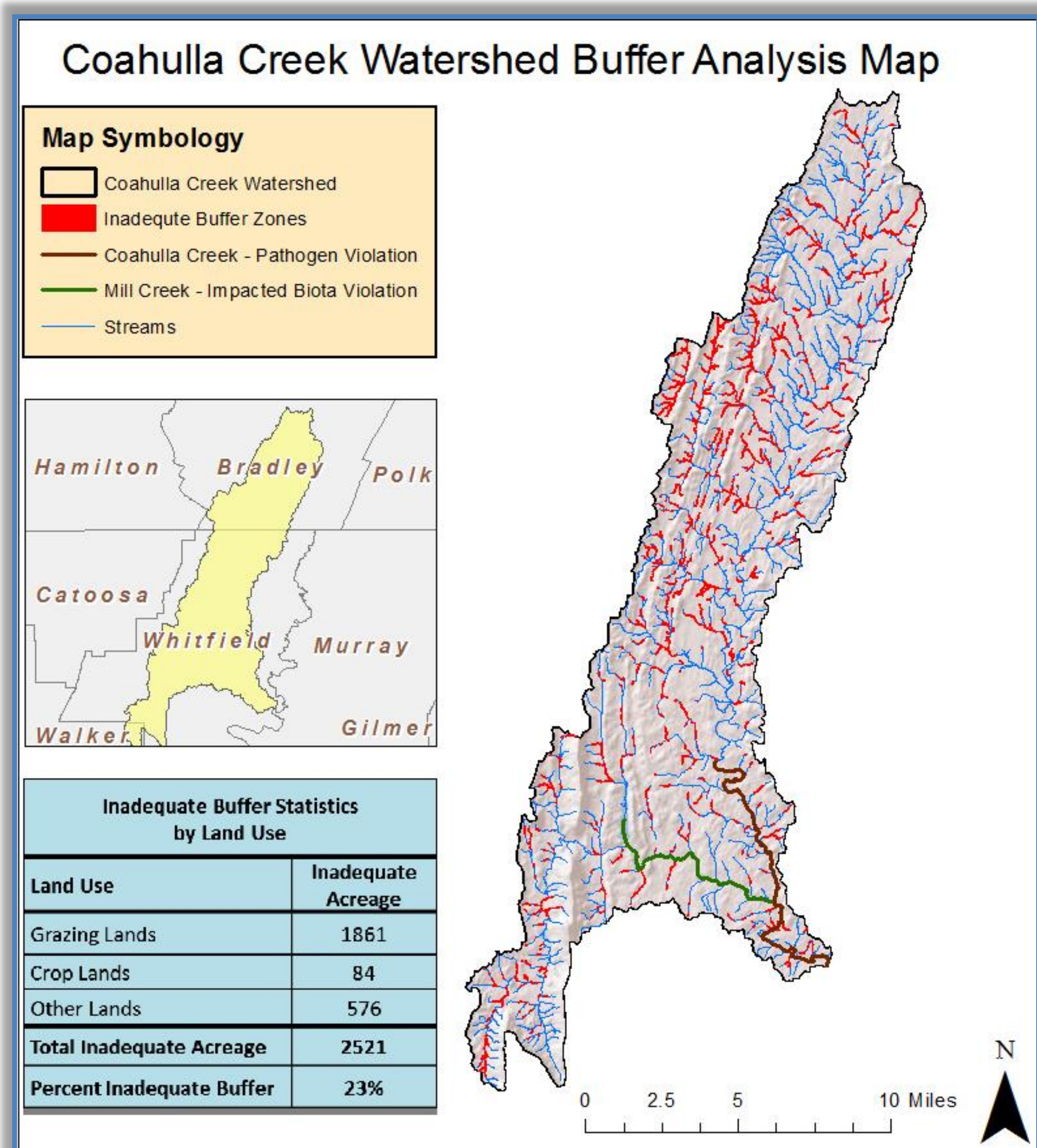
A stream buffer analysis was also completed for the Coahulla Creek Watershed as part of the development of the WMP due to the importance of vegetative buffer zones (i.e., riparian zones) on stream and water quality conditions. As the name indicates, these zones literally serve as a buffer between activities that occur on the landscape and the contents of the water in the stream by physically catching pollutants (e.g., sediment, nutrients, bacteria) from runoff during rain events.

In addition, buffers serve many other functions that are important to the health of the stream. One of the functions of sufficiently intact buffers is the mitigation of stream bank erosion, which is a common contributor of sediment to streams. The roots of the vegetation help to hold the sediment in place during high flows, making the banks more stable. The vegetation also provides shade for the stream, which aids in keeping the temperatures low (and dissolved oxygen high). Dense vegetation in the riparian zone also contributes falling dead and dying vegetation into the stream channel, providing diverse habitat for aquatic life.

Conducting an analysis of buffers within an impaired watershed has become an acceptable way to assess areas in need of restoration. Insufficient riparian buffers often indicate sources of NPS pollution. These areas could simply be a place where pollutants enter the stream through runoff, or even a place where livestock enters the stream (heavy use inhibits vegetative growth) thereby allowing direct introduction of NPS pollutants.

The stream buffer analysis was conducted using GIS software and recent aerial imagery. The purpose of this analysis was to identify areas of inadequate vegetation within a 100 foot buffer of all streams. Every tributary was analyzed with the software and aerial imagery (viewed with the naked eye), to confirm insufficient buffers. The areas having insufficient riparian zones are depicted in pink in Figure 3.6.a. A percentage of inadequate buffer was also calculated and included. This information was used for estimating the technical and financial assistance needed to de-list the impaired segments (discussed later).

The buffer analysis map reveals that many of the insufficient buffers in the watershed are along headwater tributaries of Coahulla Creek (especially in the middle and upper watershed) and Mill Creek, as opposed to along the mainstems of these creeks. Much of the inadequate buffer acreage lies on grazing lands where lack of riparian buffers when combined with cattle access can increase bank erosion, and thus sediment introduction, into the Coahulla Creek system. Still, the impacted biota impairments, which are presumably the result of sedimentation and the homogeneous habitat that generally accompanies it, lie in the Mill Creek Subwatershed, where the riparian zones appear relatively intact in comparison to the upper and middle Coahulla Creek Watershed. One can assume that the more intense development and impervious surface cover in the Mill Creek Subwatershed likely has a greater need for an intact riparian buffer zone to better protect the stream banks and instream habitats from the more potent storm-flows that coincide with more intense development.



Inadequate Buffer Statistics by Land Use

Land Use	Inadequate Acreage
Grazing Lands	1861
Crop Lands	84
Other Lands	576
Total Inadequate Acreage	**2521**
Percent Inadequate Buffer	**23%**

Figure 3.5.a. An image depicting insufficient buffers (in pink) within the 100 foot buffer of streams in the Coahulla Creek Watershed.

3.6 Structure Density Analysis

Additional GIS analysis was conducted to investigate the number of structures that occur within a 500 foot buffer of streams within the watershed. This analysis generated the map in Figure 3.4.b., and the information in Table 3.4.a. Specific types of dwellings were quantified, and residences can be used to represent the likelihood of septic system presence and ultimately fecal coliform contributions from failed septic systems. The figure and the data in the associated table were utilized to evaluate where sources of fecal coliform contributions from septic systems are likely significant. These data indicate that septic systems may be significant issues on the outskirts of the City of Varnell and the City of Tunnel Hill.

Table 3.6.a. A display of the number of residential and agricultural structures found within a 500 foot buffer per subwatershed within the Coahulla Creek Watershed and Mill Creek Subwatershed.

STRUCTURES WITHIN BUFFERS			
Subwatershed Name	**Agricultural**	**Commercial**	**Residential**
Coahulla Creek Watershed Overall	712	631	6386
Mill Creek Subwatershed	37	397	2129

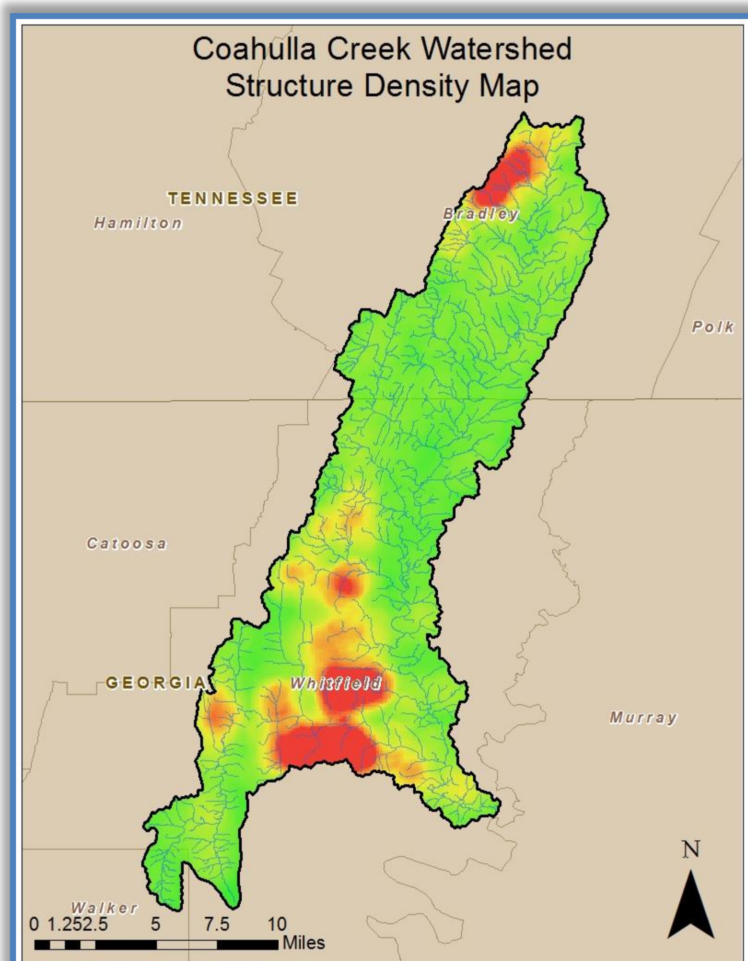


Figure 3.6.a. An image depicting the distribution of structures found in the Coahulla Creek Watershed. Red depicts a high density area, whereas green reflects low density areas.

4. Pollutant Source Assessment

This section of the WMP outlines the most likely sources of significant impairing pollutants within the watershed. The most significant issues in the watershed stem from excessive fecal coliform loads, and presumably sediment and habitat homogeneity, which more than likely led to impaired biota. The two major categories of pollutants addressed in this section are point and nonpoint sources. The quantity and type of pollutants found in a waterbody are directly related to the land uses within the watershed. See Figure 2.3.a. for a map depicting the distribution of land uses throughout the watershed. The following information was gathered through both research and stakeholder input during WMP formation.

4.1 Nonpoint Sources

Nonpoint source pollution encompasses a wide range of pollutants distributed across the landscape and washed into streams during rain events, as well as those NPS pollutants deposited directly into streams from unregulated sources. These pollutant sources are difficult to identify and regulate since they are typically ubiquitous and originate from numerous land parcels with various owners. NPS pollution can also be quite variable over time due to variable land uses, management practices, grazing rotations, runoff events, and other factors. It is generally assumed that NPS pollution makes up a significant portion of the pollutant load in this watershed leading to impairments despite several point sources permitted under the NPDES program.

<u>Agriculture</u>

Within the Coahulla Creek Watershed, agriculture makes up 23.4% of the land use. Activities range from livestock grazing and hay production (pasture = 21.7%) to cultivation of crops (1.7 %). Many poultry operations are also located in the watershed. Agriculture, with the exception of forest, is the most dominant land use type; hence it likely plays a role in impairment issues. Stakeholders postulated that installing agricultural best management practices would likely help reduce fecal coliform bacteria and sediment loads within the watershed. These agricultural programs will not only lead to nonpoint source pollution reduction, but will do so in a way that is already accepted in the local community, while also assisting farmers in their management operations.

Figure 4.1.a. Cropland is a common contributor of nonpoint source pollution in the U.S.; however, it only accounts for a small percentage of land use within the watershed.

With pastures representing approximately 22% of the land use in the watershed, livestock has the potential to be a significant contributor to both fecal coliform and sediment loads in the form of NPS pollution. Although dairy cattle, hogs, and poultry spend a large portion of their time confined (see CAFOs in 5.2), beef cattle spend the vast majority of their time in pastureland. In the pasture, cattle tend to deposit their feces upon the land, as well as create erosion issues and destroy vegetative cover when overgrazed. When significant feces builds up and erosion becomes more prevalent on the landscape, fecal coliform bacteria and eroded soil become more frequently captured by rainwater runoff and delivered into nearby waterways.

In addition to nonpoint sources of pollution derived from the landscape, beef cattle often have access to streams that run through pastureland, giving them the opportunity to deposit feces directly into the waterways. This stream access also generally contributes to the sediment load through streambank erosion, which is often significant. When cattle destroy much the vegetation in the riparian zone, the streambank may collapse into the waterway, increasing the sediment load further.

Poultry operations are also fairly common throughout the watershed. Depending on the number of animals present, these operations can be classified as potential nonpoint sources (< 125,000 animals) or potential point sources (> 125,000 animals; see Permitted CAFOs in 5.2) which require an NPDES permit to operate. There are over 50 poultry operations in the Coahulla Watershed, although none exceed the threshold above which NPDES permits are required. Despite this fact, these operations are still potential NPS contributors due to their production of large quantities of animal waste that is often applied to agricultural lands. According to Wang et. al. (2004), fecal coliform can survive for several months after animal waste excretion. This indicates that even aged manure could be a significant contributor to the fecal coliform bacteria load when applied to the landscape.

Nearly 2% of the watershed is characterized as cropland. Despite this small percentage, croplands could still contribute significant amounts of pollutants (e.g., fecal coliform after manure application) into nearby waterways. Croplands can also factor into sediment loading. According to the National Research Council (1989), sediment deposition into surface waters is significantly related to cropland erosion within basins.

Wildlife

Depending on the animals present within the watershed (see 3.2), wildlife contributions of fecal coliform and sediment to streams vary considerably. Based on the TMDL written for this section of Georgia and information provided by the Wildlife Resources Division of Georgia DNR, the animals that spend the majority of their time in and around aquatic habitats are the most important wildlife sources of fecal coliform bacteria. Waterfowl are considered to be significant contributors since they spend a large portion of their time on surface waters and deposit feces directly into the waterway. Other contributors include aquatic mammals such as beaver, muskrat, and river otters. Feral pig populations (*Sus scrofa*), known to exist along the floodplains of every major river in Georgia, could contribute as they have been sighted locally. According to Kaller et. al. (2007), these animals can contribute both fecal coliform and sediment to waterways due to their numbers and behavior. Despite feral pigs and other animals that may be viewed as pests, wildlife populations are mostly naturally occurring and an indicator of the relative health of the environment. For this reason, minimization of fecal coliform contributions from wildlife will not be a major focus of the plan. Instead the plan will emphasize the reduction of anthropogenic sources of fecal coliform bacteria.

Figure 4.1.b. Wildlife can also contribute to a stream's fecal coliform load.

Urban/Suburban Runoff

Sediment pollution can originate from many sources in an urban or suburban area, such as Dalton. Land-disturbing activities are a consistent contributor of sediment to streams nationwide. These activities include clearing, grading, excavating, or filling of land. Disturbance of land typically removes the vegetation, which exposes the surface sediment to rain events resulting in erosion and sediment delivery into streams. For example, conversion of forests to developed land (clearing) is often associated with water quality degradation.

In more urbanized areas, stormwater runoff can also contribute to erosion issues in streams. This type of runoff originates from developed land that contains higher proportions of impervious surface cover (rooftops, parking lots, roads, etc.). These surfaces concentrate large quantities of water into the stream quickly, resulting in stream bank erosion and incision. Eventually, as banks collapse, streams tend to widen and collect additional sediment, which can lead to losses in habitat variation. Additional stormwater practices and other green infrastructure may be able to reduce these issues in the Coahulla Creek Watershed.

In addition to introduction of sediment into waterways, fecal coliform contributions can also occur as a result of stormwater runoff. Domestic pets and urban wildlife populations contribute fecal coliform to the landscape, which is often washed directly into streams during rain events. Similar contributions in urban environments often originate from leaks and overflows from sanitary sewer systems, illicit discharges, and leaking septic systems in areas not serviced by sewer.

Figure 4.1.c. A failing septic system can introduce pathogens into nearby streams. This system has effluent surfacing in the yard, and drains into a nearby tributary.

Stakeholders identified failing septic systems as a significant contributor to the fecal coliform load in the watershed. Past efforts to reduce this widespread issue were dispersed throughout the greater Conasauga Watershed area. Targeting these issues in the smaller Coahulla Creek Watershed should lead to more effective water quality improvement efforts.

When considering failing septic systems as contributors of fecal coliform bacteria in our streams, it is important to look at current systems on the ground, as well as anticipate those that come along with new development. Currently, there are over 5,000 households in the watershed that are serviced by septic systems. The rate of urban and suburban expansion in Whitfield County has been high during the past decade, creating more potential sources of fecal coliform pollution. According to U.S. Census data, the population of Whitfield County has increased by 23% during 2000 – 2010, which is more than twice the national growth rate (9.7%).

Due to population growth rates and the frequent use of septic systems (over 5,000 households in the watershed), stakeholders considered failing septic systems to be another significant source of fecal coliform bacteria loads. It was decided by the stakeholder group that landowners experiencing septic system failures would likely be motivated to fix the issues, especially if cost-share assistance is available.

4.2 Point Sources

Point sources of pollution are those which are delivered to a waterbody via "discrete conveyances". These sources are regulated through the NPDES permitting system. Point sources typically include industrial sites, municipal separate storm sewer systems, and confined animal feeding operations (CAFOs). There are several permitted point sources in the watershed, but it is assumed that the majority of impairing pollutants result from NPS pollution.

Industrial Sites

Many industries are required to apply for an NPDES permit when discharging industrial storm water to a nearby waterbody. There are 15 permits of this type located within the watershed. All of these sites are located in the lower portion of the watershed. Since all are in compliance with their NPDES permits, it is likely that industrial stormwater's contribution to stream impairment is minimal. Table 4.2.a. lists the industrial NPDES permits found within the watershed.

Table 4.2.a. A display of the locations of facilities that hold NPDES permits within the Coahulla Creek Watershed.

INDUSTRIAL NPDES PERMITEES –COAHULLA CREEK WATERSHED	
FACILITY	**ADDRESS (DALTON, GA)**
Basic Ready Mix	515 Brock Drive
Royal Adhesives & Sealants	1010 Vista Drive
Beaulieu Group Plant 810	1809 Kimberly Park Drive
Shaw Industries	902 North Hamilton
Beaulieu Group Svc. Ctr.	3201 North Dalton Bypass
Self Recycling, Inc.	1206 Lamar Street
Dalton Quarry	585 Cherokee Estates Rd
Ashland, Inc.	1018 Vista Drive
Peach State Labs, Inc.	1202 Dozier Street
Shaw Industries	201 Springdale Road
Ready Mix USA	419 Selvidge Street
Beaulieu Plant 830	1510 Coronet Drive
Mfg. Chemical	1804 Kimberly Park Drive
Tandus Flooring, Inc.	1210 Royal Drive
Tandus Flooring, Inc.	1000 Vista Drive

Stormwater Systems

Runoff from rain events in urbanized areas is typically managed through the use of a municipal separate storm sewer system (MS4). This runoff captures pollutants as it travels across the urban landscape, and enters local waterways via stormwater conveyances without being treated. These conveyances are considered point source discharges, and operators are required to obtain an NPDES permit and develop a stormwater management program in order to mitigate any conveyed pollution.

According to the EPA (2011), Stormwater Phase I regulations (1990) require *medium* and *large* cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges. Phase II (1999) requires regulated small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the permitting authority, to obtain NPDES permit coverage for their stormwater discharges.

There are no areas within the Coahulla Creek Watershed that fall under phase I regulations; however, there are three urbanized areas that are regulated by phase II. The city of Cleveland, TN is located higher in the watershed, as well as the city of Varnell, GA. Dalton is located lower in the watershed. These cities are potential sources of the impairing pollutants in the Coahulla Creek Watershed.

CAFO Permits

Confined animal feeding operations (CAFOs) are considered a point source of pollution by Georgia EPD and require an NPDES permit as they reach certain capacity thresholds. Although there are many poultry operations with the Coahulla Creek Watershed, none are large enough (>125,000 birds) to require an NPDES permit and therefore be characterized as point source pollution. No dairy or swine operations are present within the watershed either. Thus, no CAFOS are present in the watershed that are large enough to require an NPDES permit. Permitted CAFOs are therefore not considered to be a source of impairment in the Coahulla Creek Watershed.

Figure 4.2.a. There are over 50 poultry operations within the Coahulla Creek Watershed. None, however, exceed the capacity threshold to require NPDES permits.

5. Watershed Improvement Goals

This section of the WMP outlines the overall goals for the watershed improvement process in the Coahulla Creek Watershed. In addition, the minimum NPS load reduction objectives for each segment (as written in TMDLs) are included and describe the estimated necessary load reductions for streams to meet water quality criteria.

5.1 Overall Objectives

Restoration

The primary objective of this WMP is to outline a framework that will lead to the restoration of the Coahulla Creek Watershed to achieve and maintain compliance with state standards. Four segments have been placed on Georgia's 303 (d)/305 (b) list, totaling over eighteen miles of impairments. A major component of restoration efforts will include implementing cost-share programs that incentivize landowners to address pollution sources on their privately-owned lands. Reductions in relevant pollutants will be tracked through water quality monitoring and potentially by sampling fish assemblages. State-designated water quality collection and analysis protocols will be followed during periodic sampling events in an effort to de-list stream segments impaired for high fecal coliform bacteria counts. In addition, sampling rotations by monitoring groups (from Georgia EPD) should help indicate improvements in biotic integrity as they occur within the streams of the watershed.

Figure 5.1.a. Excluding cattle from streams can reduce the fecal coliform load in the watershed.

The restoration objectives outlined in this WMP were derived from the desires of the Watershed Advisory Committee and local stakeholders. The underlying concerns for these water quality issues within the group were variable; however, a general consensus was identified. The main concern of the stakeholder group appears to be the health hazard that fecal coliform contamination poses. In addition, the stakeholders expressed the need for sedimentation issues that negatively affect aquatic organisms to be reduced to preserve the biodiversity present within the watershed.

Anti-degradation

Through water quality sampling data obtained during the formation of this WMP, the stakeholder group recognized that the entire watershed contained sources of fecal coliform and sediment, and that in addition to the current impairments, other stream segments had the potential to be listed at some point as well. Due to this recognition, anti-degradation efforts were emphasized as a primary objective of restoration efforts. For this reason, any cost-share program will be implemented on a watershed-wide basis. In addition, outreach efforts will be focused on the whole watershed to raise awareness of existing programs that make best management practices more affordable to private landowners and prevent further degradation of stream segments within the watershed. Given the current growth trends in the area (e.g., conversion of farmland to suburban uses), one of the biggest threats to anti-degradation objectives in the future may be stormwater pollution that negatively affects water quantity and water quality.

Education

The third and final objective identified in this plan is to educate local citizens on the uniqueness of their watershed and its diverse fauna, the NPS threats present in the area, and what can be done to mitigate these issues. Education and outreach efforts are paramount if watershed goals and objectives are to be reached. Involving local communities in the watershed improvement process is a key to success, and providing an opportunity for locals to gain an understanding of the importance of watershed restoration needs to be a priority program component to supplement BMP installation efforts.

Presentations at local events were suggested by the stakeholder group as a means to reach a broad audience in the community. Creation of events with the sole purpose of gaining support was also suggested. Specific examples include stream cleanups, rainbarrel workshops, and canoe cleanup floats down local waterways. Although the majority of Coahulla Creek may not be large enough for canoe cleanup floats, the objectives would still be accomplished by floating the larger Conasauga River, which Coahulla Creek enters not far from Dalton.

5.2 Load Reduction Targets

Two impaired segments within the watershed are the result of past fecal coliform concentrations exceeding state standards. These segments have had TMDLs created in 2003 and 2009. Based on these TMDLs, percent reductions of fecal coliform loadings were calculated. These load reductions attempt to calculate how much the pollutant load must be reduced from the watershed for a stream to meet state criteria for a particular pollutant. The results from these calculations are listed for each segment in Table 5.2.a.

The other two listed segments resulted from impacted biota. It is assumed that sediment load was the main contributor to the state of the biotic assemblages, and that should load reductions for sediment be reduced and maintained, biotic assemblages will recover in time. Sediment loads were assessed and established for each of the impaired segments. Total Allowable Loads were calculated from this information. These calculations allowed percent reduction estimates needed to de-list problem segments to be obtained. The results from these calculations are also listed in Table 5.2.a.

Table 5.2.a. Required load reductions for impaired segments in the Coahulla Creek Watershed.

Impaired Stream Segment	Impairing Pollutant	Percent Reduction
Coahulla Creek From Beaverdale Road (728) to Mill Creek	Fecal Coliform Bacteria	89%
Coahulla Creek From Mill Creek to Conasauga River	Fecal Coliform Bacteria	46%
Haig Mill Creek From Haig Mill Reservoir to Coahulla Creek	Impacted Biota (Fish)	7.71%
Mill Creek From Haig Mill Creek to Coahulla Creek	Impacted Biota (Fish)	0.06%

6. Pollution Reduction

This section explores management programs and strategies (structural and non-structural) that currently exist within the Coahulla Creek Watershed that impact fecal coliform and/or sediment pollution. Structural practices are those that are engineered and result in a physical structure that is designed to reduce a specific type(s) of pollution. Non-structural practices are those that typically work to change the attitude or behavior of individuals. It also explores a proposed program needed in the Coahulla Creek Watershed in order for the previously identified restoration goals and objectives to be accomplished.

6.1 Existing Conservation Programs

There are several existing structural conservation programs implemented within the Coahulla Creek Watershed (See Table 6.1.a.); however, none are unique to the area. Most programs that encourage water quality improvements are ubiquitous across Georgia, if not the nation. Only those that specifically relate to sediment and/or fecal coliform pollution reduction are displayed here.

Table 6.1.a. A display of existing structural programs and practices in the Coahulla Creek Watershed.

Structural Measure	Responsibility	Description	Impairment Source Addressed
Conservation Tillage Program	Limestone Valley RC&D, Limestone Valley SWCD	Makes conservation tillage equipment available for rent within the watershed, helping producers plant their crops with minimal disturbance to the soil. This reduces erosion from cropland, and increases water retention and nutrients.	Agriculture
Environmental Quality Incentives Program (EQIP)	NRCS	Works to address resource concerns on agricultural lands. EQIP is a cost-share program (75% typically) for landowners seeking to implement BMPs on their property.	Agriculture
Conservation Reserve Program	FSA, NRCS	Addresses problem areas on farmland through conversion of sensitive acreage to vegetative cover such as establishing vegetative buffers along waterways. Conversion costs are shared with FSA, and the landowner receives an annual payment for maintaining the conversion.	Agriculture
Sanitary Sewer Maintenance Program	Dalton Utilities	Sanitary sewer system inventory and inspection; infiltration and inflow identification and reduction; sewer line and manhole rehabilitation.	Urban/Residential
NPDES Phase II MS4 Permits	Whitfield Co., City of Dalton, City of Varnell	Stormwater management program consisting of both technical and educational BMPs to reduce pollution in jurisdictional storm water system.	Urban/Suburban

Many programs also provide non-structural practices in the Coahulla Creek Watershed (See Table 6.1.b.), and most are not unique to the area. These practices, although not physically reducing pollution, can arguably improve water quality as much or more than structural practices themselves. Changing behaviors and/or attitudes can be contagious, making a real difference in both the cultural and natural landscape over time.

Table 6.1.b. A display of existing non-structural programs and practices in the Coahulla Creek Watershed.

Non-Structural Measure	Responsibility	Description	Impairment Source Addressed
Georgia Water Quality Control Act (OCGA 12-5-20)	Georgia EPD	Makes it unlawful to discharge excessive pollutants into waters of the state in amounts harmful to public health, safety, or welfare, or to animals, birds, aquatic life, or the physical destruction of stream habitats.	All inclusive
Georgia Erosion and Sedimentation Act	Georgia EPD	Among other things, it prevents buffers on state waters from being mechanically altered without a permit.	All inclusive
Rules and Regulations for On-site Wastewater Management	Whitfield County Environmental Health Office	Stringent enforcement and application of the regulations through permitting and inspection of new and repaired systems.	Suburban, Residential
NPDES Phase II MS4 Permits	Whitfield Co., City of Dalton, City of Varnell	Stormwater management program consisting of both technical and educational BMPs to reduce pollution in jurisdictional storm water system.	Urban/Suburban
Georgia Rules & Regulations of Water Quality Control for CAFOs 301 to 1,000 animal units	Georgia Department of Agriculture, Georgia EPD	Outlines the swine and non-swine Feeding Operation Permit Requirements. CAFOs in this category receive a land application system permit (LAS).	Agriculture
NPDES permit regulations for CAFOs over 1,000 animal units	U.S. EPA, Georgia EPD	Permitting program created to protect and improve water quality by regulating CAFOs.	Agriculture
Conservation Technical Assistance Program	NRCS	Assists landowners with creating management plans for their lands, including but not limited to Farm and Forest Conservation Plans and Comprehensive Nutrient Management Plans (CNMPs).	Agriculture
UGA Cooperative Extension Program	Whitfield Co. Extension Office	Assists with general agricultural assistance, which includes providing suggestions for soil and water conservation.	Agriculture

6.2 Proposed Conservation Program for the Coahulla Creek Watershed

Although this WMP allows for individual organizations to piecemeal restoration efforts by submitting proposals that request funds for only one or more project activity, the stakeholders recommended a more comprehensive approach. The following proposed program, the *Coahulla Creek Watershed Restoration Program* (CCWRP), would be an endeavor partially funded by Clean Water Act (§319) grants (and assisted by in-kind donations of certain stakeholders, agencies, and non-governmental organizations) that would provide cost-shares on practices that have been deemed by the stakeholder group as a means to address the water quality issues specifically related to the local watershed. In addition, this program would attempt to raise awareness of the issues in the area, as well as educate citizens about potential solutions to these local problems.

Proposed Structural Practices of the Coahulla Creek Watershed Restoration Program

Based on water quality analysis results and stakeholder surveys, it was evident that although certain segments are listed for fecal coliform and others for impacted biota, both pollutants of concern are present in excess at times throughout most of the watershed. These data, when combined with the anti-degradation objective as well as stakeholder survey results, indicate the need to implement BMP installations throughout the watershed instead of only those locations in close proximity to the impaired segments themselves. The stakeholders decided that at least some emphasis should be placed on each of the three major sources of pollutants which include agriculture, failing septic systems, and stormwater (streambank stabilization, etc.).

Since agricultural activity encompasses a large proportion of land use within the watershed, the CCWRP could include a cost-share program that will help local farmers afford conservation practices that reduce fecal coliform and/or sediment contributions to receiving waters. Many of these practices are also beneficial to landowners which will serve as additional motivation for participation in the program. Most of the agricultural lands within the watershed are used for grazing, so funds need to be available to assist farmers with an interest in voluntary conservation to restrict livestock stream access and provide alternative watering sources. These practices would reduce the fecal coliform load from direct sources and agricultural runoff in the watershed. Projects that address erosion issues will likely include streambank and heavy use area stabilization. In addition, funds are needed to establish riparian buffers where they are absent. GIS analysis indicated that approximately 23% of the watershed has inadequate riparian buffers. Projects to improve riparian buffers would help reduce both fecal coliform and sediment pollution by acting as a physical barrier to runoff during

Figure 6.2.a. Constructing heavy use area pads for cattle feeding or watering areas can reduce erosion and sediment loads in the watershed.

rain events.

Altogether, many types of agricultural BMPs will be installed as a part of the CCWRP. In general, however, projects that only marginally address the resource concerns should be avoided. A suite of agricultural BMPs may be installed as part of the restoration process assuming they collectively assist in sediment and/or fecal coliform load reductions.

Figure 6.2.b. A septic system repair can reduce the fecal coliform load in streams. A cost-share program can help incentivize costly repairs.

Since failing septic systems were determined by the stakeholder group to be a significant contributor to the fecal coliform bacteria load in the watershed, the CCWRP could include a cost-share program to address this issue. High failure rates are said to occur for several reasons, including poorly percolating soils, outdated systems, and the low-income financial condition of a portion of the local population. A cost-share program in the area would help to incentivize more of the population to get their systems repaired. Cost-share rates are likely to vary according to the likely contributions of the failed systems to pollutant loads, and in the cases of impoverished families, financial conditions. In addition, greater public demand for septic system repairs will likely result in lower cost-shares offered in order to assist more homeowners, as well as result in greater water quality benefit per dollar. Although higher rates will generally be offered on projects that more significantly reduce pollutant loads, inclusion of other property owners to be eligible for lower cost-share rates will maximize program participation while building important momentum within communities.

Water quality data and the existence of impacted biota impairments led the stakeholders to desire an emphasis on stormwater BMPs, especially streambank stabilization. A cost-share program would incentivize private landowners to implement streambank stabilization techniques, as well as riparian restoration and potentially practices that mitigate stormwater quantity (retention ponds, etc.). Several homeowners in the area have already inquired with Dalton Utilities for help with streambank stabilization, and it is expected that cost-shares will be well-received by citizens in the area.

<u>Proposed Non-Structural Practices of the Coahulla Creek Watershed Restoration Program</u>

Efforts to educate and inform the public should also accompany the cost-share programs funded through the CCWRP. The idea is to invest in conservation practices while demonstrating their effectiveness to other landowners, with hopes that voluntary conservation and modern land management practices that address resource concerns become contagious in the community. At the least, the concepts and practices will slowly become more accepted over a period of time as they become more commonplace. Local newspaper articles derived from the press releases, farm days, and workshops are all acceptable ways to spotlight the benefits of agricultural BMPs. Other efforts will offer educational opportunities during volunteer work days (riparian plantings, stream cleanups, etc.).

As a part of the CCWRP, an outreach plan should be developed for any and every grant that is received from the 319 program. This plan should identify annual or semi-annual events that will be held that encourage public participation in the watershed improvement process. These events could include canoe floats, stream cleanups, and the establishment of viable Adopt-A-Stream groups. Although many of the streams within this watershed may be too small for floats or effective cleanups, the Conasauga River offers ample opportunity to make significant connections between citizens and their waterways.

Figure 6.2.c. Volunteer events, such as stream cleanups, can keep stakeholders engaged while benefitting stream quality.

In addition, the new program should include promotion of the watershed improvement process to local stakeholders to further develop and maintain program momentum. Press releases should be periodically issued to local newspapers highlighting program details, and the watershed issues it attempts to resolve. Promotions should also include local presentations to stakeholder groups. These promotions would serve to maintain community interest in the restoration effort by reminding local groups of the benefits the implementation effort is seeking to provide (e.g., reduced human health risk and water treatment costs and increased financial assistance within the community). These stakeholders should be also updated as significant progress is made toward water quality goals in order to show them that the goals of the restoration efforts are attainable.

7. Implementation Program Design

The objective of this WMP is to outline implementation efforts needed to result in the long-term goal of de-listing the four impaired stream segments, while ensuring additional segments are not listed. This section of the WMP outlines specific restoration activities, how they relate to implementation milestones, and estimated dates of completion. In addition, costs associated with the measures needed for watershed restoration are estimated.

7.1 Management Strategies

The recommended strategy for implementation of this WMP is to create and manage a program that features both structural and non-structural controls within the watershed to address the fecal coliform and sediment issues. It is the intent of the proposed restoration program (CCWRP) to restore the watershed to the extent that impaired segments are eventually de-listed, while ensuring that additional segments are not listed. This should be accompished by increasing the available agricultural BMP cost-share opportunities, creating a septic system repair cost-share program, assisting in the stabilization of problematic streambanks, making available educational opportunities to encourage public participation in the watershed improvement process, and monitoring water quality to track improvements and potentially de-list impaired segments. Septic system failures will be identified and addressed with the technical assistance provided by the North Georgia Health District. The NRCS will assist with technical advisement with respect to agricultural projects. Dalton Utilities and other stakeholders will assist with streambank projects and water quality sample analysis. Other agencies and non-governmental organizations will make key contributions to outreach efforts, as well as other facets of the program. All participation in grant programs will be voluntary in nature, and great care should be taken to respect private property rights.

In order to de-list several stream segments through implementation of a number of small projects, it is likely a long-term investment of time and significant funding will be necessary. Assuming the behaviors and land management practices improve over time, the benefits of clean water can last generations. It has been estimated that approximately 25% of the critical areas within the watershed can be treated with BMP installations to reduce NPS pollution through the implementation of four separate Clean Water Act §319 grants. The stakeholder recommended program, as outlined here, would cumulatively fund over $700,000 worth of projects and be implemented over the course of thirteen years (including grant proposal submission periods). This proposed allocation of funds is similar to other restoration efforts that have been funded in the state, yet is to be focused on a smaller geographic scale, which should lead to more pronounced improvements. It is believed that multiple stream segments could be de-listed as a result of this effort, although there is a possibility that more funding could be necessary to accomplish that goal.

7.2 Management Priorities

Project Fund Allocation

Cost-share programs are to be developed for agricultural BMP installations, septic repairs, and streambank stabilization projects. Stakeholders were solicited as to how to allocate the funds between these projects within the watershed. Stakeholder opinions were variable, but analysis of responses resulted in approximately 50% of the potential funds being allocated to septic system repair, 30% to agricultural BMPs, and 20% to streambank stabilization projects.

Cost-Share Rates

Agricultural BMPs addressing water quality concerns should generally be cost-shared upon at a rate of 60%. This rate is such that these projects adequately assist in providing matching fund contributions that count toward grant requirements, while remaining reasonably competitive with the NRCS EQIP program, which cost-shares at 75% on estimated project costs for projects that receive funding.

Streambank stabilization projects should also be cost-shared upon at a rate of 60%. This rate again allows completed projects to adequately assist in providing matching fund contributions that count toward grant requirements, and should incentivize landowners with considerable streambank concerns to act to improve their properties. When the high cost of this practice is prohibiting, perhaps a portion of the landowner cost could be offset by donated advisement, planning, and expertise.

For septic system repair projects, cost-share rates should depend on the demand. If demand for repair assistance is high, cost-shares should be set at lower rates in order to accommodate as many projects as possible and achieve the greatest water quality improvement. The most ideal projects for water quality improvement will be those significantly addressing the pollutants in close proximity to streams within or just upstream of impaired reaches. However, inclusion of landowners from the entire Coahulla Creek Watershed to be eligible for program cost-shares on projects that address water quality concerns is necessary to maximize program participation by building important momentum within the local community. In addition, since the problem areas are often in the downstream reaches, all areas of the Coahulla Creek Watershed likely contribute to the impaired status of local stream segments, albeit to varying degrees.

Since certain septic system repair projects may address resource concerns more than others, variable cost-share rates will generally be utilized to reflect the anticipated water quality improvement. For example, a septic system within 100 feet of an impaired stream will generally receive a higher cost-share rate than one located much farther away. This method of incentivizing participation will bring about the greatest load reductions while maximizing the overall number of participants. Similarly, impoverished members of the community may be further incentivized with higher cost-share rates in order to ensure they get failing systems repaired.

7.3 Interim Milestones

The stakeholders recommended that this WMP should be implemented for multiple years over several grants, each of which may have its own updated objectives and milestones according to changes in watershed conditions and/or management strategies. This section, however, seeks to outline objectives and milestones that could be used by any group (in any combination) seeking funds for restoration efforts in the watershed.

OBJECTIVE #1: Create/revise a septic system repair cost-share program in the watershed.

MILESTONES:

- Identify local certified septic system contractors interested in participating in the program.
- Hold meetings with NGAHD representatives to design program.
- Establish initial cost-share criteria based on proximity of system to state waters.
- Hold a septic system installer's workshop to explain program details, and ensure standards for participation are understood.
- Maintain the septic repair program throughout the implementation process.

The repair process should involve the submission of bids from locally-owned businesses. These businesses should attend an installer's workshop to participate in grant projects. Bids should be requested from 3-5 contractors for each repair, and the specific businesses that receive the opportunity to bid should be determined by using a rotating list of approved contractors. The homeowner should be allowed to choose which bid to accept. The rate of cost-share should be on a sliding scale that will result in offering more assistance to projects that will likely result in the greatest load reductions.

OBJECTIVE #2: Create an agricultural BMP cost-share program in the watershed.

MILESTONES:

- Hold meetings with the NRCS to determine appropriate BMPs and cost-share rates.
- Advertise the available grant money through local media.
- Issue press releases for successful BMP installations.
- Maintain the agricultural BMP program throughout the implementation process.

Agricultural BMP installation should be on a strictly voluntary basis, and landowner confidence and satisfaction should be a primary focus. This will allow any program to develop a positive reputation in the area, which is hoped to eventually garner more conservation interest in the watershed.

OBJECTIVE #3: Create streambank stabilization cost-share program in the watershed.

MILESTONES:

- Hold meetings with the NRCS and Dalton Utilities to determine appropriate methods and evaluate whether conceptualized cost-share rates are appropriate.
- Advertise the available grant money through local media.
- Issue press releases for successful streambank restoration projects.
- Maintain the program throughout the implementation process.

OBJECTIVE #4: Implement BMPs to achieve load reductions specified in the TMDL.

MILESTONES:

- Identify farmers willing to cost-share on agricultural BMP projects.
- Identify property owners willing to address streambank issues and inadequate riparian zones.
- Identify homeowners within targeted subwatersheds with failing or without proper septic systems.
- Implement septic repairs and pump-outs in the watershed anticipated for each grant period as shown in Table 7.7.b.
- Implement agricultural BMPs in the watershed anticipated for each grant period as shown in Table 7.7.b.
- Implement streambank BMPs in the watershed anticipated for each grant period as shown in Table 7.7.b.
- Estimate load reductions from projects when possible.

BMPs that specifically address fecal coliform should be emphasized on agricultural lands. These include activities that restrict cattle access to the stream while providing alternative water sources, and enhancement of riparian zones that may prevent animal waste and sediment from entering the stream during runoff events. Failing septic systems and "straight-pipes" should be identified and repaired to reduce the contribution of fecal coliform originating from residential areas. Streambank stabilization projects should be sought on agricultural land, as well as in urban areas that experience heavy flows from increased impervious surface cover.

OBJECTIVE #5: Reduce pollution inputs from suburban and rural areas through education and outreach.

MILESTONES:

- Provide opportunities for the public to assist with stream restoration and cleanup efforts.
- Provide opportunities for the public to participate in Georgia's Adopt-A-Stream Program.
- Conduct presentations discussing watershed restoration efforts at local events.
- Submit press releases to inform the public of the restoration process and NPS pollution issues and solutions.

A key component of the education and outreach portion of implementation should be designed to raise the awareness of citizens in the area through local media and "hands-on" events. Stream cleanups, creek walks/floats, and rainbarrel workshops should be planned to be offered to interested citizens in the area throughout any implementation effort. This ensures that the general public is provided the opportunity to not only learn about the watershed, but also participate in restoration events. These events should have the ability to not only educate and empower local citizens about water quality, but also effectively provide program outreach that can lead to agricultural BMP and streambank stabilization projects, as well as septic system repairs.

OBJECTIVE #6: Document changes in water quality throughout WMP implementation.

MILESTONES:

- Submit a targeted water quality monitoring plan for each grant received.
- Monitor several sites regularly, including at locations previously sampled by Georgia EPD.
- Conduct Pre- and Post-BMP monitoring for large agricultural BMP projects near significant streams.
- Sample to potentially de-list streams impaired for fecal coliform violations.
- Initiate WMP revisions.

Baseline data should be collected to determine the average concentrations of pollutants found at various locations within the watershed. This would allow for future comparisons when data is gathered to determine if improvements are measurable and if so, their significance. Targeted monitoring (accompanied by a Targeted Water Quality Monitoring Plan) should occur at least once for each grant that is received.

When large agricultural BMP projects are implemented near significant streams, an effort should be made to sample for the pollutants of concern before and after project completion. This may allow inferences to be made about what projects are most beneficial, as well as build local confidence on finding solutions to water quality issues.

A SQAP should be also written for each grant that is received. This will guide efforts to sample fecal coliform according the procedure necessary to "de-list" stream segments should standards be found to have been met.

Biological monitoring will also be conducted as part of regular Georgia DNR/EPD rotations and will provide insight on whether the local biotic integrity in the impaired segments is improving as water quality improvement activities take place in the Coahulla Creek watershed. Additional biotic monitoring (e.g., fish IBIs and IWBs, etc.) could be conducted in conjunction with a university, or other qualified entity, to investigate whether the biotic community has improved in the impacted biota segments should funding be approved.

OBJECTIVE #7: Provide local community leaders with the knowledge to consider the effects management decisions may have on stream health in the watershed.

MILESTONES:

- Establish connections with local community leaders.
- Conduct presentations to community leaders discussing water quality issues and the solutions that BMPs can provide.
- Share water quality data and interpret the results with local community leaders for discussion purposes.

City and county personnel should be updated regularly through presentations at local meetings to keep up involvement and/or awareness during the restoration process.

7.4 Schedule of Activities

The following schedule provides the anticipated years for various objectives and milestones to be addressed in the WMP implementation process, assuming that a comprehensive approach is pursued by the proposing organization and that funding needs are met.

Table 7.4.a. A display of milestone activities and a timeline in which they will each be addressed throughout the implementation of the WMP.

IMPLEMENTATION SCHEDULE													
MILESTONE ACTIVITY	**2013**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Submit §319 Proposal to GA EPD	X		X			X			X				
Create septic cost-share program		X											
Create an agricultural BMP cost-share program		X											
Create streambank stabilization cost-share program		X											
Install agricultural and streambank BMPs		X	X	X	X	X	X	X	X	X	X	X	X
Install septic system BMPs		X	X	X	X	X	X	X	X	X	X	X	X
Establish AAS Monitoring Group			X		X		X		X		X		X
Update County Commission/press releases			X		X		X		X		X		X
Conduct education/outreach Events		X	X	X	X	X	X	X	X	X	X	X	X
Conduct WQ monitoring (targeted)		X			X			X			X		
Conduct WQ monitoring (de-listing)				X			X			X			X
Reevaluate milestones				X			X				X		
Initiate reassessment of WMP						X					X		

7.5 Indicators to Measure Progress

The numbers of agricultural, streambank stabilization, and septic system projects completed and outreach event attendance should reveal progress that the implementation program is gaining momentum. Landowner participation rates can be another useful tool in determining the success of grant implementation. It is hoped that the rate will increase through subsequent years of watershed restoration due to education and outreach efforts, as well as the gradual acceptance of BMPs within the watershed. Education and outreach participation rates can be analyzed to help measure progress. It is anticipated that these rates will also increase through subsequent years as the events gain notoriety within the watershed.

Of more importance in the long run will be to measure how these projects have translated toward the goals of accomplishing the necessary load reductions and eventually de-listing the impaired segments within the watershed. For the stream segments impaired for high fecal coliform bacteria counts, tracking water quality improvements will best indicate progress toward reducing fecal contamination and eventually de-listing streams. Water quality improvements should be revealed using two water quality sampling regimes intermittently throughout the implementation process. Both types of water quality monitoring (targeted sampling and "de-listing" sampling) should be used to measure progress towards de-listing of segments impaired for exceeding fecal coliform standards.

For stream segments impaired for poor biotic diversity, progress may be more difficult to indicate. Targeted water quality monitoring may potentially reveal changes in TSS (total suspended solids) within the water column over time, but Georgia DNR/EPD will be relied upon to sample fish according to their scheduled rotations in order to determine whether biotic integrity has improved and to potentially de-list streams.

In addition, discussions have been had with the University of Tennessee at Chattanooga Biological and Environmental Sciences Graduate Department to work with them to assess the biotic integrity of the impacted biota segments should funding be provided. The group has the expertise and equipment to provide the assessments according to the same protocols, and working with them may allow a more immediate assessment (and potentially more frequent assessments focusing on temporal changes) of the impacted reaches than Georgia DNR/EPD can provide. It is not yet known, however, whether such an endeavor would result in de-listing should it reveal improved fish assemblages. Other than Georgia DNR/EPD, only Tennessee Valley Authority to our knowledge is known to have sampled biota locally that has resulted in impairments, although this implies their efforts could also result in de-listing impaired reaches. It is unknown whether the same deference is given to practiced fish ecologists at universities as well.

7.6 Technical Assistance and Roles of Contributing Organizations

This section will focus on the roles of various groups anticipated to contribute to make any restoration effort a success. Any organization seeking to aid in watershed restoration should rely on technical expertise from the NRCS with respect to agricultural BMP implementation, Dalton Utilities and/or NRCS with respect to streambank projects, and the North Georgia Public Health with respect to septic system BMPs. The program also relies on in-kind assistance with logistics and education/outreach activities from other groups listed below (Table 7.6.a.).

Table 7.6.a. The following groups are anticipated to contribute to implementation by taking on the roles described below. While working towards accomplishing conservation goals, many of these activities could count towards non-federal match contributions associated with any funded 319 projects.

Organization Roles and Responsibilities		
Organization Name	**Organization Type**	**Description of Role in Coahulla Creek WMP Implementation**
Analytical Industrial Research Laboratories	Private Company	Provide discounted services in order to aid the restoration efforts. Analyze water samples for fecal coliform concentrations, which will be collected by project partners throughout implementation of this plan.
Conasauga River Alliance	Local Non-profit	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
Dalton State College	Local University	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
Dalton Utilities	Local Utility	Provide in-kind services such as water quality sample analysis and technical assistance with streambank restoration efforts within their operating area.
Dalton-Whitfield Solid Waste Management Authority	City/County Org.	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
Environmental Protection Agency	Federal Agency	Provide EPA Clean Water Act Section 319 funds to Georgia EPD to administer through the state 319 grant program.
Georgia Department of Natural Resources	State Agency	Conduct monitoring rotations to sample sites in the watershed for fecal coliform bacteria and biota that can reveal improvements or aid de-listing efforts.
Georgia Environmental Protection Division	State Agency	Adminster Clean Water Act Section 319 Grants to provide funding for this restoration program.
Keep Dalton-Whitfield Beautiful	Non-profit	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
Limestone Valley Soil and Water Conservation District	State Agency	Assist with marketing for agricultural BMPs in the watershed. Potentially help identify willing landowners in the watershed that are interested in the program.
Limestone Valley RC & D Council	Quasi-Governmental Organization	Lead implementation efforts including submitting grant applications, serving as grantee fulfilling reporting obligations, marketing program components, spearheading outreach efforts, managing finances, conducting monitoring, and managing projects
Natural Resources Conservation Service	Federal Agency	Provide technical expertise for agricultural BMPs. This process will include multiple farm visits, the development of a conservation plan for the landowner, project supervision and project inspection. All projects will be installed according to NRCS specifications and standards.
North Georgia Public Health	State Agency	Provide technical expertise for septic system repairs. This process will include assessing, planning, permitting, and inspection of installed or repaired septic system components. Help may also be provided through identification of potential septic system repair projects. Assistance may also be provided during workshop preparation if applicable.

Northwest Georgia Regional Commission	State Agency	Provide technical assistance for implementation efforts in the watershed. Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
Prater's Mill Foundation	Non-profit	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
The Nature Conservancy	Non-profit	Serve as a vehicle to promote the Coahulla Creek Restoration Project and assist in marketing its outreach efforts.
University of Georgia Cooperative Extension	State Agency	Assist in marketing efforts for program components and outreach events.
Whitfield County	County Org.	Provide in-kind assistance to any grantee through donated office space, meeting space, and potentially equipment/labor for certain types of projects.

7.7 Estimates of Funding

As discussed in Section 6, many programs are already offered within the Coahulla Creek Watershed that aim to reduce NPS pollution. Despite the existence of these endeavors, impairments persist in the area. The estimates in this section for implementing the recommended comprehensive restoration program (CCWRP) are reliant on the 319 program as the main source of funding (in addition to key contributions from various groups as discussed above), and assume continuous consistent effort from the other programs previously mentioned in order for water quality improvements to occur.

In order to estimate the cost associated with the de-listing of impaired segments within the watershed using a comprehensive approach, an estimate of total watershed treatment was first calculated (Table 7.7.a.). The Total Watershed Treatment Table is an estimate of the cost of a hypothetical instantaneous treatment for fecal coliform and sediment reduction at all critical sites (estimated through statistics, or identified remotely). **The high cost associated with total watershed treatment may be alarming at first glance; however, it is not anticipated that total watershed treatment is necessary in order to de-list the majority of impaired segments.** Despite this fact, it is important to estimate the maximum restoration effort in the watershed based on actual watershed conditions and the amount of money needed to accomplish such an effort, so that lower estimates can be developed that are necessary to meet state criteria.

Many of the BMPs needed to de-list the stream were chosen by the Watershed Advisory Committee based on their expertise and knowledge of the area. The quantities of BMPs estimated in the Total Watershed Treatment Table were calculated using a variety of techniques. The septic system BMP needs were estimated based on information obtained from Whitfield County and failure statistics provided by the U.S. EPA. Agricultural BMP quantities were largely estimated through Geographic Information Systems analysis. Each tributary in the watershed was studied to determine the location of grazing lands and cropland. This information was coupled with an insufficient riparian buffer analysis to determine likely areas in need of BMPs. Many BMPs are often coupled with others, and the frequencies of these associations were calculated using conservative estimates.

Efforts to begin working towards the de-listing of impaired stream segments are recommended to begin immediately with the approval of this WMP. **A goal of approximately 25% of total watershed treatment has been set to be accomplished by 2026, which is believed to likely be sufficient to de-list multiple segments.** In order to lay the framework to accomplish this, Table 7.7.b. was created to outline the recommended approach for fund requests, and collectively represents approximately 25% of the total watershed treatment costs excluding landowner contributions. Again, the costs associated with these tables do not include landowner contributions to the project, and are displayed at 60% of the total cost in order to better describe federal funding needs.

Table 7.7.a. An estimate of the cost associated with a hypothetical instantaneous watershed-wide treatment for fecal coliform and sediment reduction at all critical sites.

TOTAL WATERSHED TREATMENT TABLE			
Agricultural BMPs (Name - Code)	**Quantity**	**Cost/Unit**	**Cost Estimate**
Fence - 382	592,349	$1.90/lin.ft.	$1,125,463
Heavy use area (pad – concrete 3'x4' pad; w/ 614 below) - 561	960	2.23/sqft	$2,141
Heavy use area (pad – geotextile/gravel 50' x 50') - 561	50,000	$1.20/sqft	$60,000
Pipeline - 516	40,000	$1.90/lin.ft.	$76,000
Riparian forest buffer -391	630	$180.00/ac	$113,400
Riparian herbaceous cover - 390	630	$228.50/ac	$143,955
Streambank and shoreline stabilization	8,450	$45/lin.ft.	$380,250
Water well - 642	26	$5,300 each	$137,800
Watering facility - 614	80	$712.50 each	$57,000
Septic System BMPs (Name - Code)	**Quantity**	**Cost/Unit**	**Cost Estimate**
Conventional system repair (13,500 homes on septic)	625	$4000 each	$2,500,000
Experimental system installation	50	$7000 each	$350,000
TOTAL WATERSHED TREATMENT COST			**$4,946,009**
TOTAL TREATMENT COST EXCLUDING LANDOWNER CONTRIBUTIONS (60%)			**$2,967,605***

60% of Total Watershed Treatment Cost.

Table 7.7.b. A display of recommended financial requests for each of four 319 grants sought by an organization attempting comprehensive watershed restoration. The proportions are derived by stakeholder recommendations, and the sum of all activities is approximately 25% of total watershed treatment as displayed in figure 7.7.a.

	Septic System Funds	Agricultural Project Funds	Streambank Project Funds	TOTAL
Proposal 1 - 2013	$90,000	$40,000	$30,000	**$160,000**
Proposal 2 - 2016	$100,000	$45,000	$35,000	**$180,000**
Proposal 3 - 2019	$100,000	$45,000	$35,000	**$180,000**
Proposal 4 - 2022	$115,000	$50,000	$40,000	**$205,000**

7.8 Getting Started

A goal of approximately 25% watershed treatment has been set to be accomplished by 2026 through the recommended comprehensive approach, as opposed to the piecemeal approach (assuming funding needs are met). This treatment prescription is believed to likely be enough to de-list multiple segments, although there is a possibility more funding may be necessary to de-list all impaired streams. Efforts to begin working towards the de-listing of impaired stream segments are recommended to begin immediately with the approval of this document by Georgia EPD and the US EPA.

8. Education and Outreach Strategy

According to the recommendations from local stakeholders, the outreach associated with watershed restoration efforts should seek to put volunteers to work in ways that assist with cleaning up Coahulla Creek, enhancing the riparian buffer, reducing non-point source pollution, and sampling water quality parameters. These events have been recommended, since they aid in raising awareness of local nonpoint source issues, and lay the groundwork for implementation through the establishment of partnerships and identification of potential BMP projects. This idea is based on stakeholder opinions and Limestone Valley's past experience with implementing 319 grant projects, which revealed that the general public is one of the most valuable sources of information with respect to identifying both general and specific sources of pollutants. With each commitment from a citizen to volunteer their time, the likelihood of successful watershed restoration increases. The following descriptions are recommended events that could be held in and adjacent to the watershed. A value could be placed on many of these events through calculating volunteer labor, supplies, or other in-kind donations. This value, with all supporting documentation, could then be reported as match to the federal funds distributed through any applicable 319 grant.

Riparian Tree Plantings

Riparian tree planting events with volunteers could be held on the banks of streams and creeks in the Coahulla Creek Watershed. It is anticipated that trees and the tools with which to plant them would be obtained through the use of grant funds or donations from non-federal sources. The volunteers to plant the trees could be acquired through newspaper articles and word-of-mouth. The primary purpose would be to utilize volunteer labor to plant trees in an effort to increase the riparian buffer within the watershed. Another purpose of this event is to identify potential BMP projects through personal interaction with volunteers that encourage them to assist in "spreading the word" about grant funds and opportunities. These events should include a presentation about the non-point source pollution issues that face Coahulla Creek. Other educational materials on septic system repairs and maintenance, and stormwater practices (rainbarrels, raingardens) should be made available.

Rainbarrel Workshops

During past 319(h) grant implementation projects in Northwest Georgia, rainbarrel workshops have proven to be one of the more useful tools to garner public support for watershed restoration efforts. Through these past projects, the workshops not only develop a relationship with the local Coca-Cola plant that provides the barrels, but also assess the level of interest from the public. In the past, these events have generated overwhelming interest from local communities, and have attracted the most enthusiastic volunteers. Furthermore, rainbarrels are desired by a diverse array of citizens including both farmers and homeowners, which is the exact demographic that is needed to implement BMPs that address resource concerns on residential and agricultural lands.

For the purposes of conducting outreach thorugh a 319(h) grant project, this outreach activity would have the primary objective of incentivizing rainbarrel construction and installation to reduce NPS pollution, but would also serve as the sounding board from which to advertise available BMP funds. At these events, citizens should receive specific information about cost-share funds for projects that benefit both landowners and our natural resources, information about Coahulla Creek's water quality issues (with watershed map visual aids), and the opportunity to work to construct and take home a free rainbarrel to affix to the guttering system of their home. Volunteers from these events should be encouraged to participate further in identifying potential BMP sites and assisting with other outreach events. Follow-up communications should be initiated to keep these interested citizens engaged throughout the implementation process. The barrels donated from Coca Cola, the parts used to retrofit them, and the homeowners' labor and time spent constructing rainbarrels are all values that could be calculated and compiled for matching purposes for any applicable 319 grant.

Adopt-A-Stream Workshops

These events are designed to train volunteers on how to use AAS monitoring equipment to sample water quality parameters and inform them of non-point source pollution issues. At these workshops, volunteers should be informed of the basics of water quality sampling and watershed science, as well as how to use the AAS website to enter all collected data from the stream that they choose to adopt. The hours that volunteers spend in the training workshop, along with subsequent hours of actual sampling, could be used to calculate a match value that could be reported with supporting documentation to Georgia EPD. In addition, volunteers should be given information advertising potential available cost-share funds for both agricultural projects and septic system repairs that reduce non-point source pollution. Some workshop components may be featured in events that fall under a different category (e.g., Water Quality Monitoring Canoe Float).

Conasauga River Cleanup

As part of previous 319 efforts in the watershed, a partnership has been formed with Limestone Valley RC&D, the Conasauga River Alliance, Dalton State College, Keep Dalton-Whitfield Beautiful, Prater's Mill Foundation, Dalton-Whitfield Solid Waste Authority, Whitfield County, The Nature Conservancy, and UGA Cooperative Extension to host a river cleanup. It is planned that this cleanup event will occur annually, and (since many volunteers are from the watershed) could be continuously used as sounding board for advertising available BMP project funds while providing opportunities for NPS education. Volunteer labor and donated material values from sites within and near the Coahulla Creek Watershed could be recorded and reported for matching purposes.

Water Quality Monitoring and Stream Cleanup Canoe Floats

These events should be designed to attract members of the local community to volunteer to clean up our local waterways from a canoe and/or sample water quality during a training session on how to use Adopt-A-Stream equipment for water quality sampling. These volunteers could paddle while picking up all accessible trash within the stream and on the banks, and/or sample water quality at several sites, while learning about the importance of varying water quality parameters, agricultural and residential runoff issues and how they pertain to Coahulla Creek. Maps and handouts should be distributed at stops along the way to discuss pollution sources, BMPs, and steps they can take on their own property to reduce pollution. In addition, local aquatic fauna should be a topic of discussion in order to convey what could be at stake should pollution problems continue. Volunteer labor and donated material values will be recorded and reported as matching funds for any applicable 319 grant.

Summary of Nine Elements

The following is a summary of the Nine Elements addressed in the Coahulla Creek Watershed as identified in the Watershed Management Plan (WMP).

1. An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load reductions or achieve water quality standards.

The Coahulla Creek Watershed has a number of streams that fail to meet the criteria within the State of Georgia for pathogens and impacted biota, which respectively result from fecal contamination and excessive sediment loads. Load reductions of these pollutants are necessary in many stream segments, so the WMP focuses on fecal coliform bacteria and sediment as the nonpoint source (NPS) pollutants of concern and identifies several consistent sources for these pollutants (discussed in detail in Section 4), each of which relates to land use. This WMP identifies agricultural lands for targeting load reductions of both fecal coliform bacteria and sediment pollution through the installation of Best Management Practices (BMPs; e.g., controlling livestock access to water sources, installing alternative watering sources, protecting heavy use areas, etc.). In addition, residences will be targeted for septic system repairs to reduce the contributions of fecal coliform bacteria from failing septic systems. Streambank stabilization projects will be completed on agricultural and/or urban land when feasible.

2. An estimate of the load reductions expected for the management measures described under number 3 (below);

The load reductions recommended in Total Maximum Daily Load (TMDL) documents are featured in Section 5. Management measures that will be implemented to achieve load reductions include agricultural projects, streambank stabilization, and septic system repairs. Agricultural BMPs will vary according to the interests of the farmers, and it is difficult to predict the frequency that each practice will be used during implementation, as well as where projects will be located, the current onsite conditions, and the significance of the NPS pollution at each site to be ameliorated. Septic system repairs will also be conducted as part of the WMP implementation process, especially in close proximity to blueline streams. However, the type of repairs, the proximity to streams, and the contributions to instream fecal coliform counts may vary for each septic repair project. Complicating matters further, conditions within the watershed will change over time. Due to the complexity involved in predicting the load reductions from the broad management measures provided below, the WMP instead seeks to focus on the completion of multiple projects and intermittently evaluating where the watershed is within the restoration process. Eventually, the management measures implemented should result in restoration to the extent that the necessary load reductions will be met and the impaired segments will be able to remain delisted.

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;

A number of management measures including both structural and non-structural practices have already accomplished and will continue to accomplish various objectives. These practices are highlighted within Section 6. WMP implementation will also aim to execute additional structural controls to include some combination of the agricultural practices, streambank stabilization efforts, and a number of septic system repairs directed toward NPS load reductions (discussed in Chapters 6 and 7). The management measures should be implemented across several grants with each involving monitoring to gain updates on current watershed conditions and completing projects potentially according to changing priorities. In conjunction with these efforts, we recommend implementing non-structural controls geared towards promoting watershed improvements with educational involvement within the community (also described in Chapters 6 and 7).

4. An estimate of the amounts of technical and financial assistance needed, and/or the authorities that will be relied upon to implement the plan;

The groups responsible for each existing and new management measure are described within Section 7 of the WMP. Estimates of funding needs are indicated only for activities conducted exclusively for WMP implementation. In order to come up with an estimate, we first conceptualized the extent of work within the watershed potentially needed for complete watershed treatment. Next, we estimated the extent of that treatment that would likely result in the de-listing of the majority of impaired streams. We assumed completion of approximately 25% of total watershed treatment may suffice to meet this objective, and each series of projects and monitoring events may allow for a better estimate. The process used to estimate the financial resources utilized is described in greater detailed in Section 7, and was chosen due to the complexities of implementing load reductions "on the ground" through voluntary conservation practices. The anticipated sources of funding to achieve restoration goals are several Environmental Protection Agency (EPA) Section 319 grants administered by the Georgia Environmental Protection Division (EPD), in conjunction with in-kind services from Whitfield County, Dalton Utilities, North Georgia Health District, and volunteers from across the region.

5. An informational/educational component that will be used to enhance public understanding of and participation in implementing the plan;

Public education and outreach recommendations are identified in Section 8. The more successful programs should remain standard practices for the duration of the implementation process. The recommended educational programs focus on water quality monitoring, septic system maintenance, and stream cleanups, among others. Additional programs should be designed and implemented as necessary for successful implementation.

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

The implementation schedule is found in Section 7 and initially estimates implementation activities to occur through 2026. This includes water quality monitoring and implementation activities (e.g., agricultural BMPs, streambank stabilization and septic system repairs), in addition to education and outreach. Each of these activities will continue through each grant implementation period, although priorities may be reevaluated and subsequently altered with each grant period. Currently, we anticipate that four grant implementation periods may allow for the goals of the WMP to be accomplished.

7. A description of interim, measurable milestones (e.g., e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

A number of goals and objectives are recommended as interim milestones proposed to implement the management measures of this watershed improvement plan. These are included in Section 7. The initial goals of the WMP include developing a septic system cost-share program, building momentum toward implementation of agricultural management practices, completing both septic, streambank and agricultural projects that reduce pollutant loads, carrying out educational activities, and monitoring to observe where extra focus is necessary and maintain that load reductions are occurring as a result of implementation. Over the course of implementation, each grant will include interim milestones with more finite objectives for each of the overall goals (i.e., number of agricultural and septic projects, number of newspaper articles, number of Adopt-A-Stream (AAS) programs initiated, multiple years of water quality monitoring data, etc.).

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; and;

Several sources of the pollutants of concern will be addressed by WMP implementation. Water quality data collection is ongoing to determine priorities and current conditions and will continue intermittently to indicate how projects on the landscape are translating into water quality changes. Yet, it may be a few years before enough projects are completed in each subwatershed to significantly affect water quality. Therefore, throughout the implementation process, project types and locations will be documented to get an idea of the extent of water quality improvements as projects become more prevalent within each subwatershed and the Coahulla Creek Watershed. This will allow management measures to be adapted to effectively address concerns that may arise with improvements in the implementation strategy. In the interim, continued monitoring of water quality and determination of the success of completed projects is necessary to determine if revisions are needed. At the least, revisions should be submitted in an addendum to this document in 2019 to evaluate successes and adaptations to the initial management measures recommended in this WMP. Section 7 includes how progress will be indicated and considers documenting the details of each project, load reductions per project when applicable, increased public interest, and changes in water quality that indicate progress toward the overall goal of de-listing all or the majority of segments within the watershed.

9. A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item (8).

In Section 7, the WMP recommends that two different monitoring protocols continue to be conducted within the watershed as the new management measures (and the ongoing programs discussed in Section 6) are implemented. One type of monitoring is identified as "Targeted Monitoring", and involves sampling at specific sites in both wet and dry periods to help establish baseline conditions and monitor for improvements. The second type of monitoring is for "de-listing" purposes, and follows a strict procedure (regardless of weather) in an attempt to show that restoration has been achieved.

Glossary of Acronyms

AAS - Adopt-A-Streams

BMP - Best Management Practice

CNMP - Comprehensive Nutrient Management Plan

DNR - Department of Natural Resources

EPA - Environmental Protection Agency

EPD - Environmental Protection Division

GIS - Geographic Information Systems

IBI - Index of Biotic Integrity

IWB - Index of Well Being

NPS - Nonpoint Source

NRCS - Natural Resource Conservation Service

RC&D - Resource Conservation and Development Council

CCWRP – Coahulla Creek Watershed Restoration Program

SQAP - Sampling and Quality Assurance Plan

TMDL - Total Maximum Daily Loads

WMP - Watershed Management Plan

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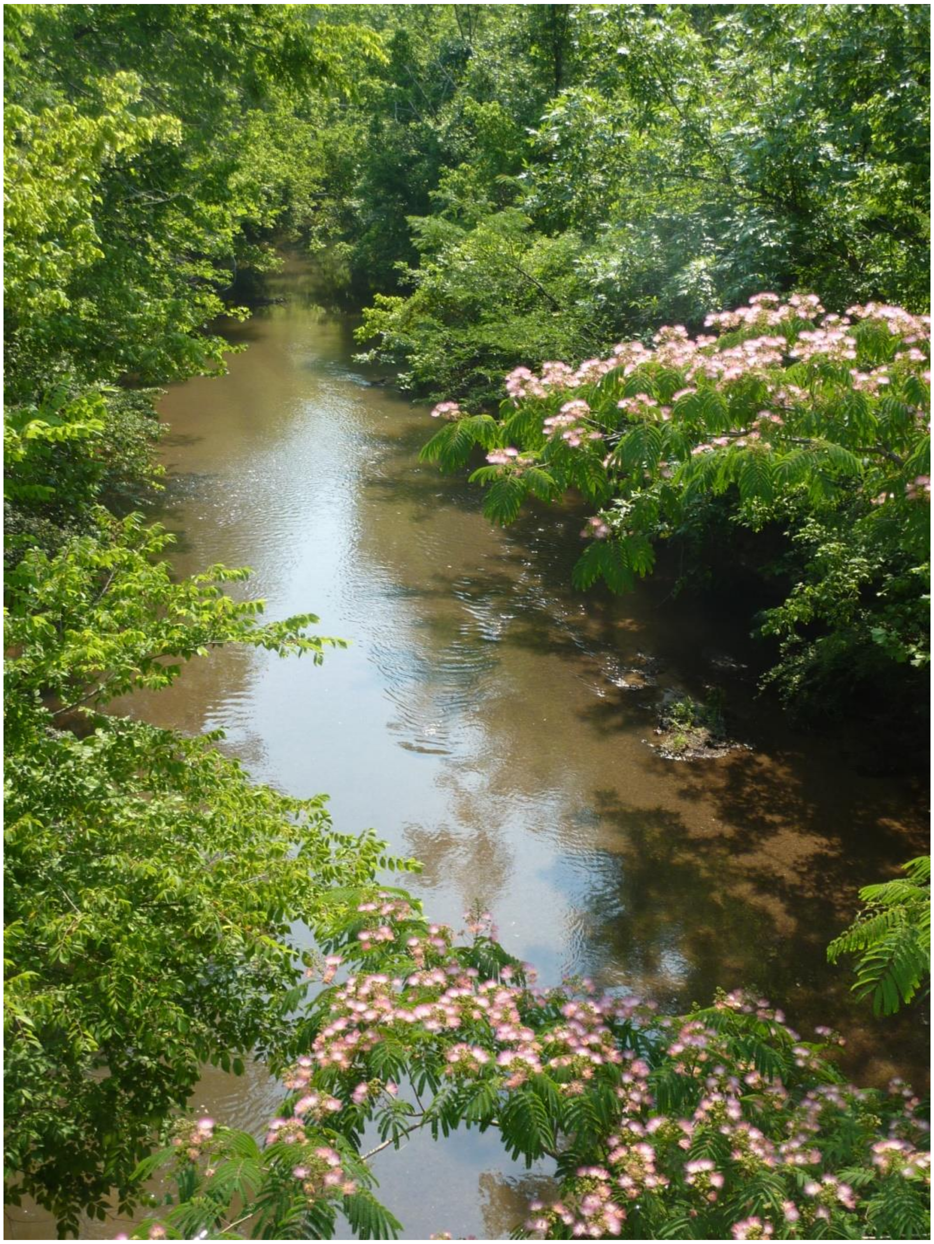
Appendix A:

Targeted Water Quality Monitoring Plan

Targeted Watershed Monitoring Plan for Coahulla Creek Watershed (HUC 0315010103) in Whitfield County, Georgia



Submitted to Georgia Environmental Protection Division
Water Protection Branch
March 19, 2012

Part One: Introduction & Study Objectives

Objective

Our objectives are to collect water quality data within the Coahulla Creek Watershed to determine baseline conditions, as well as gain insight on the relative extent, distribution, and seasonal variation of fecal coliform bacteria and sediment loads. These data in conjunction with land use data and historical data will likely allow further inference of general areas in the watershed contributing pollution to impaired stream segments. Utilizing this information, a Watershed Management Plan (WMP) will be developed in which areas most in need of Best Management Practices (BMPs) will be identified as priorities. Assuming BMPs are eventually implemented in a carefully constructed effort to reduce fecal coliform and sediment loads, the baseline dataset would be the benchmark on which future data are compared to monitor the efficacy of restoration efforts. This TWQMP may be amended in the future to reflect changes in monitoring strategies or the need to further investigate specific stream reaches.

Background

The Coahulla Creek Watershed originates in Bradley County, Tennessee, yet drains over 71,000 acres of a mostly rural landscape in Northwest Georgia. The catchment occupies a small portion of Walker County and much of Whitfield County where it contributes to the Conasauga River of the Coosa River Drainage. The watershed is entirely contained within the Ridge and Valley ecoregion, and contains significant agricultural activity (46 % land use in Georgia) in addition to moderate levels of urban development in Dalton.

In the entire watershed, there are over 18 miles of impaired segments (Table 1). Two segments along the mainstem of Coahulla Creek (totaling a length of 10 miles) are impaired due to high fecal coliform counts. Two segments on tributaries, Haig Mill Creek and Mill Creek, have been considered impaired as a result of surveys indicating the aquatic biota has been impacted. High fecal coliform bacteria loads are generally the result of agricultural activities, development, and wildlife in the watershed. In rural areas, failing septic systems and livestock waste tend to be the main anthropogenic causes of fecal coliform pollution loading. In more urbanized areas, high fecal coliform bacteria loads tend to be the result of leaking sewer systems and animal wastes. Impairments characterized as impacted biota violations do not imply explicit causation; however, sediment load is generally assumed to be the factor leading to impacted aquatic biota. In addition, sediment accumulation can lead to increased fecal coliform retention and serve as an additional source of fecal coliform bacteria to flows during runoff events.

Water quality sampling will be conducted in this watershed as part of a 319-(h) Grant funded project to develop a Watershed Management Plan (WMP). The main purpose of the monitoring is to provide the local stakeholder group with the tools to establish priorities that will be incorporated into the final WMP. Also, these efforts will establish a baseline dataset that will allow for temporal comparisons with data collected during and after the WMP implementation process. Knowing the current state of the watershed as it relates to state standards will be important for the WMP development process as well as prioritization at the local and state levels.

Table 1. Impaired stream segments within the Coahulla Creek Watershed, the counties in which are they are located, and the criterion violated.

Waterbody (Miles/Acreage)	Criterion Violated
Coahulla Creek (5 miles)	Fecal Coliform
Coahulla Creek (5 miles)	Fecal Coliform
Haig Mill Creek (1 mile)	Bio F
Mill Creek (7 miles)	Bio F

Project Coordinators
Since these monitoring activities are a part of a 319(h) planning project, Limestone Valley Resource Conservation and Development Council will be serving as project lead. The project contacts are:

Joshua Smith
Limestone Valley RC & D
105 Laurel Creek Road
Suite 6
Calhoun, GA 30701
Phone: 423-309-2630
Jsmith.cra@gmail.com

OR

Daniel Huser
Limestone Valley RC & D
105 Laurel Creek Road
Suite 6
Calhoun, GA 30701
Phone: 423-544-9076
Danielthuser@netscape.net

OR

Barbara Stitt-Allen
Watershed Protection Division
Georgia EPD
Phone: 404-657-5947
Barbara.stitt@dnr.state.ga.us

Part Two: Sampling Plan

Delineation of Study Area

The Coahulla Creek Watershed (HUC 0315010103) in Northwest Georgia is predominantly composed of agricultural land at 45.8 % of the landscape (Appendix 1). The landscape, however, grows more urbanized as it approaches Dalton, Georgia, where it drains into the Conasauga River of the Coosa River Basin. Impaired streams are located in the relative lower extent of the watershed, and impairments are the result of high fecal coliform bacteria loads and impacted aquatic biota, which is generally the result of sedimentation. Sources of fecal coliform bacteria in the watershed have been listed as agricultural activities, septic failures, urban development, and wildlife in the latest TMDL implementation plan for the watershed. Sediment load sources in the watershed are unknown at this time, but given land use in the watershed likely result from bank erosion associated with insufficient riparian corridors, heavy use areas on grazing lands, and potentially erosion from storm flows due to increases in impervious surface cover.

Sampling Sites

Eight sample sites (Appendix 2) have been established at road crossings in the Coahulla Creek Watershed. Five sites were chosen along the mainstem of Coahulla Creek from locations near the Georgia-Tennessee border to immediately upstream of the confluence with the Conasauga River. Two addition sites were located on Mill Creek, a significant tributary with impaired segments; one just upstream of the confluence with Coahulla Creek and the other upstream of the confluence with Haig Mill Creek. Another site was chosen on Haig Mill Creek, a tributary to Mill Creek with a segment that has been characterized as impaired. The data collected from these sites should allow us to make valid comparisons among stream reaches and make assumptions regarding potential source areas of pollutants. In summary, the distribution of the sampling sites around the watershed allows the watershed data to be divided into sub-watersheds to help stakeholders determine where to focus restoration efforts.

The GPS Coordinates for the sites scheduled for monitoring are as follows (See Appendix A):

- Coahulla Creek Sample Site 1 (CC1): 34.964748, -84.88977
  (Hopewell Road)

- Coahulla Creek Sample Site 2 (CC2): 34.895506, -84.921055
  (Prater Mill Road)

- Coahulla Creek Sample Site 3 (CC3): 34.838604, -84.930711
  (Beaverdale Road NE.)

- Coahulla Creek Sample Site 4 (CC4): 34.779302, -84.896507
  (Chatsworth Highway)

- Coahulla Creek Sample Site 5 (CC5): 34.74334, -84.8808
  (Keith Mill Road SE)

- Mill Creek Sample Site 1 (MC1): 34.797594, -84.994097
  (Dalton Bypass)

- Mill Creek Sample Site 2 (MC2): 34.781276, -84.925432
  (Brooker Drive)

- Haig Mill Creek Sample Site 1 (HMC1): 34.800907, -84.982896
  (Dalton Bypass)

Sampling Parameters

Fecal Coliform Bacteria Counts

Water samples collected on each sampling event will be analyzed to determine fecal coliform concentrations. Fecal coliform concentrations, in addition to knowledge of local land use, will help indicate the sources of agricultural runoff containing fecal material and failing septic systems in close proximity to tributaries.

Fecal coliform bacteria concentrations (most probable number per 100 mL) will be determined from water samples collected at each site using the membrane filtration technique. Dalton Utilities of Dalton, Georgia, is certified to analyze the samples and will volunteer their services for the foreseeable future. Joshua Smith and Daniel Huser will be the primary sample collectors. They have each received training in proper water quality sample collection and handling previous to and while conducting other projects, and will cooperate with Dalton Utilities to maintain the proper delivery for timely analysis**.**

Total Suspended Solids Measurements

Water samples will also be analyzed for Total Suspended Solids (TSS). TSS is the preferred measurement for investigating potential sediment sources and may reveal erosion issues/sediment sources within the watershed. Dalton Utilities is also certified to conduct this analysis and has committed to voluntarily provide this analysis for the foreseeable future. Joshua Smith and Dan Huser will assume the responsibilities of sample collection and delivery to Dalton Utilities for timely analysis.

Ensuring Precision

For determination of sampling precision for both fecal concentrations and TSS, a second sample will be collected and analyzed to serve as a duplicate from one of the eight sites on sampling dates. Collecting duplicates will allow us to ensure quality control and evaluate the variation in samples from a singular location per event.

Sample Collection

Samples will be collected for each analysis from each site once a month for a one-year period for a total of 108 samples per parameter. Samples will be collected during both wet and dry occasions within the one-year period. On half the months (e.g., January, March, May, etc.) we will collect samples during an event characterized as dry. On the other half of the months, we will attempt to collect samples during an event characterized as wet. During a month for which we are seeking wet samples, after three weeks in which we have not yet been able to collect wet weather samples, samples will be collected regardless of weather. Overall, however, our objective is to collect approximately equal wet and dry weather sampling.

Dry weather will be characterized by less than 0.25 inches of precipitation within the last 48 hours, whereas more precipitation for the previous 48 hours will result in characterization of a wet weather event. These samples from runoff events will probably have more variation and rely on many variables, and thus are less suitable for temporal comparisons; however, they may reveal more about landscapes within the watershed. This strategy may help us infer how instream sources of fecal coliform and sediments compare with those from runoff.

Part Three: Quality Assurance Plan

Specified Requirement

Since this project is funded using federal grant dollars the following condition applies:
"All sample collection, field parameters, and lab analysis will be conducted in accordance with EPD's Quality Assurance Manual, 40 CFR Part 136 and U.S.EPA guidelines. These guidelines and references have been set forth in the Quality Assurance Project Plan (QAPP) and Quality Monitoring Plan (QMP) developed and maintained by EPD and has been previously been approved by USEPA. Copies of the QAPP and QMP are available from the EPD and will be kept on site to be used as reference and provide future guidance on water quality monitoring procedures. Any additional agencies, organizations, or subcontractors that participate in the aforementioned water quality monitoring activities shall also adhere to EPD's "Guidance on Submitting Water Quality Data for Use by the Georgia Environmental Protection Division in 305(b)/303(d) Listing Assessments."

Project Provisions

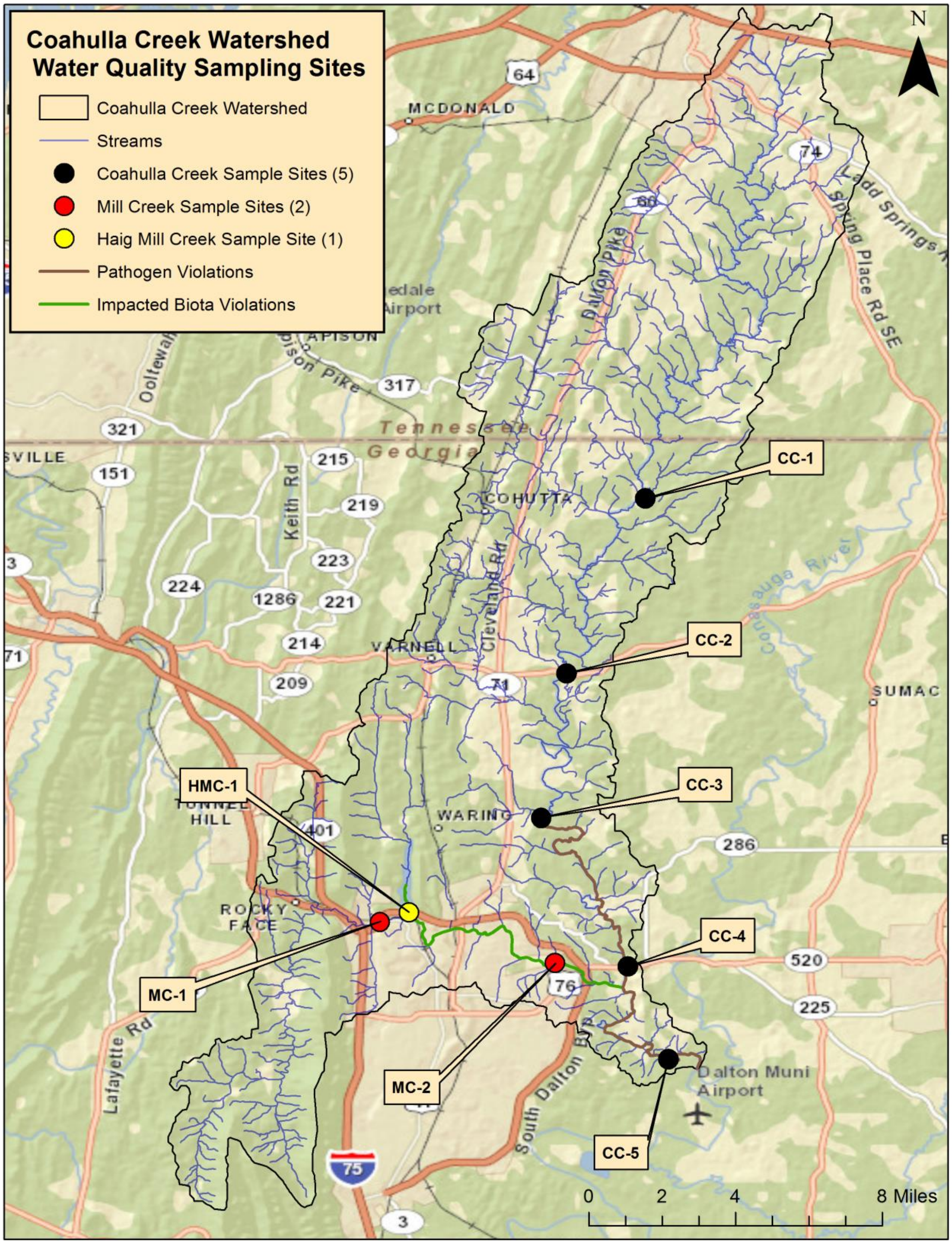
The majority of samples will be collected in the thalweg from bridges via bucket and rope. In the event, the bridge makes a poor sampling site due to dangerous traffic, insufficient depth, or other factors, the samples will be taken as close as possible to the road crossing where a quality sample can be collected. If this occurs, samples will be collected by hand in the thalweg similarly to the way in which the bucket collects samples. Collection will be performed on the upstream side of all bridges and the bucket will be rinsed at least two times in the stream before the sample is collected. The sample bottles (provided by Dalton Utilities) will be placed in the bucket (and held by zip-ties) to collect water directly from the stream. The samples will be taken toward mid depth in flowing water in the thalweg whenever possible and put on ice and delivered to Dalton Utilites within four hours of collection.

Records for analytical procedures (bench sheets) and Quality Assurance/Quality Control measures will be maintained to document proper implementation and performance. Records for the monitoring results will be housed at the Limestone Valley RC&D Office in Calhoun, Georgia, for a period of no less than three years. Electronic and hard copies of the files will be retained.

Appendix 1: Table Displaying Land Use Percentages within the Coahulla Creek Watershed (HUC 0315010103) in Northwest Georgia, as presented in the latest TMDL Implementation Plan.

Coahulla Creek Watershed		
Land Use Classification	**Acres**	**% of total area**
Agriculture	32,719	45.8
Commercial	1,785	2.5
Industry	1,397	2.0
Multi-family	583	0.8
Public/Institutional	2,438	3.4
Parks/Rec/Conservation	3,453	4.8
Single family residential	18,060	25.3
Trans/Comm/Utilities	334	0.5
Vacant	10,421	14.6
Water	227	0.3
Total:	71,417	100.0
Source: Whitfield County Comprehensive Plan, October 2008		

Appendix 2: Map of Water Quality Monitoring Sites within the Coahulla Creek Watershed.



Appendix B:

2012-2013
Targeted Water Quality
Monitoring Data

Appendix B.1.: Fecal Coliform Bacteria Counts from Targeted Water Quality Monitoring. Sites are shown on the map in Figure 3.3.a.

Fecal Coliform Results (MPN/100ml)								
Date	**HMC1**	**MC1**	**MC2**	**CC1**	**CC2**	**CC3**	**CC4**	**CC5**
4/27/2012	0	80	180	114	58	188	70	52
5/24/2012	50	76	80	110	81	144	124	244
6/29/2012	26	68	46	18	8	112	48	84
7/12/2012*	3500	480	700	70	160	220	170	460
8/31/2012	30	136	58	42	44	164	42	172
9/21/2012	20	70	90	170	190	220	210	250
10/19/2012	6	36	38	56	70	38	52	44
11/16/2012	0	72	106	40	22	28	18	46
12/11/2012*	14	150	120	280	214	180	242	252
1/19/2013*	300	440	410	350	430	590	450	270
2/22/2013*	1	1000	1000	1700	2400	1300	1600	1900
3/21/2013	10	48	36	26	37	45	35	50

** indicates wet weather events.*

Appendix B.2.: Turbidity Measurements (NTUs) from Targeted Water Quality Monitoring. Sites are shown on the map in Figure 3.3.a.

TSS Results (mg/L)								
Date	**HMC1**	**MC1**	**MC2**	**CC1**	**CC2**	**CC3**	**CC4**	**CC5**
4/27/2012	6	5	3	12	10	14	18	14
5/24/2012	4	13	8	18	22	21	18	18
6/29/2012	4	6	2	9	18	17	14	16
7/12/2012*	8	8	6	5	13	13	9	25
8/31/2012	1	3	2	8	9	29	10	16
9/21/2012	4	5	7	7	22	23	18	32
10/19/2012	1	2	2	2	11	5	12	9
11/16/2012	2	2	1	2	4	3	5	3
12/11/2012*	3	7	6	32	19	16	23	22
1/19/2013*	9	14	19	23	22	29	20	13
2/22/2013*	9	41	73	99	107	104	74	77
3/21/2013	5	6	4	4	6	7	9	7

** indicates wet weather events.*

Appendix C:

Land Use
Category Definitions

Class Definitions of the National Land Cover Dataset:

- Open Water—All areas of open water, generally with less than 25 percent cover of vegetation or soil.

- Developed, Open Space—Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

- Developed, Low Intensity—Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20–49 percent of total cover. These areas most commonly include single-family housing units.

- Developed, Medium Intensity—Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50–79 percent of the total cover. These areas most commonly include single-family housing units.

- Developed, High Intensity—Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.

- Barren Land (Rock/Sand/Clay)—Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes,strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15 percent of total cover.

- Deciduous Forest—Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.

- Evergreen Forest—Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.

- Mixed Forest—Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

- Shrub/Scrub—Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.

- Grassland/Herbaceous—Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

- Pasture/Hay—Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

- Cultivated Crops—Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.

- Woody Wetlands—Areas where forest or shrubland vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

- Emergent Herbaceous Wetlands—Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Appendix D:

Notes and Materials from Stakeholder Meetings

Notes from the February 7th, 2013 Watershed Advisory Committee Meeting #1 At the Whitfield County Administrative Building in Dalton, Georgia

- The purpose of the stakeholder committee was identified as "to create opportunity for community leaders to provide input into Watershed Management Plan formation".

- Stakeholder roles were identified as "Sharing issues that concern you and your organization, give insight into possible solutions for stream quality issues, providing access to data, volunteers, outreach networks, or other assets that can be used to enhance the watershed plan, and offering technical expertise needed for planning initiatives."

- A summary of previous 319 efforts in the watershed was given. These efforts included septic system repairs, several streambank stabilization projects, and a handful of agricultural projects.

- Four impaired stream segments, as identified by Georgia EPD, were introduced.

- Stream issues were identified as fecal coliform bacteria, sediment pollution, and trash.

- Many stakeholders were aware that impairments existed in the watershed.

- Sources of fecal coliform were identified as failing septic systems, cattle in the streams, excessive poultry litter application, pollution from Tennessee, and wildlife from forested areas. Sources of sediment were identified as heavy use areas, streambank erosion, and erosion from stormwater issues.

- A discussion was held of the various contributions, although no clear ranking of sources were established.

- There are ongoing management efforts within the watershed that address these pollutants. EQIP is active in the area. North Georgia Public Health has a permitting program for septic system repairs and installations.

- The following potential programs were discussed to complement existing programs: a septic system repair cost-share program, a grazing BMP installation cost-share program, an unused impervious surface removal cost-share program, a streambank stabilization cost-share program, and a nutrient management program for applicators of poultry litter.

- Whitfield County has been providing office space to Limestone Valley RC & D for work associated with the development of this plan.

- Whitfield County agreed to provide access to a GIS specialist and materials as needed.

- Dalton Utilities is helping with water quality analysis.

- The goals of the next advisory committee meeting were discussed.

Coahulla Creek Watershed Advisory Committee Meeting #1 Survey

Please answer the following questions about the Coahulla Creek Watershed.

1. What do you think are the more significant sources of fecal coliform pollution in the watershed that have led to impairments in the lower reaches of Coahulla Creek? Please list them in order from what you think are the most significant to least significant sources.

2. Haig Mill Creek, the reach downstream of the reservoir, is listed as impaired due to poor fish sampling results, and sediment reductions have been recommended. What do you think leads to poor biotic surveys in this stream segment?

3. Mill Creek (from Haig Mill to Coahulla Creek) is listed as impaired due to poor fish sampling results as well, and slight sediment load reductions have been recommended. What do you think leads to poor biotic surveys in this stream segment?

4. What types of projects do you think will be most valuable to de-listing efforts? Please list these in order of their likely importance in de-listing efforts.

5. What types of projects do you think will be most valuable to ensure all streams currently meeting stream criteria continue to do so? In other words, what types of pollution sources are most likely to become significant issues in the coming decade?

6. What types of pollution reduction projects are likely to be best received by residents in the watershed?

Please make any additional comments on back.

Notes from the June 13th, 2013 Watershed Advisory Committee Meeting #2 At the Whitfield County Administrative Building in Dalton, Georgia

Establishing Priorities

- Education and outreach was brought up as being very important. Judy Tackerman agreed fully.

- Chad mentioned that they could definitely use septic dollars.

- When asked whether more agricultural BMPs could be put be on the ground, Bill Henderson replied that they could use more money to put BMPs on the ground and some folks didn't like working with the Feds, filling out so much paperwork , and said there were a few more freedoms and more creative practices to fit people into the programs than NRCS sometimes offers. Also, Dan Huser mentioned often times that they can get people paid upon completion, and Bill mentioned that Limestone also could generally give an answer to a proposed project now, whereas NRCS is now taking applications for a year from now.

- Paul Bradley asked whether regulations had tightened over the years for construction and reconstruction. Chad Mulkey explained that most septic issues came from older systems with newer systems less prone to have issues and could be tracked easier.

-When asked about the potential for a nutrient management rebate program, Brenda Jackson mentioned that UGA has a program that tests litter and maybe soils for $25. Perhaps a rebate system for those tests would encourage more involvement in calculated spreading.

- Brenda also mentioned having some funding for an outreach booth to educate the public regarding septic systems.

- They said we should contact poultry houses to get litter tested and perhaps have a sheet describing its properties to accompany it when sold to landowners.

- While NRCS has put up a lot of litter houses, some just store and sell litter, but don't actually use it.

- Litter management needs more education and an incentive program.

- Josh asked Bill if he could elaborate on how fecal contributions from litter might compare with agricultural operations such as having cattle in the creek. Bill said in general that cattle in the creek are probably a greater issue. Litter issues probably depend on timing and whether spread properly. Also, depends on height of grass, buffers, filtration. Bill indicated you might have more litter get loose from the truck hauling it than from the litter that has been spread.

-Someone mentioned the focal point of that issue should be public education. If not informed, the public will not participate. Also, people need to be informed about access to testing.

- Judy said Prater's Mill will be opened on the inside beginning in July and would love to have some educational signage and/or pamphlets inside to make the public aware of local issues. Also, at Prater's Mill, the county or city has destroyed much of their work in restoring the banks. Failed communication was the culprit.

-The need for annual BMP workshops for city and county workers was brought up so that they are aware of the work put into projects before they mow over them.

- John Lugthart brought up the need to inform landowners about easements to protect the banks and buffer areas. We informed him that while we can't offer or require easements, we can inform people and hand out information.

- Dan brought up whether habitat projects were feasible and where could find funding partners.

- Judy said there was a lot of fishing at Prater's Mill and there are now fishing platforms.

- Katie Owens brought up that it can be tough to do instream restoration due to T and E, and bank restoration was easier due to not needing one. Someone brought up that it's a waste to restore habitat prior to having stable banks. Katie did say you probably wouldn't need T and E for Coahulla and Mill provided USFWS does not see them as habitat for T and E species.

- Dan brought up how stormwater practices were probably needed to keep degradation from occurring in the future according to the surveys from the last meeting. He asked how we might obtain match knowing that MS4s cannot use 319 funds except to go above and beyond MS4 requirements. Barbara Stitt-Allen of EPD chimed in that city and county stormwater programs have to say what they did that year and what they are doing to meet their permits. She was saying they shouldn't limit themselves to things that are part of the problem - we can count those as match (e.g., broken sewer pipe). We should try to help alleviate specific stormwater issues and put them into the plan, then the city can apply to do the project. They shouldn't miss out on the opportunity to put these things in the plan. If a particular stormwater project is not funded, they have priority for GEFA funds to fund these projects instead. Dalton and Whitfield County know some areas that need to be addressed and need to put into the plan so that the funding can be applied for. It ranks much higher for 319 usage if in the plan as well as using GEFA funds if the project is not funded using 319 funds. The urban areas under MS4s need to be captured in the WMP.

- Barbara brought up that better back roads projects are welcome under 319 as well. Doug mentioned that there weren't any dirt roads around.

- Dan asked the group whether a rebate for removal of impervious surfaces was possible. Bill asked about instead converting impervious to pervious. Neal mentioned that you can drill holes in current parking lots to make pervious. Bill mentioned the use of geoweb to make new parking lots pervious. Barbara mentioned that in the past impervious removal projects have been attached to larger bank restoration projects and floodplain expansion projects.

- Someone asked about Dalton Utilities plan to place a stormwater tax on properties with extensive impervious surface cover. David said that it appeared that it was going to happen for awhile, but now seems unlikely.

- As far as bank restoration, David of DU mentioned that they have dabbled in bank restoration plans for several landowners, but the landowner generally backs off after DU has committed planning dollars due to the steep cost.

- Barbara mentioned the cost of engineering counts as match and to make sure the engineering is in proposal and in actual project cost so that it can count as match.

- David mentioned they weren't sure how to get landowner skin in game and lead the projects to completion.

- David said DU had no GEFA loans in place - in general green infrastructure projects are tacked onto loans. Many people are apparently trying to get these type loans to access these dollars. Inclusion into the plan would give them priority.

Coahulla Creek Watershed Meeting 2 Materials

Limestone Valley RC&D Council

June 13, 2013

Objectives:

1. Review the goals of watershed management development and the stakeholder process.
2. Evaluate the notes and survey responses from the last meeting.
3. Discuss water quality monitoring in the watershed in detail.
4. Look at various watershed maps and discuss how they relate to water quality.
5. Discuss potential solutions to water quality issues.
6. Determine whether priority areas should be established and their locations.
7. Complete surveys related to designing programs for the watershed.

Overall Project purpose:

To put together a stakeholder-approved Watershed Management Plan (WMP) to serve as guidance for watershed improvement efforts. Currently, there are four stream segments in the watershed that have fecal coliform bacteria and sediment pollution issues per Georgia Environmental Protection Division.

Water Quality Monitoring Details

- The sites are depicted on the following page.
- Fecal coliform bacteria counts and TSS appear highest in lower Coahulla Creek and Mill Creek.
- Although bacteria counts are high on occasion, they appear lower than in other local impaired waters.
- No sites revealed to have instantaneous maximum violations (> 4000) throughout sampling endeavor.

GEOMETRIC MEANS OF FECAL COLIFORM COUNTS (2012-2013)	
Site (code)	**Mean Fecal Coliform Counts (MPN)**
Coahulla Creek Site 1 (CC-1)	100.7
Coahulla Creek Site 2 (CC-2)	96.3
Coahulla Creek Site 3 (CC-3)	152.9
Coahulla Creek Site 4 (CC-4)	111.2
Coahulla Creek Site 5 (CC-5)	159.7
Haig Mill Creek Site 1 (HMC-1)	17.2
Mill Creek Site 1 (MC-1)	125.7
Mill Creek Site 2 (MC-2)	126.8

Table 1. A display of geometric means (n = 12) of fecal coliform counts (in Most Probable Number) calculated from samples collected by Limestone Valley in 2012 and 2013 in the Coahulla Creek Watershed.

Watershed Maps

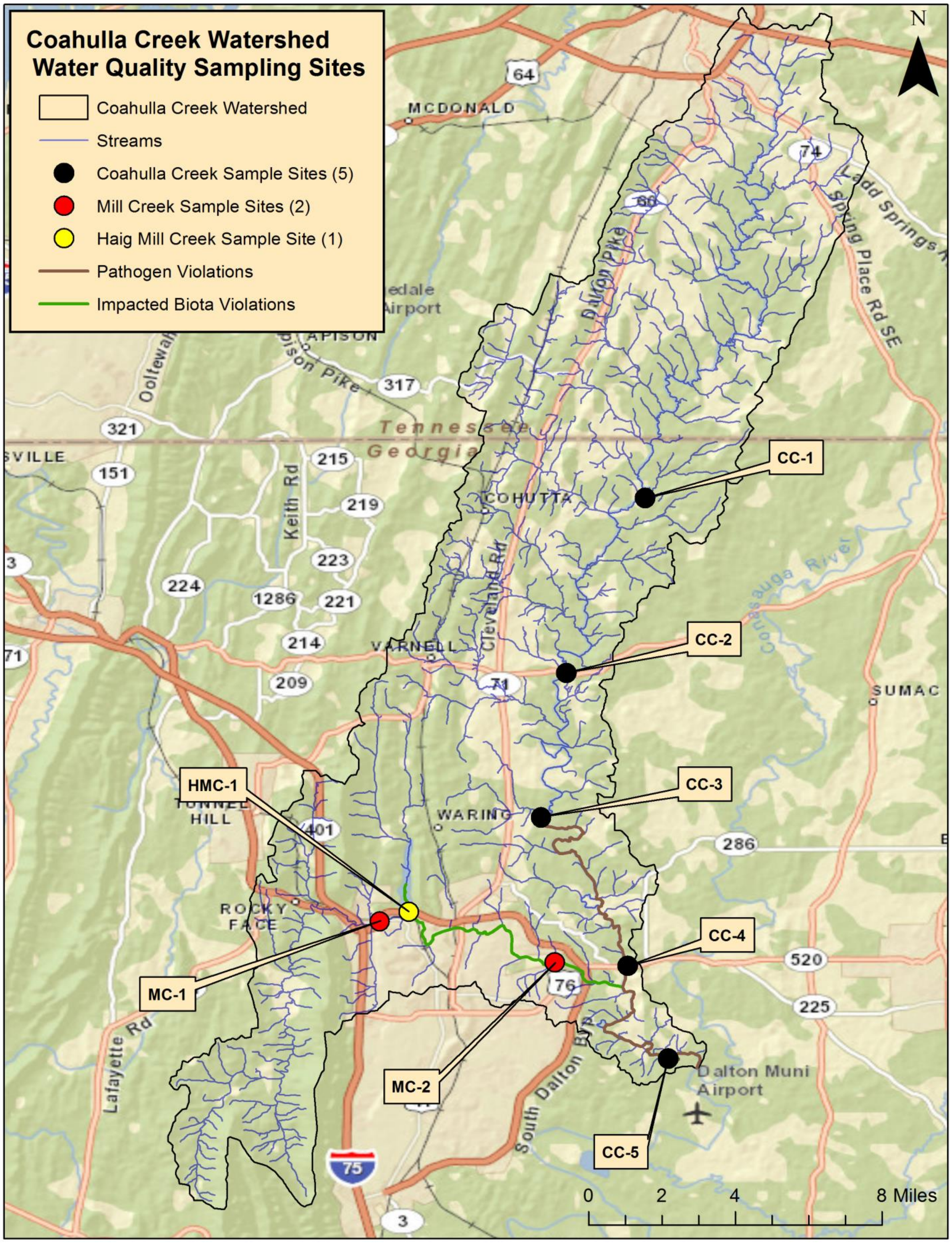
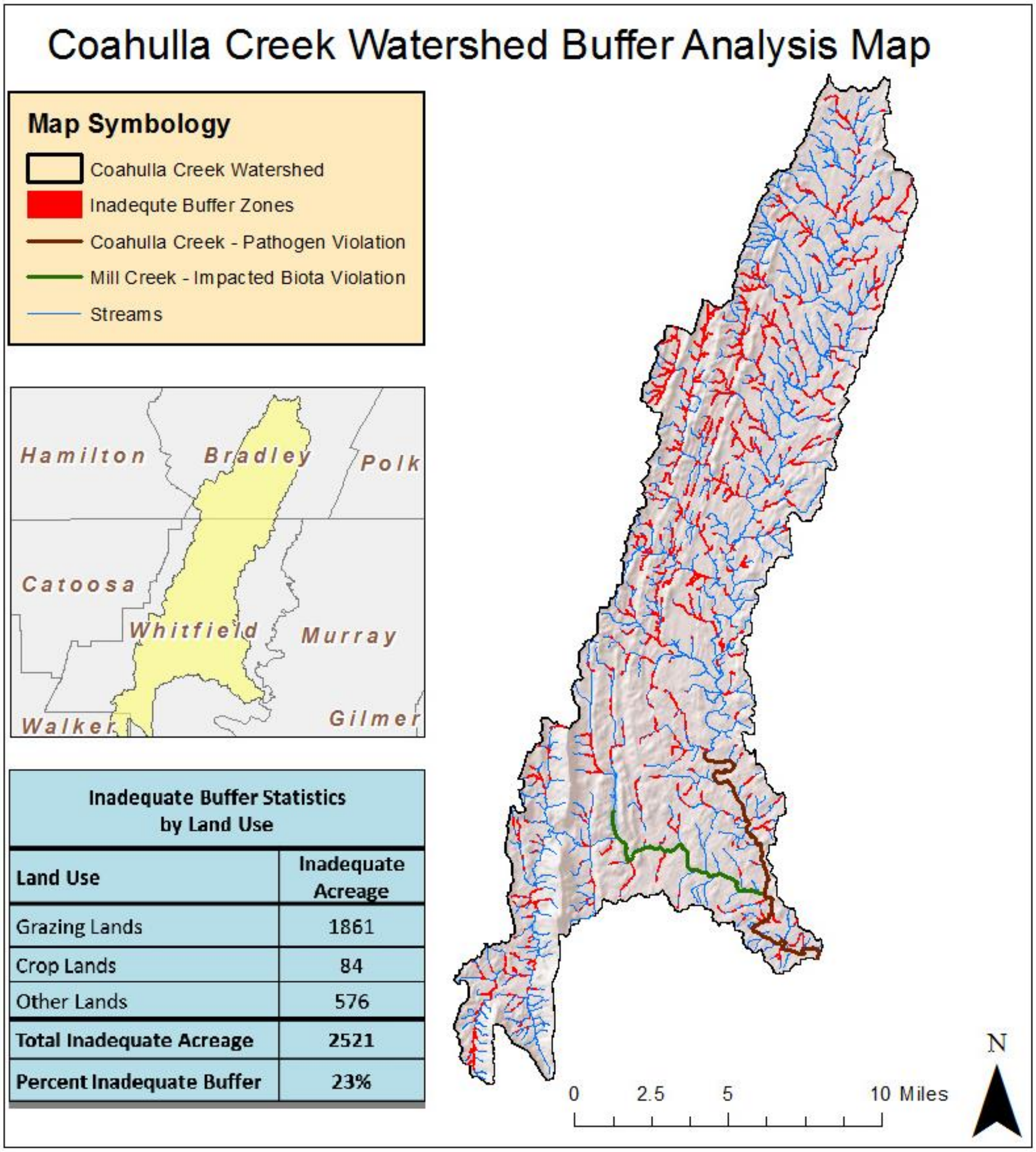


Figure 1. Coahulla Creek Watershed monitoring sites.



Inadequate Buffer Statistics by Land Use	
Land Use	**Inadequate Acreage**
Grazing Lands	1861
Crop Lands	84
Other Lands	576
Total Inadequate Acreage	**2521**
Percent Inadequate Buffer	**23%**

Figure 2. Insufficient buffers within the 100 foot buffer of streams within the Coahulla Creek Watershed.

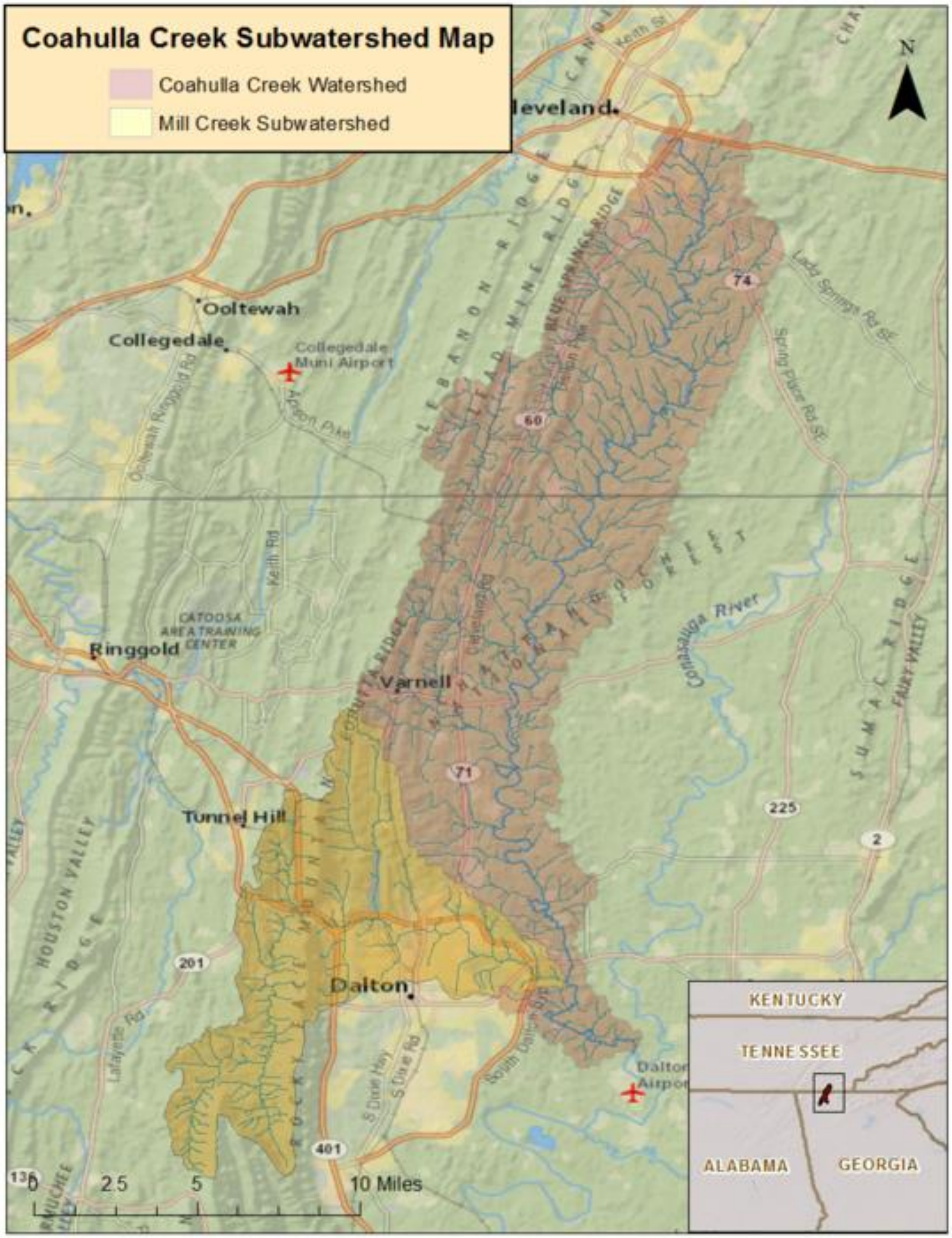


Figure 3. The Coahulla Creek Watershed and Mill Creek Subwatershed.

Potential solutions to watershed issues

- Septic system repair cost-shares to fix backlog of failures and keep them to a minimum.
- Agricultural BMP cost-shares to continue to reduce agricultural NPS contributions.
- Nutrient management incentive program to ensure precise manure management and spreading.
- Stormwater BMP cost-shares to assist with and improve stormwater management.
- Bank stabilization cost-shares to reduce sediment introduction.
- Riparian buffer establishment.
- Impervious surface removal cost-share or rebate program.

Project Priorities

Things to Consider:

- How do the potential solutions listed above compare in importance?
- Are there areas where we should attempt to target before others?
- If we utilize a sliding septic cost-share program who should be awarded the highest cost-shares?
- Should we attempt to make cost-shares higher in certain areas (e.g., stream buffers, headwaters)?

Coahulla Creek Watershed Advisory Committee Survey – Mtg. #2.

Please answer the following questions related to improving the Coahulla Creek Watershed.

3. Please number the potential solutions to watershed issues in order of importance. If you find certain solutions to be of little value or not practical, leave them blank.

______Septic system repair cost-shares to fix backlog of failures and keep them to a minimum.
______Agricultural BMP cost-shares to continue to reduce agricultural NPS contributions.
______Nutrient management incentive program to ensure precise manure management and spreading.
______Stormwater BMP cost-shares to assist with and improve stormwater management.
______Bank stabilization cost-shares to reduce sediment introduction.
______Riparian Buffer Establishment.
______Impervious surface removal cost-share or rebate program.

4. Please allocate the percentages of potential future project funds that you would like to see accompany your rankings from above.

______Septic system repair cost-shares to fix backlog of failures and keep them to a minimum.
______Agricultural BMP cost-shares to continue to reduce agricultural NPS contributions.
______Nutrient management incentive program to ensure precise manure management and spreading.
______Stormwater BMP cost-shares to assist with and improve stormwater management.
______Bank stabilization cost-shares to reduce sediment introduction.
______Riparian Buffer Establishment.
______Impervious surface removal cost-share or rebate program.

5. Do you have any ideas in addition to those listed above that should be considered as potential solutions to watershed issues/impairments?

6. How do you see us matching grant funds that might be spent on stormwater practices?

______Dalton Utilities
______Local Government
______Private Property Owners
______Other

Please describe how this could be conducted.

4. The impairments within the Coahulla Creek Watershed are in the lower reaches of Mill and Coahulla Creeks. Are there areas (e.g. upper watershed vs. lower; coahulla vs. mill) that you feel are higher priorities to reduce nonpoint source pollution in these streams?

5. If we utilize a sliding septic cost-share program who should be awarded the highest cost-shares?

Please make any additional comments on back if necessary.

Coahulla Watershed Advisory Committee Meeting #3 Notes

September 26, 2013

The meeting commenced at 10:00 a.m., and it began with a powerpoint presentation conducted by Daniel Huser. The powerpoint was basically a highlight of the different sections included in the Coahulla Creek Watershed Management Plan. Each of Sections 1 – 6 were discussed in detail, which covered topics such as plan preparation and implementation, Coahulla Creek watershed descriptions, watershed conditions, pollution source assessment, watershed improvement goals, and pollution reduction.

The second presentation was conducted by Joshua Smith, and it covered Sections 7 & 8. These topics included the objectives and milestones of the watershed restoration effort, a timeline for watershed restoration, and the estimated financial cost of projects. A discussion was then had about the contributions expected from project partners.

After the presentation, the floor was opened for discussion between the Watershed Advisory Committee members. The discussion included the feasibility of implementation, the appropriateness of the objectives and milestones, and the timeline for implementation. After the discussion, the survey was handed out to the committee members. Through this survey and discussions, it was concluded that the WMP was approved by the committee to be sent to Georgia EPD for further review.

Coahulla Creek Watershed Advisory Committee Survey – Mtg. #3

Please answer the following questions related to improving the Coahulla Creek Watershed Management Plan.

1. Do you have any suggestions for revisions to the WMP? If so, please make them in the space provided.

2. Are you ready to approve the WMP in its current state to allow for submission to Georgia EPD and the USEPA for their review?

Please make any additional comments on back if necessary.