SALACOA CREEK WATERSHED MANAGEMENT PLAN

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

Limestone Valley RC & D Council

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 National Water Quality Initiative for funding the preparation of this document. Additionally, the council would like to thank the individuals associated with Calhoun Utilities, the Natural Resources Conservation Service, Keep Bartow Beautiful and Gordon County Officials that contributed many hours by providing resource information, guidance, and donated services. Other organizations that contributed to this plan include the City of Fairmount, the Coosa River Alliance, Georgia Department of Natural Resources, Georgia Soil and Water Conservation Commission, Gordon County Environmental Health Department, Pickens County Commission, City of Calhoun, The Nature Conservancy, U.S. Forest Service, and University of Georgia Cooperative Extension. We sincerely appreciate the work of University of Tennessee at Chattanooga graduate student, Dayle Hoefling, for her assistance in this project. 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 Salacoa Creek Watershed in Georgia.

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Executive Summary

Several stream segments within the Salacoa 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 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 USDA grant through the NWQI program. This Watershed Management Plan recommends a multi-faceted Salacoa 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 as an effort to play on the strengths of the various project partners, and could complement existing conservation programs (e.g., Environmental Quality Incentives Program, Calhoun Utilities Stormwater Program). Smaller projects, however, could be devised that address individual components of the recommended program should an organization seek funding

Agricultural

Agricultural lands were identified for targeting load reductions. Best Management Practices, through cost-shares with landowners, are a likely means by which these agricultural reductions can be realized. The agricultural practices implemented will vary according to the interests of the producers, but will likely include heavy use area protection, streambank stabilization, stream access control for cattle coupled with alternative watering systems, stream buffer enhancement and green infrastructure installation. Natural Resource Conservation Service will be a key contributor to the success of the agricultural load reduction component of this plan.

Residential

Residential lands could also be targeted to reduce the contributions of fecal coliform bacteria. Addressing septic system issues and failures have been shown to have positive effects on reducing fecal Coliform bacteria loads in proximal waterbodies. Inclusion of cost-share for septic system repairs, prioritizing systems in proximity to streams and wet weather conveyances, will build further momentum. For this program component, it is anticipated that North Georgia Health District and local county health departments will play a key role. Additional "on-the-ground" conservation could likely be achieved through the implementation of green infrastructure and streambank stabilization in urban areas. Depending on location,

these practices may be implemented in collaboration with Calhoun Utilities, the City of Fairmount, or other willing partners in the watershed.

Outreach

In addition to actual “on-the-ground” projects, this document outlines the importance of outreach activities. Volunteers were identified by the stakeholder group as having the potential to contribute toward the reduction of pollutant loads through educating 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 funding opportunities. Reevaluation of the watershed conditions, through monitoring, was noted as an important aspect that could be supported through an outreach effort or funding request.

Urban

The limited urban landscape inside the watershed made nonpoint considerations for urban run off a lessor assumed factor in the planning process. Nonetheless urban runoff is one potential factor in the health of Salacoa Creek. Green infrastructure as a means to address runoff resulting from impervious surfaces should be considered in any funding requests associated with Salacoa Creek. Particularly, green infrastructure in the city of Fairmount would contribute an outreach opportunity as well as playing a role in runoff control.

Assessment protocols and funding

As part of the development process for this watershed management plan, estimates were prepared to consider the time and funding from state 319 sources and federal sources, such as NWQI, likely needed to accomplish restoration goals. These estimates assumed 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. To generate 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 319, NWQI or other funding-based 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 several variables and priorities that will be evaluated and altered throughout the multiple year periods to maximize results.

1 Plan Preparation and Implementation

The following section will serve as a brief 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.

The Salacoa Creek Watershed (HUC 0315010207) has several stream segments that fail to meet the state criteria for water quality. Two segments are designated as impaired due to negatively impacted biota, which is typically a result of excess sedimentation. An additional segment is impaired to elevated fecal coliform concentrations. To address these impairments, Total Maximum Daily Load (TMDL) Evaluations were written in 2003 and 2009. A TMDL Implementation Plan was also written in 2006 to evaluate and track water quality protection and restoration. Despite these efforts, little progress has been made over the years to improve the water quality of the Salacoa Creek Watershed. The purpose of this Watershed Management Plan (WMP) is to propose a preferred set of Best Management Practices (BMPs) to implement to restore Salacoa Creek and timeline on which to implement them. The document is not regulatory in nature, but the preparation process educates stakeholders about the issues and provide suggestions for improvement. It also develops momentum within the community which can then contribute to the restoration effort. The ultimate goals of the planning and restoration process are for impaired segments to be (and remain) delisted and for the integrity of other segments to be maintained. The broader goal is to provide information for stakeholders and landowners in the watershed concerning watershed issues and restoration practices to help them manage the landscape to minimize water and soil resource concerns.

It should be noted that Salacoa Creek is classified by drainage area as a “HUC 10” watershed. Since the last watershed management plan was written, the Hydrologic Unit Code was changed from #0315010206 to # 0315010207. This may cause some confusion since previous TMDL Implementation Plans written for this area display the former number.

Limestone Valley Resource Conservation and Development Council (RC&D) has developed this plan as part of a National Water Quality Initiative (NWQI) grant to update and improve former Water Quality Management Plans as well as jumpstart restoration activities in the watershed.

The EPA has recommended nine key elements for watershed management plans to help ensure that stakeholder involvement and approval lead to an explicit prescription to eventually meet watershed restoration objectives.

Specifically, the nine key 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.

The nine elements provide a better framework for planning successful long-term watershed improvement plans. Utilizing the strategies within them increases the probability of successful implementation of restoration efforts.

Limestone Valley Resource Conservation and Development Council (RC&D) opted to develop more extensive WMP that focuses more effort on specific watershed details, as well as a more comprehensive Geographic Information Systems (GIS) analysis that investigates several factors that exert an influence on NPS pollution loads. More focus on these details should lead to more specific WMPs that are founded on a greater understanding of the local physical and social environment. Compiling more extensive data should help us better determine 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 complex and utilized extensive research on the watershed, including water quality monitoring and GIS analysis. Data regarding water quality, fish and macroinvertebrate assemblages, geology, soils, and land use were considered when conducting research on the watershed. The GIS component focused on analyzing riparian buffers, land use percentages, and housing densities. GIS and water quality monitoring were also tools to identify broad areas of likely NPS pollution sources and priority areas for installation of BMPs.

The development of the plan also relied upon the participation of a stakeholder group (Table 1.), which consisted of members from local, state, and Federal government agencies, nonprofit groups, and the private sector. They are a group of volunteers that work in the watershed to utilize their expertise, reach out to local communities and develop long-term partnerships. Their efforts will help ensure the long-term NPS pollution reduction strategies will be implemented successfully. Three public meetings conducted in 2017 and 2018 were held with the stakeholder group to engage the public in the process of drafting this management plan. Stakeholder members were invited to take part in the

process based on professional interests, activity in the watershed and familiarity with previous stakeholder efforts. Local governments were also made aware of the stakeholder process and given the opportunity to participate in the stakeholder group. All members were informed of what was expected of them throughout the stakeholder process, and those that wished to contribute more were allowed and encouraged to do so. A few stakeholders were consulted more regularly due to their expertise and willingness to provide additional support. It is also anticipated that some stakeholders may contribute significantly in the restoration process. Meetings focused on gathering input about potential problems and solutions, developing priorities, evaluating what BMPs might be met with the best public reception, and obtaining insight on the document. Finally, approval was sought for the Watershed Management Plan document to serve as the plan on which restoration and implementation efforts will follow.

Table 1 . Stakeholder Committee

Name	Position	Main Affiliation
Doug Cabe	NRCS Soil Science	NRCS
Stuart Proctor	NRCS Grassland Specialist	NRCS
Sherri Henshaw	Executive Director	Keep Bartow Beautiful
Missy Phillips	Assistant Sustainability Coordinator	Bartow County
Jerry Crawford	Water & Wastewater Director	Calhoun Utilities
John Banks	Wastewater Plant Superintendent	Calhoun Utilities
Rodney Buckingham	Land Development Control Officer	Pickens County
Calvin Watts	Mayor	City of Fairmount
Jim Ledbetter	County Manager	Gordon County
Donna Reever	GIS Manager	Gordon County
Jim Bradford	Ordinance Officer	Gordon County
Alex Lamle	Watershed Coordinator	The Nature Conservancy
Michael Fantom	Leader	Gordon County Boy Scouts
Jesse Demonbreun-Chapman	Executive Director and River Keeper	Coosa River Basin Initiative
John Loughridge	UGA watershed educator	UGA Extension
Greg Bowman	Gordon County Agent	UGA Extension

Plan implementation will focus to improve the watershed through several specific project components. These include reducing NPS pollution from septic systems and agricultural lands and potentially stormwater runoff in the watershed, as well as educating the public about these sources and watershed processes in general. Stakeholder assistance in some aspects of the implementation effort will be key to the process. Plan implementation will occur with respect to private property rights and rely on voluntary conservation, which involves participation from landowners in cost-shares to reduce NPS pollution on their properties. Although management of individual parcels is key to watershed restoration, a discussion regarding individual parcels in this plan has been avoided to not discourage participation, which could occur if criticisms over the management of private lands were included. Instead, the general NPS issues associated with specific land uses which predominate within the watershed are discussed. Achieving the objectives of the plan through voluntary conservation will be a difficult endeavor. However, by building momentum through a phased approach, and developing relationships in the community, the process should cumulatively achieve significant NPS pollution reduction. To increase the

chance of successful watershed restoration, a reassessment of this plan is scheduled every five years, just after an extensive assessment of the local water quality. This iterative process will allow a chance for stakeholders and citizens to analyze project successes and failures and provide opportunities for changes in restoration priorities.

2 Salacoa Creek Watershed Description

Extensive knowledge regarding the watershed is paramount in making effective watershed planning decisions. This section will focus on providing a background to the watershed as it relates to the development of a WMP for Salacoa Creek. The section is organized into three parts. First, a description of landscape features is given that includes the local watershed geography, geology, and the climate in the area. The second part focuses on the important local flora and fauna. The last describes anthropogenic features in the watershed. Much of the following information regarding the Salacoa Creek Watershed was written with the assistance of the historical TMDL Implementation Plans. Additional sources are referenced within the text

2.1 Location and Subwatersheds

Salacoa Creek (HUC 0315010207, formerly 0315010206) is located in the Coosa River Basin and flows from the Southeast to Northwest into the Coosawattee river just north of the City of Calhoun, Georgia (Figure 1). The Coosawattee and Conasauga Rivers converge ultimately to form the Oostanaula River, a tributary of the Coosa River. It should be noted that Hydrologic Unit Codes (HUCs) have changed in recent years. As a result, previous TMDLs and WMPs list Salacoa Creek as HUC 10 # 0315010206 and Pine Log Creek—a tributary to Salacoa Creek—listed as 0315010207. This document uses the updated HUCs.

Salacoa Creek is the largest tributary to the Coosawattee and has its source in the high elevations in Pickens and Cherokee Counties. Most of the watershed lies in Gordon County, but a significant valley section is also in Bartow county. Pine Log Creek (HUC#0315010206, formerly 0315010207) is a tributary to Lower Salacoa Creek, but is listed as a separate HUC10 cataloguing unit. The study area for this plan excludes Pine Log Creek and further planning will be required to address water quality issues in the Pine Log Creek Watershed. The Salacoa Creek watershed (Figure 1) contains roughly 74,240 acres and a drainage area of approximately 116 square miles, when excluding the Pine Log Creek Watershed. The majority is still forested with the secondary land uses being agricultural and urban. It has several sub watersheds including Lick Creek (25.71 sq mi), Marlow Branch (16.19 sq mi), Pinhook Creek (20.12 sq mi), Ninetynine Branch (30.48 sq mi), and Little Creek (23.04 sq mi), which is the headwaters area of Salacoa Watershed (Figure 2).

The physiographic type of this area is defined as the Ridge and Valley region in Georgia, but intergrades into others in the higher elevations (Figure3). For Ridge and Valley, the ridges are typically composed of chert and capped sandstone, while the valleys are usually limestone or shale. The thicker, more fertile soils typically form in the valleys from erosion of soil from higher elevations and the weathering of parent rocks. The weathering of sandstone and chert on ridges help form the acidic soils which maintain the forested areas of this region.

Figure 1. The Salacoa Creek Watershed

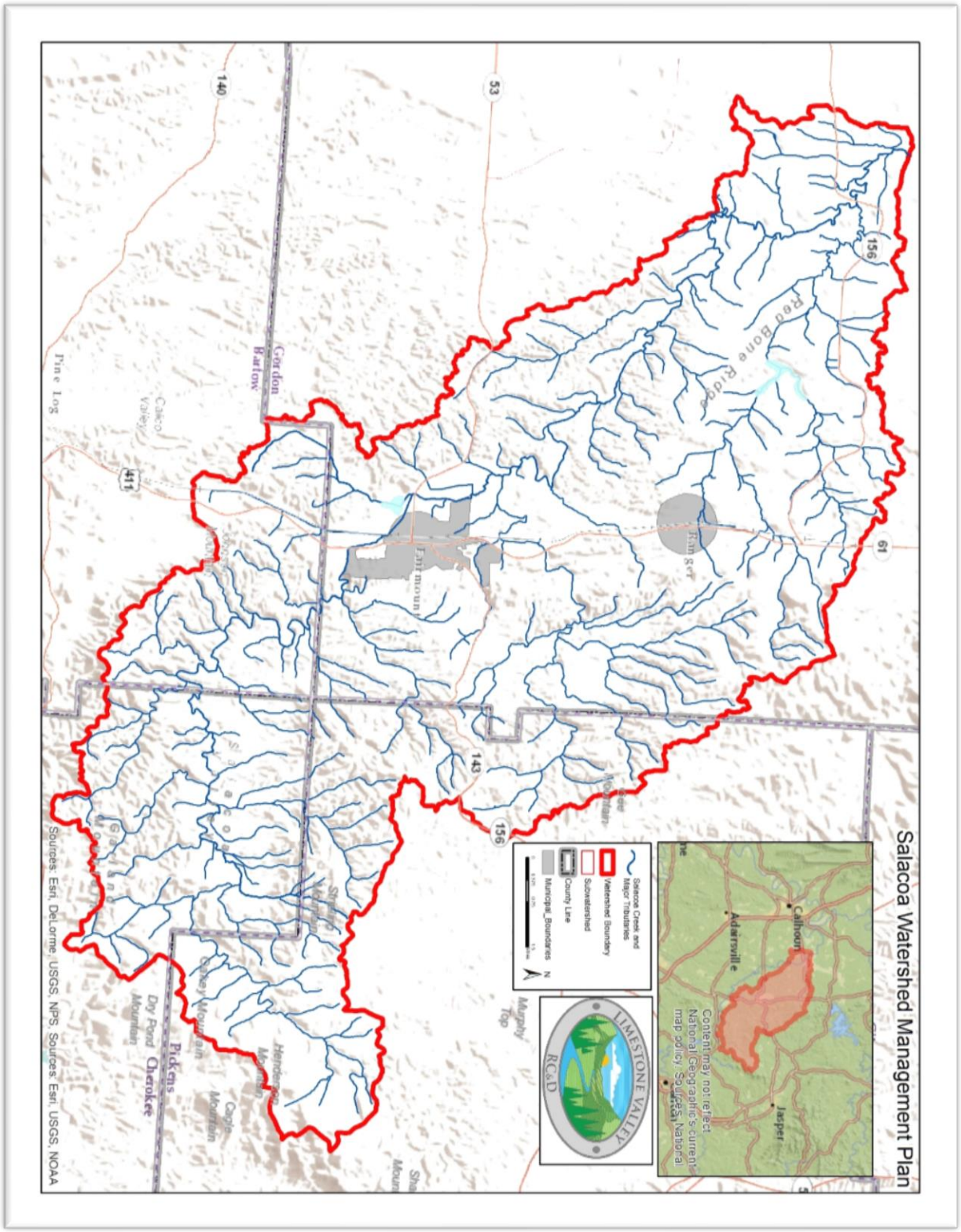


Figure 2. The subwatersheds of Salacoa Creek

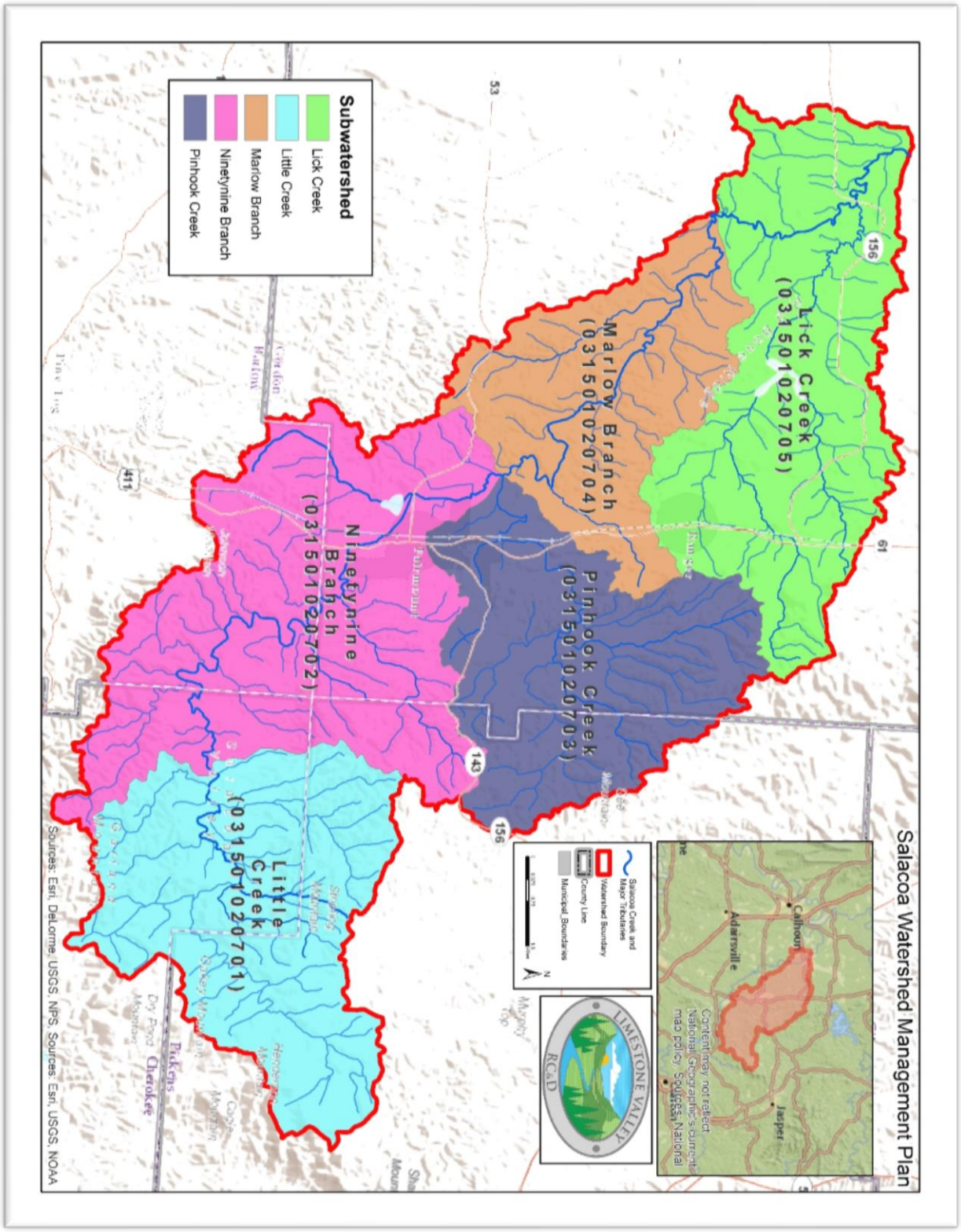
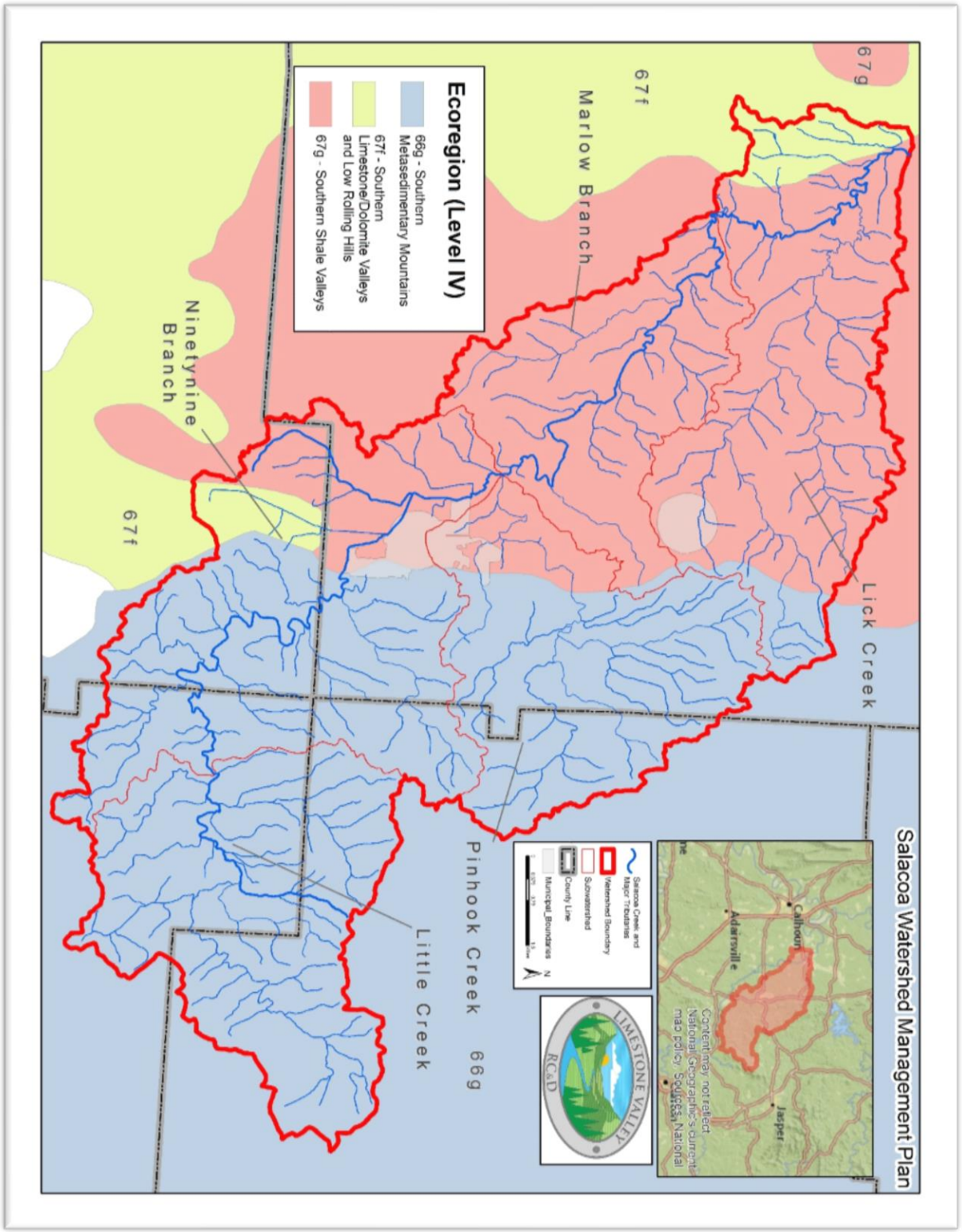


Figure 3. Ecoregions of the Salacoa Creek Watershed



The upper reaches of the watershed in Pickens and Cherokee counties are characterized by steep slopes and metamorphic rocks. Pine plantations dot the upper watershed. Many are actively being harvested and replanted. In addition, several large tracts of land are being held in pine lands by a retirement investment annuity. These have the option of timber harvesting when the annuity is up for sale. In 2015, the total volume of timber harvested in the four county area was 658,140 tons of which 76% was softwood, predominantly loblolly pine with the main hardwoods being oaks and yellow poplar. However, the total harvest in the four counties only accounts for 1.4% of the total timber harvest in the State of Georgia (Risher Willard, personal communication)

Once crossing the county line into Gordon County there is a wide floodplain across which the creek traverses. The low, rounded hills typical of this Southern Shale Ecoregion (67g) comprise the lower reaches as the creek winds its way to the Coosawattee. The Salacoa Valley runs roughly north to south down the center of the watershed. Sandy and rocky soils seen in this area may erode more easily than clay in other areas.

2.2 Local Climate

The climate of Gordon County, where the majority of Salacoa Creek Watershed is located, is influenced by its latitude and its proximity to the foothills of the Appalachian Mountains. Prolonged periods of extremely hot or extremely cold weather rarely occur. Summers are characterized by moderately warm days and mild nights. Daytime temperatures typically reach 90°F on only one-half of the days during the June, July and August period. Winters may be relatively cold, but periods of cold are normally short in duration and are quickly followed by comparatively mild temperatures. Periods of cold with temperatures below 15°F can be expected each winter, but periods near zero are uncommon. Due to the elevation changes within the watershed early morning temperatures may vary as much as 10 to 15°F from the mountains to the east and the valley to the west. The average yearly rainfall is 54 inches with snowfall averaging 1.4 inches. The region averages 99 days of precipitation per year with 210 days classified as sunny. The average July high is 89.2, and the average January low is 28.7.

Climate and water data is collected nationally by the United States Geological Service (USGS) utilizing a stream gage system. Unfortunately, there is no USGS stream gage located within the Salacoa Creek Watershed for data collection. Although not located within the watershed, there is a USGS Stream Gage #02383500 on the Coosawattee River near Pine Chapel, Georgia, located six miles from the western border, which will be utilized as a data collection point to represent the local precipitation and hydrological characteristics. Comparing the 2015-2108 Coosawattee stream gauge data to the historical data indicates increasing variation of discharge, particularly illustrating higher discharge events. These increases can substantially impact erosion in the watersheds.

Figure 4. Climate Data for the Calhoun, Georgia

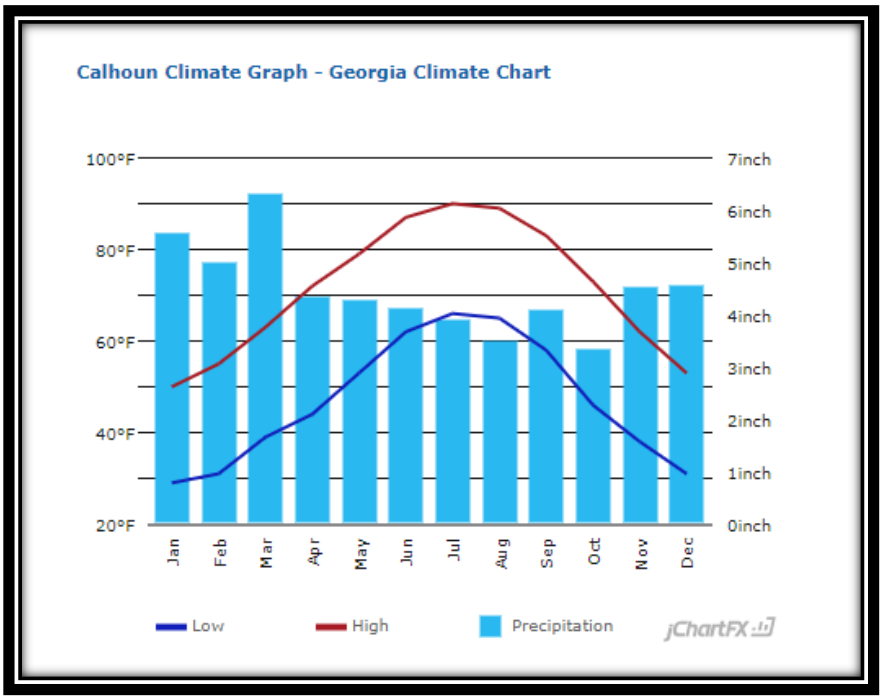
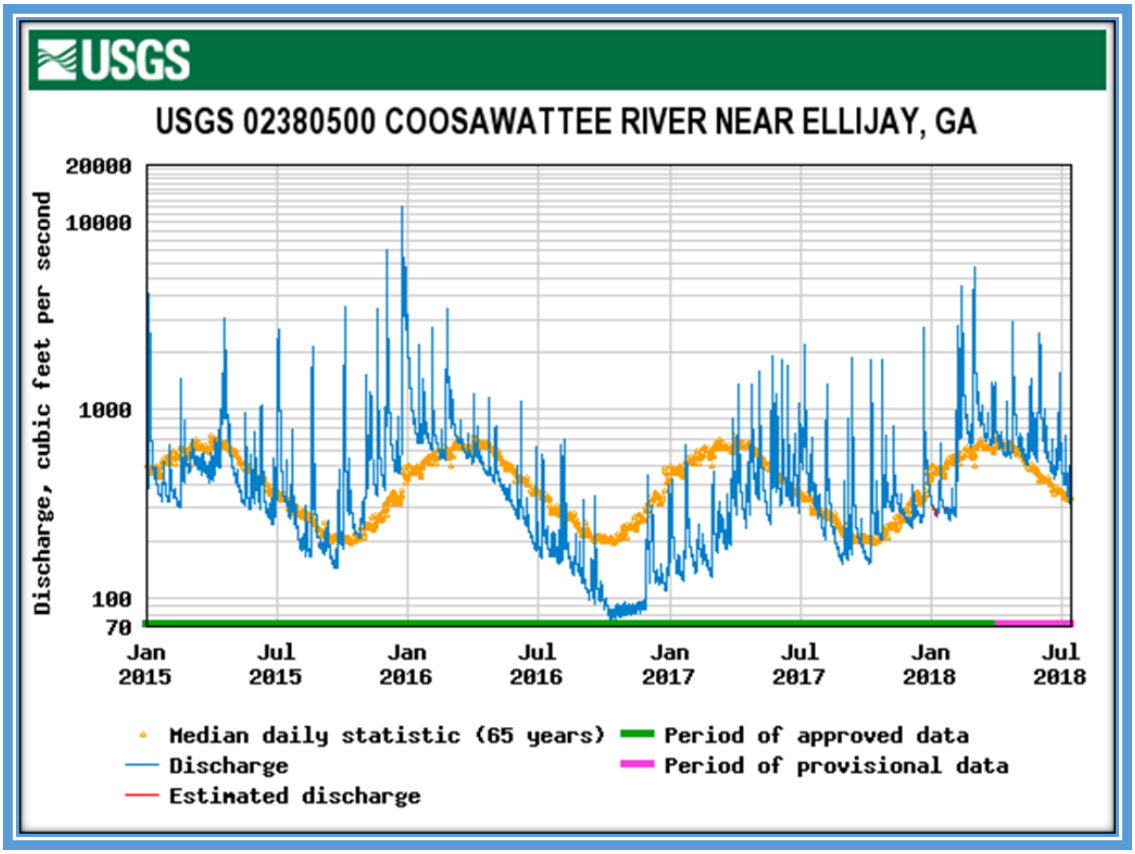


Figure 5. Discharge and Median Daily Statisics for the USGS Gauging Station on the Coosawattee River near Ellijay, GA.



2.3 Important Flora and Fauna

2.3.1 Forest Ecosystems

According to the land use analysis conducted as part of this WMP development, forested land in the Salacoa Creek Watershed makes up approximately 60,123 acres and is the most common land use category (71%). Deciduous forest is the dominant forest type at 53%. Tree species in the watershed are comprised predominantly of loblolly-shortleaf pine forest, mixed oak, pine and hickory.

2.3.2 Wildlife and Habitat

The topography of the Salacoa Creek Watershed provides an excellent habitat for a wide variety of species. The mountainous area in the eastern section is home to a substantial population of white-tailed deer (Odocoileus virginianus) and wild turkey (Meleagris gallopavo). Extensive well-watered woodlands and excellent cover provide the perfect habitat for these two species. The floodplain region of the watershed is home to a wide variety of wildlife which include bobwhite quail (Colinus virginianus), mourning dove (Zenaida macroura), barn swallow (Hirundo rustica, gray squirrel (Sciurus carolinensis), Eastern cottontail (Sylvilagus floridanus), and various species of duck (Anatidae family). Due to the many lakes and ponds in the floodplain, an ever increasing population of Canadian geese (Anatidae family) can be found. With the extensive network of streams in the watershed, American Beaver (Castor canadensis) and Northern river otter (Lontra canadensis), kingfisher, red winged blackbird, and various species of heron (Ardeidae family) can often be found.

2.3.3 Fisheries

The only listed trout stream in the project watershed is a portion of Salacoa Creek itself, which is stocked twice a year in March and May in Cherokee County. It is designated a secondary trout stream with special criteria restricting anyone from raising stream temperatures and or impounding on the stream. http://www.georgiawildlife.com/fishing/trout

Lick Creek is one tributary not listed for trout fishing. The species known to inhabit Lick Creek are largemouth bass (Micropterus salmoides), bluegill (Lepomis macrochirus), and smallmouth bass (Micropterus dolomieu).

The Salacoa Creek Park is a 343-acre county park containing Salacoa Lake, which is a 126 acre lake suitable for recreation and fishing. Species inhabiting the lake are black crappie (Pomoxis nigromaculatus), bluegill, brown bullhead (Ameiurus nebulosus), common carp (Cyprinus carpio), gizzard shad (Dorosoma cepedianum), green sunfish (Lepomis cyanellus), largemouth bass, redbreast sunfish (Lepomis auritus), and redear sunfish (Lepomis microlophus). They have recently restricted boating to non-motorized watercraft, hoping to reduce the algal growth, according to the park manager.

2.3.4 Species of Special Concern:

Two species—one fish and one mollusk—are federally or state protected in the Salacoa Creek Watersed. The Southern Clubshell (*Pleurobema decisum*) is listed as Endangered by the U.S. Fish and Wildlife Service (USFWS) and the Georgia Department of Natural Resources (GADNR) (US Fish and Wildlife Service Georgia Ecological Services HUC 10 Watershed Report)

The Southern Clubshell was historically found throughout most of the Upper Coosa River Basin in Georgia. Currently, the clubshell appears to be restricted to the Conasauga River drainage and Salacoa Creek. The Southern Clubshell typically occupies large streams and rivers with moderate flow with sand and gravel substrates. The major threat to these organisms is excessive sedimentation due to inadequate buffer zones, development, and eroding agricultural lands. Where present, excessive sediment covers suitable habitat and can potentially suffocate mussels (Southern Clubshell information, Georgia Wildlife Resources).

The trispot darter (Etheostoma trisella), is currently listed as Endangered by GADNR and has been proposed to be listed as Threatened by the USFWS. Trispot darters are found in shallow main channel habitats of larger streams and in smaller tributary streams. The primary threat to the Trispot Darter is habitat loss and degradation. The Coosa River System harbors the only population of this darter. The USFWS proposed listing the trispot darter due to a number of threats: Reduced Connectivity limiting or preventing fish movement, storm flow changes in intensity and base flow, Channel Modification, Urbanization, Loss of plants along river/ stream margins and stream banks (these darters require shallow vegetated habitat to spawn) which also increases stream temperature and turbidity, and a general increase in sedimentation. https://georgiawildlife.com/FreshwaterFish

Male trispot darter (*Etheostoma trisella*). This species is known to migrate from larger creeks and rivers into tributary streams for spawning. Conserving the trispot darter requires the protection of small creeks, larger rivers, and the movement corridor between these habitats. (Photo by David Neely) *https://www.fws.gov/southeast/faq/proposed-listing-of-the-trispot-darter*

2.4 Anthropogenic Features

2.4.1 Political Boundaries

The Salacoa Creek Watershed lies in four counties, originating in the higher elevations of Pickens and Cherokee Counties and flowing into the wider valleys of Bartow and Gordon Counties. Most of the watershed is in Gordon County. Two municipalities lie within the watershed, the City of Fairmount (population 738) and the City of Ranger (population 135). Wastewater services only exist in the vicinity of the City of Fairmount, and only about 200 households are now connected to the Waste Water Treatment Facility. J. M. Huber Corporation has been utilizing one of the oxidation ponds at the Fairmount Wastewater Treatment Facility for their own wastewater treatment, but they will soon discontinue that practice. The rest of the population uses septic systems for wastewater processing.

2.4.2 Community Water Supply

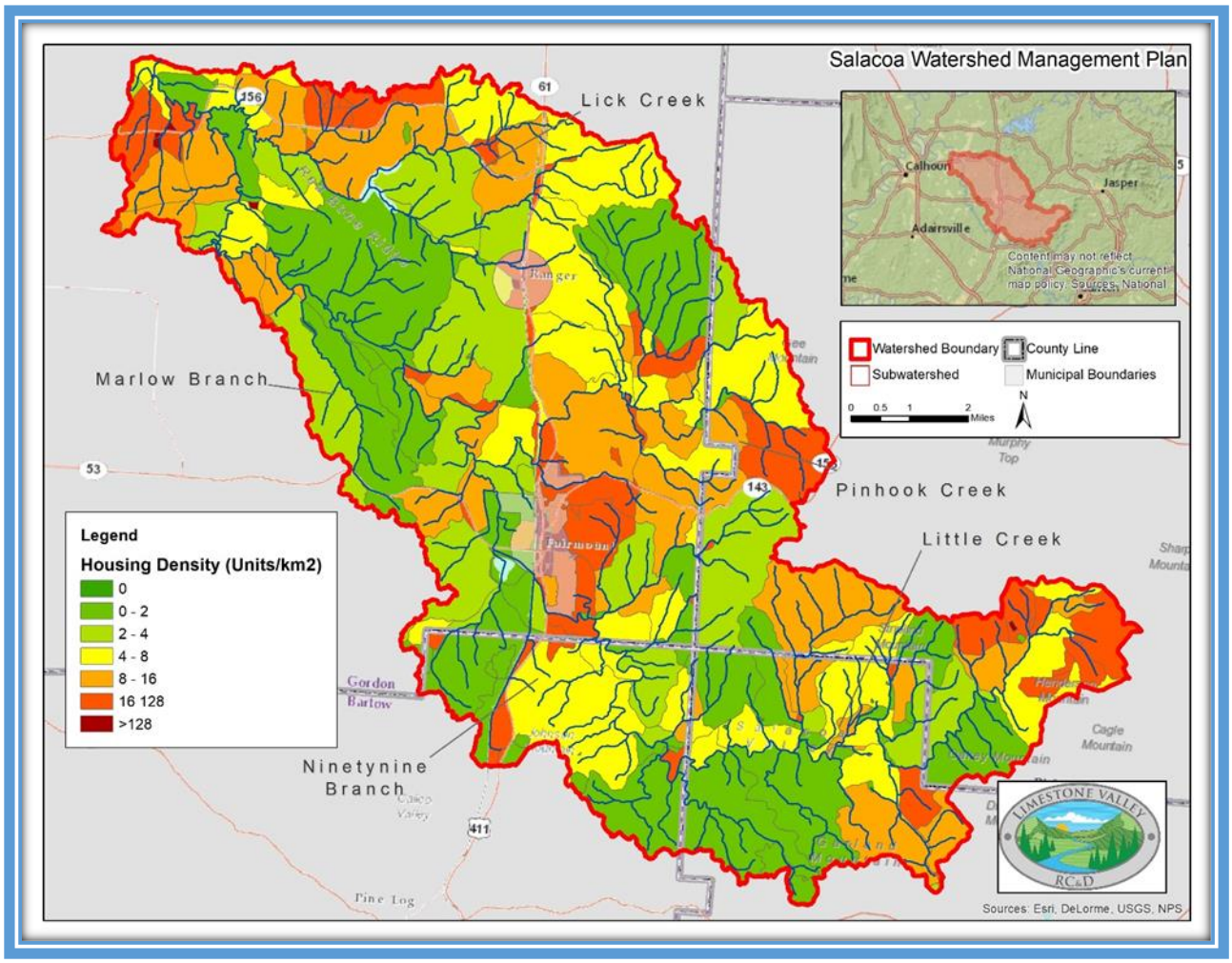
Calhoun Utilities supplies most of the water for residents in the area, which is drawn from the Coosawattee just upstream of the City of Calhoun. People in some areas in the watershed rely on wells as a water source, which are used for both domestic and livestock purposes. Livestock water sources also include streams and ponds.

In addition to an abundant river supply in the region, numerous freshwater springs provide additional water resources. One of those springs is located in the Salacoa Creek Watershed near Fairmount, Georgia. The Northwest Georgia Water Resources Partnership considers the site as a potential water resource. Operated for years as a quarry, the location once provided the water for the City of Fairmount, and has the potential to become a major water resource, not only for Gordon County, but for the entire northwest Georgia region including the City of Atlanta. Due to the significance of this resource, the availability could become a factor in the Georgia, Alabama, and Florida water discussions. The site is located adjacent to Salacoa Creek and contains substantial wetlands, which must be constantly monitored for water quality issues now and certainly with future development. As a part of the current monitoring protocol associated with this project, a water quality sample site has been established in Salacoa Creek immediately downstream from the site.

2.4.3 Development and Land Use

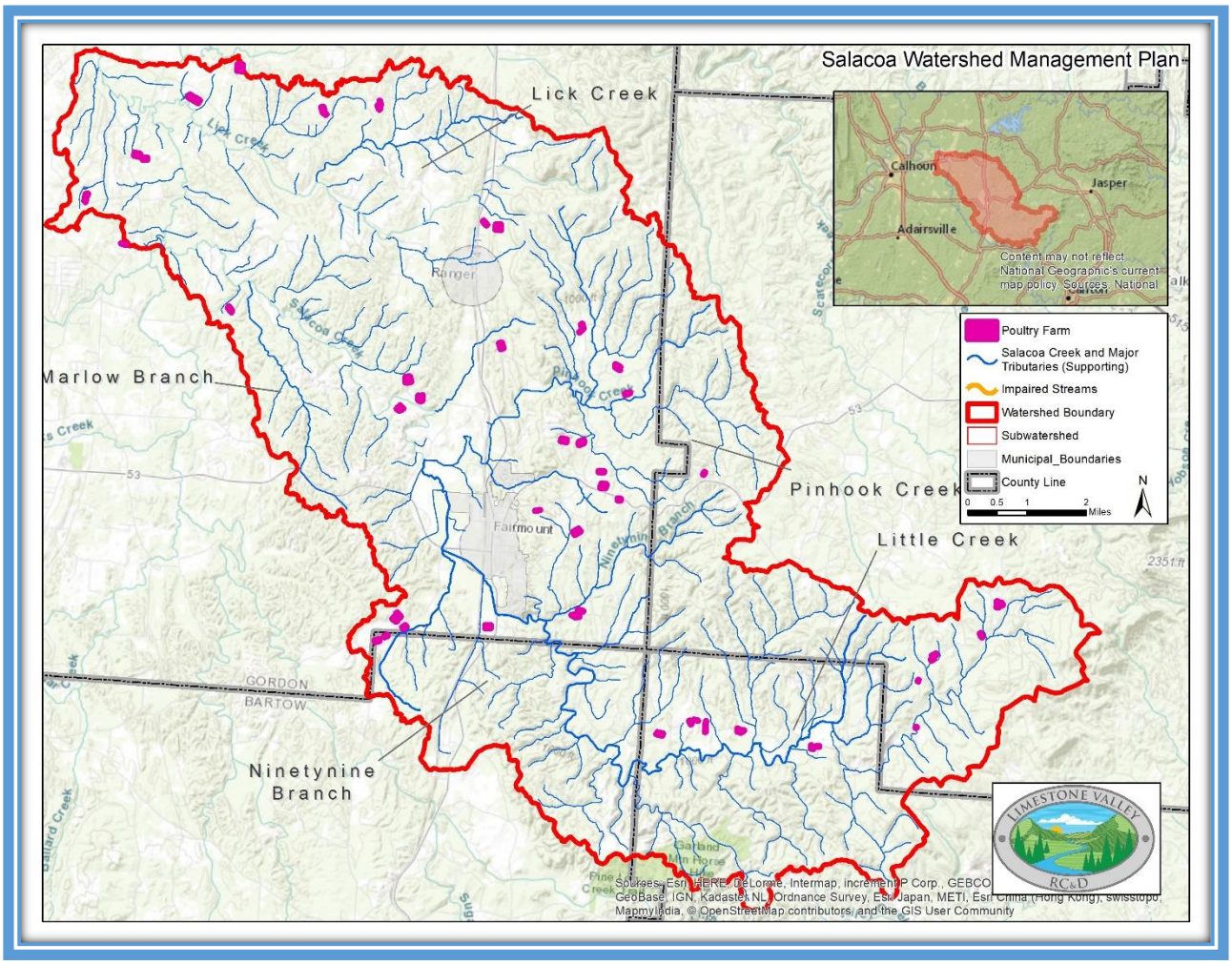
The primary concentrated residential development is in the City of Fairmount, but recently more residential development is occurring across the watershed, especially in the upper reaches in Cherokee County. Most of this watershed contains single family homes on large lots or farms resulting in a low population density. The density only reaches above 16 houses/km2 in less than 15% of the watershed.

Figure 6. Housing Densities within the Salacoa Creek Watershed



The watershed is experiencing some changes which much also will be addressed in this plan. While the population density is still very low, the poultry density has increased rapidly. Poultry is the primary livestock in the area, followed by cattle. New poultry houses are required to be 100 feet from a property line and 500 feet from the nearest residence, but many are grandfathered in and sit very close to property boundaries and creeks. In the last Agriculture Census in 2012, Gordon County ranked 2nd in poultry production with an estimated 13.2 million chickens valued at $239 million. The next census is due out early in 2019 is estimated to show a continuing increase in chicken population. Bartow and Pickens each have approximately 4 million chickens and Cherokee many fewer, less than a million. (Georgia Agriculture Census, 2012)

Figure 7. Poultry operations located within the Salacoa Creek Watershed



In addition, dairy and beef cattle are abundant. Bartow County ranks 6th in the state for cattle production with over 22,500 head. Gordon is close behind with 19,200 head of cattle in January, 2018. There is also an increase in smaller hobby farms, smaller chicken farms as well as upscale residences, all of which could contribute to non-point source pollution issues. The increase in sod farms in the lower Salacoa Watershed, particularly in the Lick Creek watershed, also could contribute to the sediment load. The ditches dug to drain the sod fields have no buffers and lead directly to the creeks. The sod farms are periodically completely inundated, most recently in May, 2018.

While it is a forest and farm dominated watershed, Salacoa Creek still experiences the flashy hydrology typically associated with excess runoff is being observed by local residents, potentially due to increases in impervious surface area. Storm events also cause a pronounced impact on turbidity and E. coli, particularly downstream of Fairmount (Richard Bundy, personal communication). The lack of riparian buffer zones in the watershed exacerbates these increases.

2.4.4 Active Groups within the Watershed

Federal entities relevant to the WMP development process and/or conservation efforts in the area include the EPA, the Farm Services Agency (FSA), the Natural Resource Conservation Service (NRCS), and the United States Forest Service (USFS). State entities relevant to the conservation efforts in the area include the Northwest Georgia Regional Commission., Georgia Department of Natural Resources (DNR), Georgia Department of Public Health, the Georgia Environmental Protection Division (EPD), the Georgia Soil and Water Conservation Commission (GSWCC), and the UGA Agricultural Extension Service. On the local level, active groups include Calhoun Utilities, the Gordon County Board of Commissioners, Limestone Valley RC&D Council, Keep Bartow Beautiful, The Nature Conservancy, and Coosa River Basin Initiative as well as many Scout groups and other youth groups. Groups involved in outreach programs, water quality education and monitoring or who will play a significant role in the implementation of this Watershed Management Plan will be discussed further within this 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 Salacoa Creek Planning Area, and sampling data from past and current monitoring endeavors. Assessments representative of current watershed conditions are also included.

3.1 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 Salacoa Creek Watershed are designated for Fishing. The numeric criteria associated with this designated use are found below. 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 2. Water Quality Criteria for Fishable Waters

Fecal Coliform Bacteria	Dissolved Oxygen	pH	Temperature
May – Oct < 200 colonies/100 ml as geometric mean*; **Less than 400 as instantaneous max**	< 5 mg/l daily average Not < 4 mg/l at all times	Between 6.0 and 8.5	< 90° F
Nov – April < 1000 colonies/100 ml as geometric mean; < 4,000 as instantaneous max	-	-	-

* The geometric mean of at least 3 samples collected from a site within a 30-day period.

3.2 Impairments

The Salacoa Creek Watershed has three segments that fail to meet the state criteria for water quality. These impairments are the result of excessive fecal coliform bacteria counts and / or heavy sedimentation, as indicated by poor biotic survey results. In order to address these impairments, Total Maximum Daily Load (TMDL) Evaluations were written in 2003 and 2009. A TMDL Implementation Plan was also written in 2006 to evaluate and track water quality protection and restoration. Despite these efforts, little progress has been made over the years to ameliorate the water quality issues in the Salacoa Creek Watershed. This watershed based plan addresses sediment and pathogen loading in the watershed. With full implementation of this plan, our goal is to have Salacoa Creek removed from the 303d list of impaired streams.

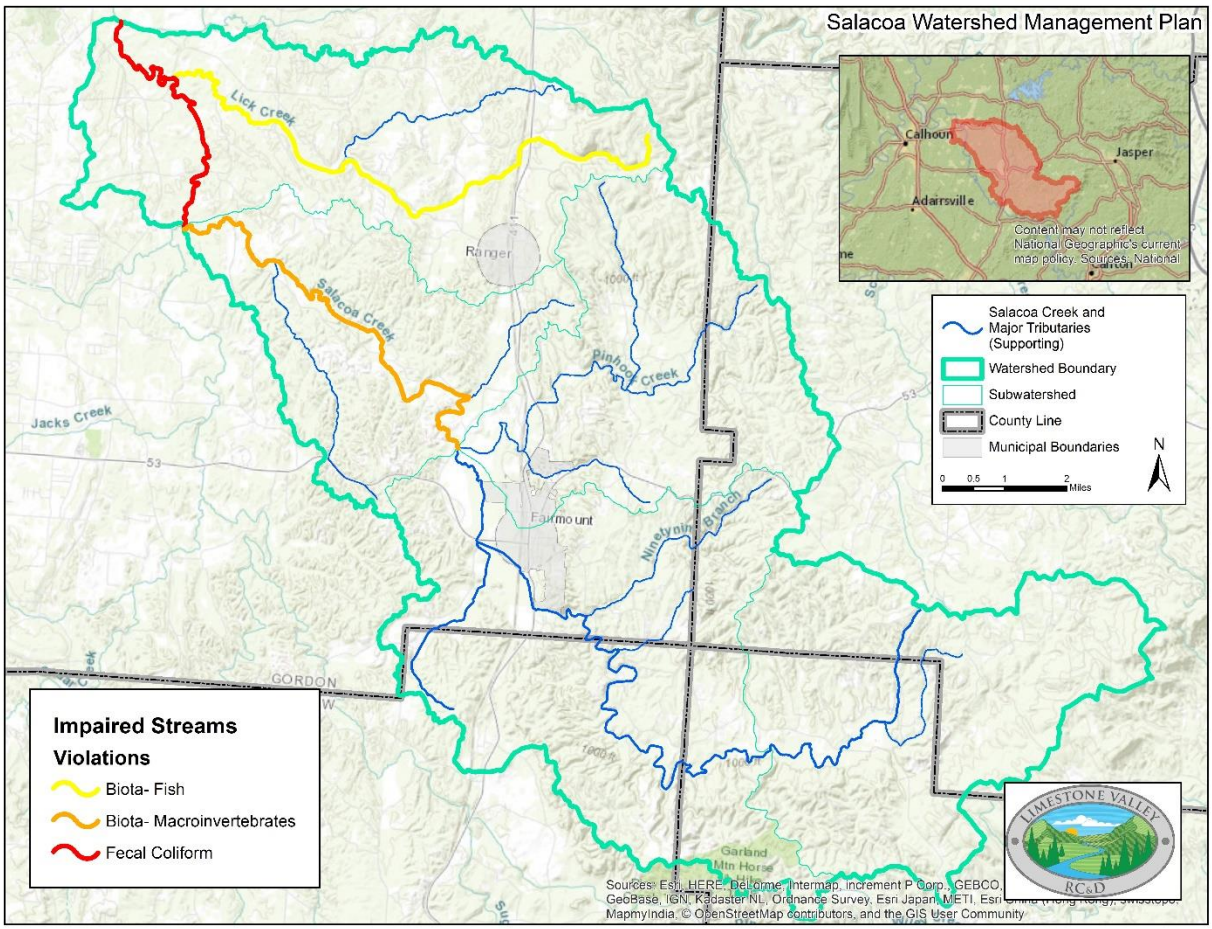
Table 3. Impaired Segments within the Salacoa Creek Planning Area

Waterbody (Impaired miles)	**County**	**Criterion Violated**
Salacoa Creek (6 miles)	Gordon County	Fecal Coliform
Lick Creek (11 miles)	Gordon County	Biota- Fish
Salacoa Creek (8 miles)	Gordon County	Biota- Macroinvertebrates

The Salacoa Watershed is approximately 116 Square Miles in area of which 11 linear miles of Lick Creek and 14 miles of Salacoa Creek are listed as impaired. The upper 20 miles of Salacoa Creek are fully supporting of designated uses. The entire length of Lick Creek is listed as not supporting fish life, primarily due to sedimentation (031501020705) It is also noted that the macroinvertebrate life was only fair in the Lick Creek segment between Redbud Creek and Salacoa Creek and is due to be reevaluated to see if macroinvertebrate criteria are actually being met. Two segments of Salacoa Creek are listed as impaired: the 8 mile segment from the inflow of Pinhook Creek to Pinelog Creek is impaired for macroinvertebrate biota, primarily due to excess sedimentation (031501020704) and the 6 mile long segment from Pinelog Creek to the mouth of the creek at the Coosawattee is impaired due to fecal coliform contamination (also now within 031501020705). NOTE: HUC codes changed since the last TMDL and WMP were written. Salacoa Creek was formerly HUC 10 # 0315010206 and is now #0315010207and the sub watersheds have also been renumbered for HUC 12 numbers.

It should be noted that Pinelog Creek (HUC 10# 0315010206) is also listed as impaired due to not supporting macroinvertebrate biota and high fecal coliform levels at its junction with the Salacoa Creek.

Figure 8. Impaired Streams within the Salacoa Creek Watershed



3.2.1 Impacted Biota Impairments

Within the Salacoa Creek Watershed, two segments are designated as impaired due to negatively impacted biota. Lick Creek is designated as impaired for Fish Biota from the Headwaters to Red Bud Creek and from Red Bud Creek to Salacoa Creek. Salacoa Creek is impaired from Pinhook Creek to Pinelog Creek for Macroinvertebrate Biota. Upstream of the Pinhook Creek confluence, Salacoa Creek is listed as supporting biotic life. 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 (IBI) or modified Index of Well Being (IWB) scores. 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 stream segments 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 that can be used to indicate suspended sediment in the water column), 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.

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, even eliminating certain habitat types, 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. (Castro and Reckendorf, 1995).

The Salacoa Creek 2009 TMDL calls for a 92% reduction in sediment load for Salacoa Creek. Sediment loading in Salacoa Creek is attributable to many factors. The flashy nature of the stream downstream of Pinhook Creek junction is leading to extensive bank scouring and trees falling into the creek. As trees fall and create snags, the water creates additional pathways around the roots, causing further streambank erosion. Logs and trees in the creek are also creating debris jams which increase erosion as well. In addition, foresting timber is active in this watershed. Depending on the type of timber management being implemented, disturbance from machinery, unmanaged road building, and increased soil exposure can lead to increased erosion and sediment delivered to streams. Another important source of sediment is from cattle fields where the cows are allowed to create pathways into the creek as well as collapse the bank around these paths. Other potential sediment sources are from other unpaved roads, the brick factory, other industry and other cleared land.

The increasing use of farms to produce turf grass is another sediment source both for Salacoa and Lick Creeks. The increase in sod farms in lower Salacoa and Lick Creek watersheds is impacting the sediment load due to the common practice of irrigating and trenching the fields to drain the water off. There is little vegetation in these trenches which lead directly to the creeks.

Table 4. Salacoa Creek TMDL Sediment Load Summary

Water-body	Reach	Drainage Area (mi^2)	Current Load (tons/yr)	Wasteload Allocation(tons/yr)	Load Allocation (tons/mi^2/yr)	TMDL (tons/mi^2/yr)	Total Load (tons/yr)	Percent Reduction
Salacoa Creek	Upstream of Pine Log Junction	90	14,046	0	13.22	13.22	1,188	92%
Lick Creek	Headwaters to Redbud Creek	-	515.6	-	515.6	515.6	38.2	0%
Lick Creek	Redbud Creek to Salacoa Creek	-	2032.5	-	2032.5	2032.5	150.4	0%

Average annual watershed loading rates represent the long-term processes of accumulation of sediments in the stream habitat. According to the TMDL, the physical habitat survey noted "unstable banks, poor streambank vegetation, inadequate riffles, and poor riparian zone cover" as issues in the stream. The biological study showed moderate impairment with degradation of habitat conditions identified as the cause of impairment. Both of the sections which are impaired have significant sedimentation identified from agricultural activities as well as unpaved roads. Stormwater runoff and instream erosion are increasingly important to the habitat degradation.

Table 5. Salacoa Creek Sediment Loading Rates

Waterbody	Waterbody Drainage Area (mi_2)	Sediment Rate (tons/mi_2/yr)	Total Load (tons/yr)	Storm Event Loading Rate (Lbs/mi2/day)
Salacoa Creek upstream of Pine Log junction	90	156.27	14,046	1689

In Lick Creek, TMDL data indicate sediment loading is not as high as in Salacoa Creek, except recent data collection indicated loading may be higher downstream of the sod farms. The TMDL calls for a 0% reduction in sediment load since it has been determined that most of the load as of 2009 was a result of legacy sediments which are the cause for the 303d designation, not current sediment loading. Further monitoring is needed to determine if this is indeed the case.

3.2.2 Fecal Coliform Impairments

The impaired segment on the Salacoa Creek below its junction with Pine Log Creek has failed to meet state criteria for fecal coliform bacteria. Although generally present in the environment 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. 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 water bodies. 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 rural watersheds include failing septic systems, livestock with direct stream access, applied manure, and natural areas with abundant wildlife.

In Salacoa Creek, pathogen loading is high particularly after rain events. Both the Fairmount WWTP monitoring and LVRCD monitoring indicate at least an order of magnitude increase in pathogens after rain events. This is not occurring only below the Pine Log Creek junction, but also from Hwy 53 to Pine Log. Additional monitoring is needed to determine where exactly in the watershed the pathogen levels exceed standards.

Table 6. Suggested Impairment Sources from TMDL Plan for Salacoa Creek.

Impairment Sources	Impact Rating	Applicable BMP's and repair
Urban Runoff	.25	Green Infrastructure
Failing Septic Systems	3	Septic Tank Repair
Wildlife	5	N/A
Agricultural Runoff	9	Poultry Litter Storage Facility; Cattle Exclusion devices; Riparian Forest Buffers; Stream Buffer Zones
Silvicultural Runoff	.25	GFC BMP's

The TMDL for pathogens for Salacoa Creek requires a 62% load reduction to achieve water quality standards in fecal coliforms and was determined using the 2009 303d load duration curves for designated drainage areas.

While the TMDL states Lick Creek requires 0% sediment load reduction, the increase in sod farms and development may require reduction in load in the future. For Salacoa Creek, the TMDL indicates a 92 % reduction is needed to reduced sediment levels which would allow for potentially de listing the creek. In the Salacoa, the TMDL notes unstable banks, poor buffer zones, poor riparian zone cover, unpaved roads, sheet and rill erosion, stream access by cattle, snags and obstructions in the creek, forestry practices and excess stormwater as potential causes of high sediment load in the creek. When the TMDL was established in 2009, the sediment load was 14,046 tons per year and the target load was established at 1,188 tons per year.

3.3 Previous Monitoring/Resource Data Collected in Watershed

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 and Georgia DNR Wildlife Resources Division (WRD) have conducted relevant monitoring within the Salacoa 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.

3.3.1 TMDL Data

New Echota River Alliance performed AAS monitoring at the Red Bud Road Bridge from 2009 to 2012 measuring the basic water quality parameters, but did not measure TSS or fecal coliforms. However, every month of 2011, Georgia EPD collected water quality data on Salacoa Creek at Mauldin Road . In 2012, EPD sampled monthly at Lovebridge Road, both for TSS and Fecal Coliforms. Lovebridge Road is the next road crossing after Pine Log Creek joins with Salacoa Creek. Pine Log is on the 303d list for pathogens and sediment.

Table 7. 2011 EPD TSS Data at Mauldin Road

TSS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Novr	Dec
Mg/L	4.0	110	17	21	13	13	8.3	10	25	50	5.6	2.6

Table 8. 2012 TSS Data at Lovebridge Road by GAEPD

Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Unit (mg/L)	44	17	41	20	57	23	16	12	8.3	6.5	No data	1

Table 9. 2012 Fecal coliform Geometric Means at Lovebridge Road by EPD

February/March	May	August	November
227	1088	701	210

While the fecal numbers fell below the state criteria for the February and November geometric means, the May and August numbers were well above the state criteria for fishable waters, therefore keeping Salacoa Creek listed for pathogens.

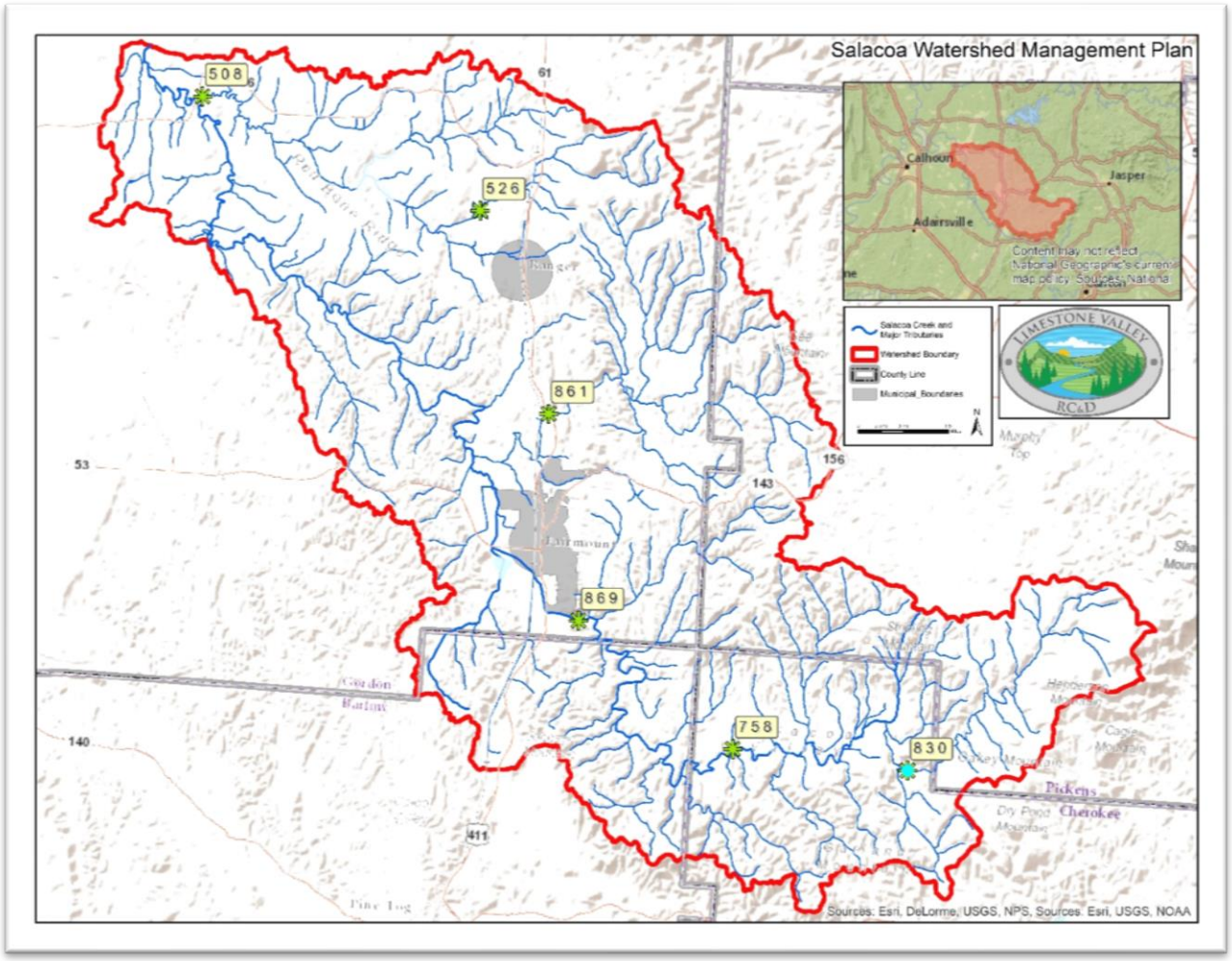
3.3.2 Georgia Wildlife Resources Monitoring Efforts

In addition to Georgia EPD's water quality monitoring efforts, Georgia WRD periodically monitors fish populations and lotic habitats to determine whether statewide criteria are being met. Fish sampling indices and habitat scores from sampling efforts in 2001-2005 are presented in Table 9. IBI and IWB scores from GAWRD in the Salacoa Creek Watershed .

Table 9. IBI and IWB scores from GAWRD in the Salacoa Creek Watershed

Collection	Stream Name	Year	IBI Score	IBI Category	IWB Score	IWB Category	Habitat
508	Lick Creek	2001	16	Very Poor	6.4	Very Poor	65
526	Lick Creek	2002	22	Very Poor	6.8	Fair	102
758	Salacoa Creek	2004	44	Good	8.9	Good	128
830	Salacoa Creek	2005	52	Excellent	8.2	Good	125
830	Salacoa Creek	2008	44	Good	8.0	Good	124
861	Pinhook Creek	2005	36	Fair	8.8	Fair	77
869	Salacoa Creek	2005	46	Good	9.2	Excellent	103

Figure 9. GAWRD IBI, IWB, and Habitat assessment sites located in the Salacoa Creek Watershed



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. As of April 2013, the IWB is no longer a part of the Georgia DNR Biomonitoring Program.

Habitat assessments are also a part of the biomonitoring process conducted by WRD 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.

3.4 Monitoring/Resource Data Collected for the Development of the WMP

Efforts were made to determine current watershed conditions and provide stakeholders with current water quality data and assist with the development of this plan. This monitoring, detailed in a Targeted Water Quality Monitoring Plan located in Appendix B, focused on collection of fecal coliform count and total suspended solids (TSS) data. Fecal coliform counts were determined to represent amounts of fecal contamination upstream of each site, and TSS was used to represent potential erosion issues upstream of each site. Samples were taken from twelve sample sites within the watershed (Figure 10). We attempted to take samples during both wet and dry periods because wet weather samples better represent the NPS pollution flushed from the landscape during runoff events whereas samples collected during dry events better reveal instream sources of NPS pollutants. Sample analyses were conducted by the lab at the Calhoun Wastewater Treatment Plant, with the exception of one occasion when Coliscan Easygel was used to evaluate E. coli numbers and turbidity tubes were used to measure nephalometric turbidity units (NTU). Due to the short duration of our study, geometric means were not collected, but the data do give an indication of the variation within the watershed.

Results from sampling performed during the planning process indicate that most of the levels have been very low, with the exception of the day we sampled turbidity and E. coli which was just after heavy rain storms. May 16 was also a higher water day, but the storms had been continuous for several days, so the first flush of sediment and coliforms was likely already downstream. The water was not as turbid that day as it was on March 30. Additional sampling is needed to gather samples required to compute more current geometric means for each season so we have a better baseline to compare with after BMP's are in place.

Figure 10.Sampling Sites located within the Salacoa Creek Watershed

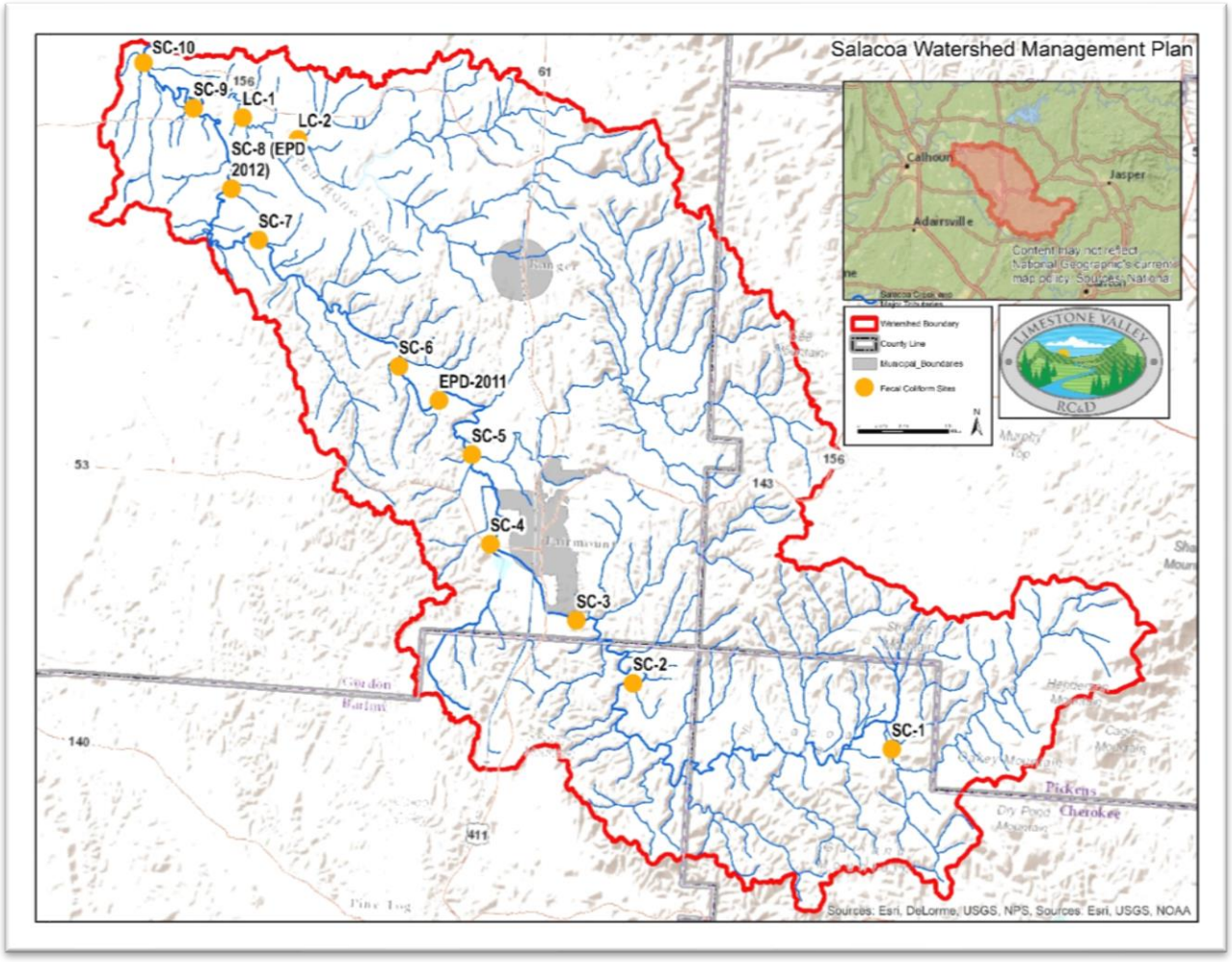
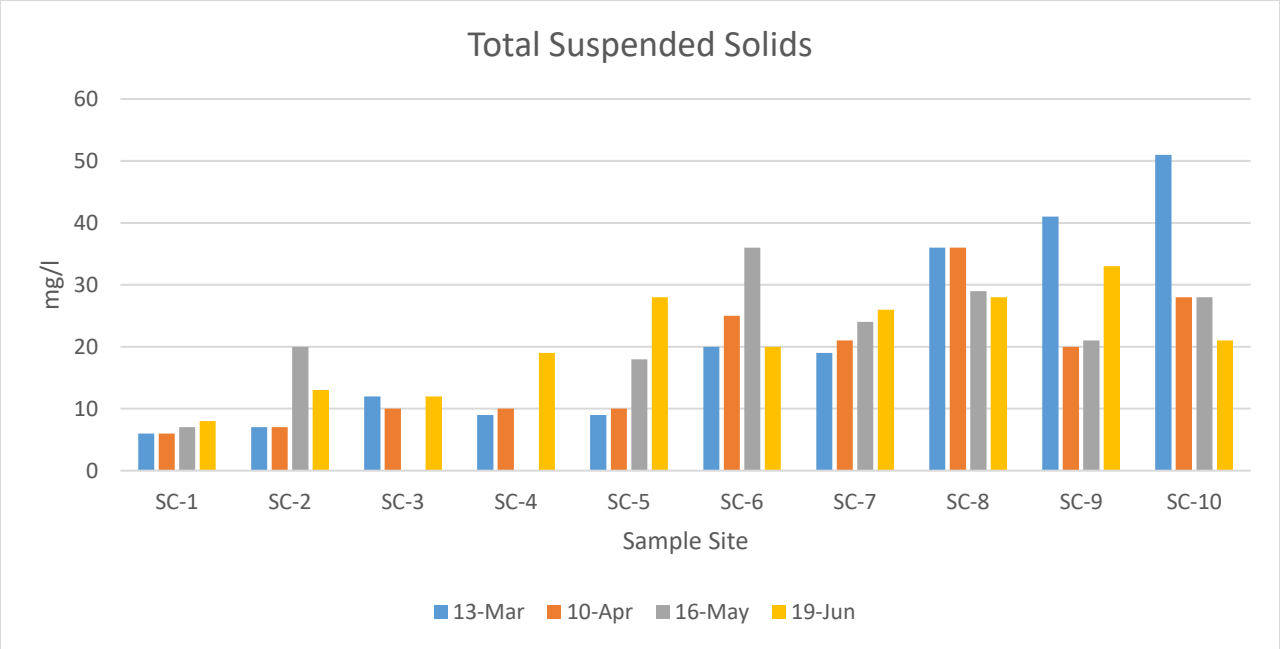


Table 10. Total Suspended Sediment and Turbidity Data Collected During Planning Period

Site ID	Location	13-Mar	10-Apr	16-May	19-Jun		3/30 turbidity
		mg/l	mg/l	mg/l	mg/l		NTU
SC-1	Salacoa Road at Jerusalem Church	6	6	20	8		0
SC-2	Salacoa Road SE	7	7	no sample	13		0
SC-3	Irwin Mill Road SE	12	10	no sample	12		0
SC-4	HWY 53	9	10	12	19		11
SC-5	Sam Hunt Road	9	10	18	28		17
SC-6	Covington Bridge Rd	20	25	36	20		27
SC-7	Knights Bottom Road	19	21	24	26		50
SC-8	Lovebridge Road	36	36	29	28		100
SC-9	Red Bud Road	41	20	21	33		65
SC-10	Slagle Rd NE	51	28	28	21		65

PC-1	Pine Log on Covington Bridge Road	-	-	16	18		150
LC-1	LC Lick Creek Langford Road NE	-	-	41	22		-
LC-2	LC2* Lick Creek Pleasant Hill Ext	-	-	20	-		-

***Located downstream of sod farms**



On March 30, 2018, samples were taken after a heavy rain storm. Since it was not anticipated that sample data was to be gathered, Turbidity was measured with a standard turbidity tube in NTU's (nepholametric turbidity units) and coliforms were measures by utilizing Coliscan Easygel, quantifying E coli colonies. It should be noted that Sample Site 8 is just downstream of the junction of Pine Log Creek and Salacoa Creek. The Turbidity in Pine Log Creek that day was 150 NTU. Pine Log is on the 303d list for pathogens and macroinvertebrate biota.

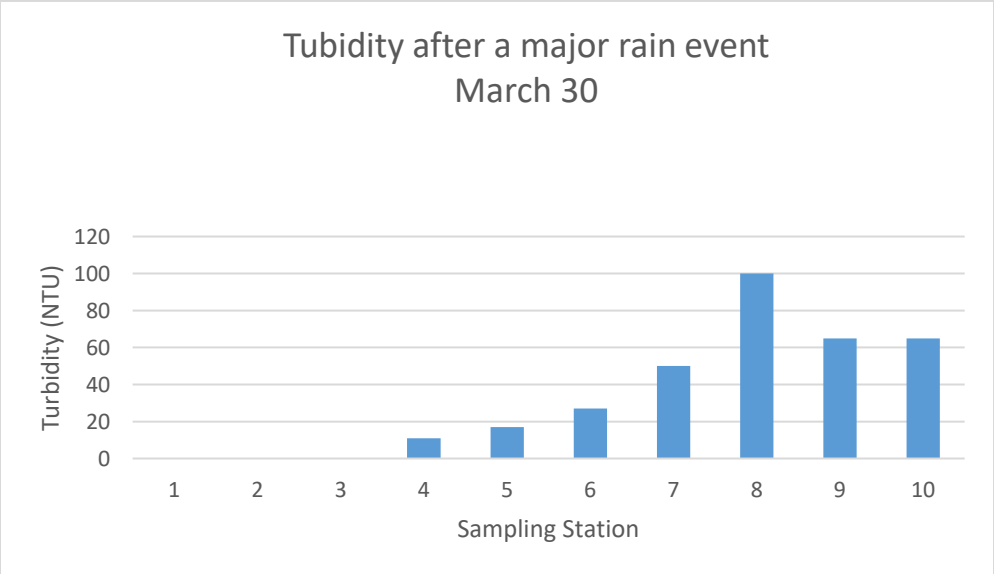
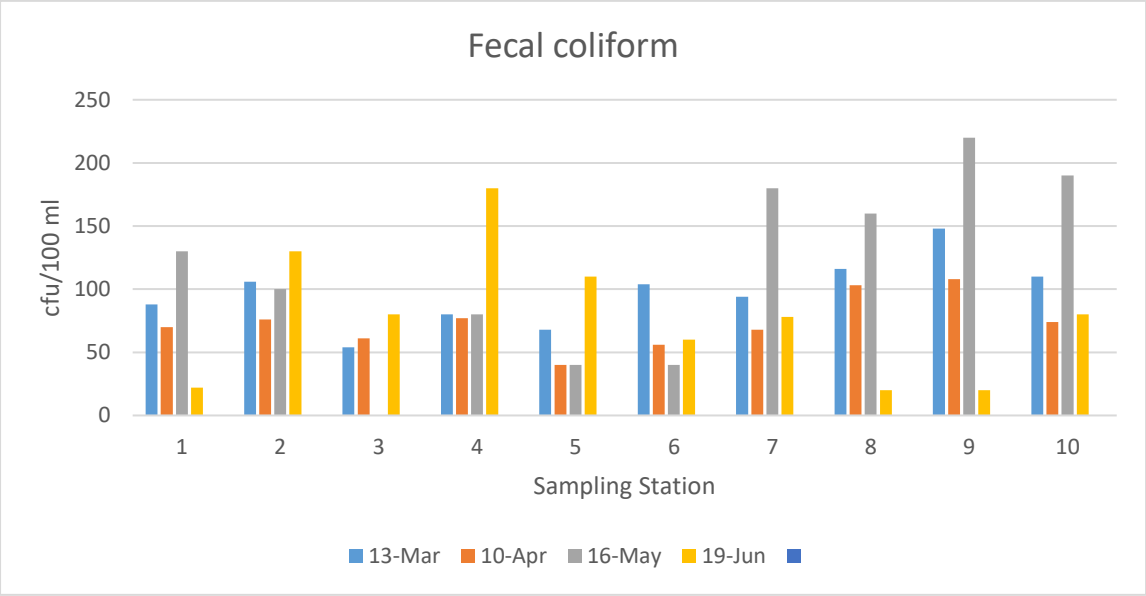
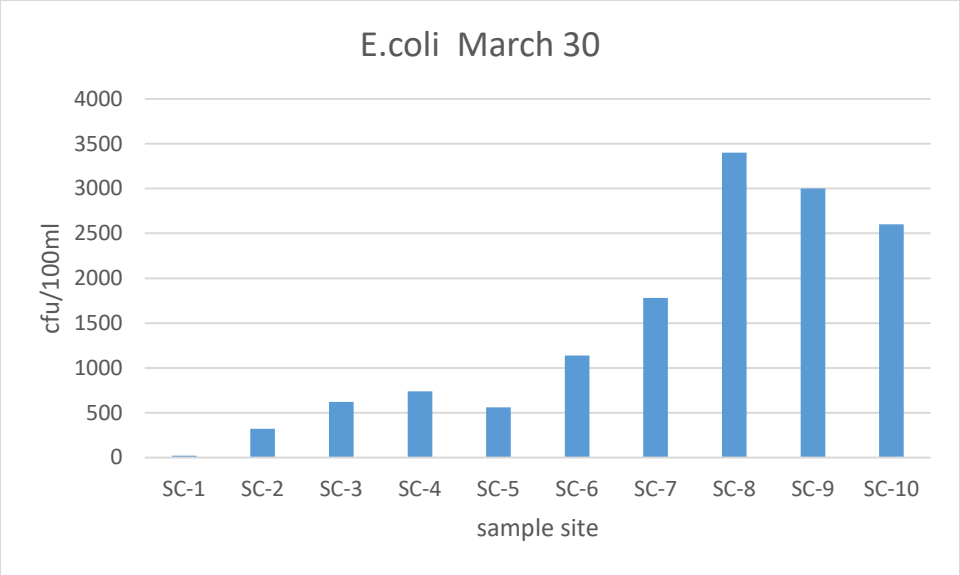


Table 11. Fecal Coliform Data Collected during Salacoa Creek Planning Period

Site ID	Fecal Coliform Sample Site	Fecal Coliform Data (Colonies/100)				
		March 13	April 10	May 16	June 19	March 30*
SC-1	Salacoa Road at Jerusalem Church	88	70	130	22	20
SC-2	Salacoa Road NE	106	76	100	130	320
SC-3	Irwin Mill Road	54	61	no sample	80	620
SC-4	HWY 53	80	77	80	180	740
SC-5	Sam Hunt Road	68	40	40	110	560
SC-6	Covington Bridge Rd	104	56	40	60	1140
SC-7	Knights Bottom Road	94	68	180	78	1780
SC-8	Lovebridge Road	116	103	160	20	3400
SC-9	Red Bud Road	148	108	220	20	3000
SC-10	J Slagle Rd NE	110	74	190	80	2600
PC-1	Pine Log on Covington Bridge Road	-	-	80	108	5360
LC-1	Lick Creek Pleasant Hill Ext	-	-	-	30	-

***E.coli was measured using Coliscan Easygel.**





3.5 Land Use Analysis

Land use within the Salacoa Creek Watershed was analyzed using the most recent National Landcover Database(NLCD) data completed in 2011 (Homer 2015). The watershed is predominately a mix of Forested and Agricultural land uses (Table XX). Forests dominate the watershed with 68% of the total acres made up of Deciduous, Evergreen, and Mixed forest types. The secondary land-use type within the watershed is agriculture, represented by Hay/Pasture (12.3%) and Cultivated Crops (0.9%). Developed areas represent a smaller percentage. Developed areas represent approximately 7.6% of the watershed, with a majority of that classified as "Open-Space". The remaining land-uses are variable but reflect the rural nature of the watershed. Much of the residential development is concentrated in the municipalities of Fairmount and Ranger, as well as along Highways, 53, 411, and 143 that bisect the watershed from north-south and east-west. 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.

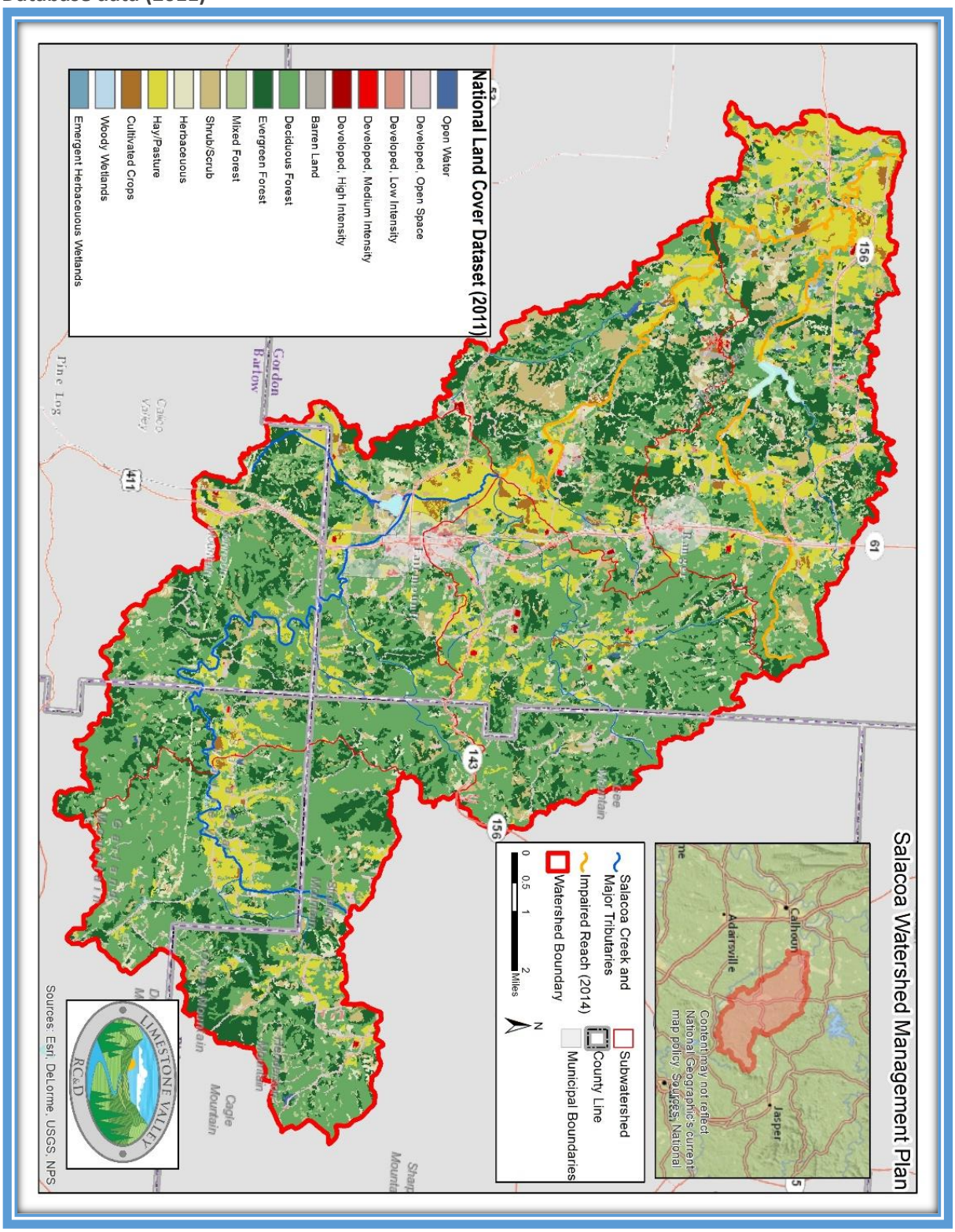
Table 12. Land-use within the Salacoa Creek by subwatershed

Land Use Type	Lick Creek 031501020705		Little Creek 031501020701		Marlow Branch 031501020704	
	Acres	%	Acres	%	Acres	%
Open Water	82	0.5%	28	0.2%	35	0.3%
Developed, Open Space	1,241	7.6%	829	5.6%	557	5.4%
Developed, Low Intensity	142	0.9%	87	0.6%	70	0.7%
Developed, Medium Intensity	40	0.2%	6	0.0%	27	0.3%
Developed, High Intensity	10	0.1%	1	0.0%	12	0.1%
Barren Land	14	0.1%	13	0.1%	68	0.7%
Deciduous Forest	4,484	27.3%	7,911	53.7%	2,890	27.9%
Evergreen Forest	2,887	17.6%	2,791	19.0%	2,790	27.0%
Mixed Forest	1,275	7.8%	729	5.0%	753	7.3%
Shrub/Scrub	1,420	8.6%	493	3.4%	1,371	13.2%
Herbaceuous	675	4.1%	581	3.9%	665	6.4%
Hay/Pasture	3,737	22.7%	1,146	7.8%	967	9.3%
Cultivated Crops	272	1.7%	30	0.2%	99	1.0%
Woody Wetlands	128	0.8%	68	0.5%	30	0.3%
Emergent Herbaceous Wetlands	23	0.1%	7	0.0%	17	0.2%
Total	16,428	100.0%	14,721	100.0%	10,352	100.0%

Table 13. Land-use within the Salacoa Creek by subwatershed (cont'd)

Land Use Type	Ninetynine Branch		Pinhook Creek		Total	
	031501020702		031501020703			
	Acres	%	Acres	%	Acres	%
Open Water	76	0.4%	29	0.2%	250	0.3%
Developed, Open Space	1,070	5.5%	1,020	7.9%	4,717	6.4%
Developed, Low Intensity	157	0.8%	192	1.5%	649	0.9%
Developed, Medium Intensity	44	0.2%	52	0.4%	168	0.2%
Developed, High Intensity	15	0.1%	28	0.2%	65	0.1%
Barren Land	26	0.1%	33	0.3%	154	0.2%
Deciduous Forest	8,626	44.3%	6,735	52.4%	30,646	41.5%
Evergreen Forest	4,427	22.7%	1,740	13.5%	14,635	19.8%
Mixed Forest	1,234	6.3%	750	5.8%	4,742	6.4%
Shrub/Scrub	948	4.9%	436	3.4%	4,669	6.3%
Herbaceous	769	3.9%	339	2.6%	3,030	4.1%
Hay/Pasture	1,910	9.8%	1,350	10.5%	9,110	12.3%
Cultivated Crops	142	0.7%	126	1.0%	670	0.9%
Woody Wetlands	34	0.2%	31	0.2%	292	0.4%
Emergent Herbaceous Wetlands	2	0.0%	2	0.0%	49	0.1%
Total	19,480	100.0%	12,865	100.0%	73,845	100.0%

Figure 11. Land-use within the Salacoa Creek Watershed as determined by National Landcover Database data (2011)



3.6 Riparian Buffer Analysis

For the development of the Salacoa Creek WMP, a desktop spatial analysis of the Salacoa Watershed Study Area was performed to assess the general condition of the riparian corridor regarding woody vegetation. Full documentation of methods used for this assessment can be found in Appendix A. This stream buffer analysis was completed due to the importance of vegetative buffer zones (i.e., riparian zones) for stream and water quality conditions.

The riparian area literally serves as a buffer between activities that occur on the landscape and the water in the stream by physically catching pollutants (e.g., sediment, nutrients, bacteria) from runoff during rain events. They are critical to the health of waterways. In healthy stream systems, extensive root systems stabilize the soils close to streams and, most importantly, the stream banks. Without these root systems, erosion is more prevalent and the banks often erode and collapse leading to sedimentation issues. 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.

This analysis focused on defining the degree to which stream segments were considered “wooded” or “forested” as determined by the National Land Cover Database (NLCD) Tree Canopy Cover Product (Homer 2015). The NLCD provides data on land cover and land cover change at a 30-meter resolution. Also, due to the relatively low-resolution of the data – 30 meters – this assessment is intended as a high-level metric to help identify watersheds within the study area that may require more analysis to identify potential stressors.

Table 14. Miles of Stream within the Salacoa Creek Planning Area and its Associated Canopy Cover (%)

Subwatershed	Miles of Stream by Percent Canopy Cover					
	0-20	***20-40***	***40-60***	***60-80***	***80-100***	***Total***
Lick Creek	19.23	7.48	6.83	10.26	29.27	73.07
Little Creek	5.08	1.80	2.87	5.72	48.74	64.21
Marlow Branch	5.45	2.45	2.91	5.50	25.62	41.94
Ninetynine Branch	9.7	3.38	4.19	7.06	53.92	77.72
Pinhook Creek	5.67	2.85	3.31	4.87	33.19	49.89
Total	44.60	17.96	20.11	33.41	190.75	306.84

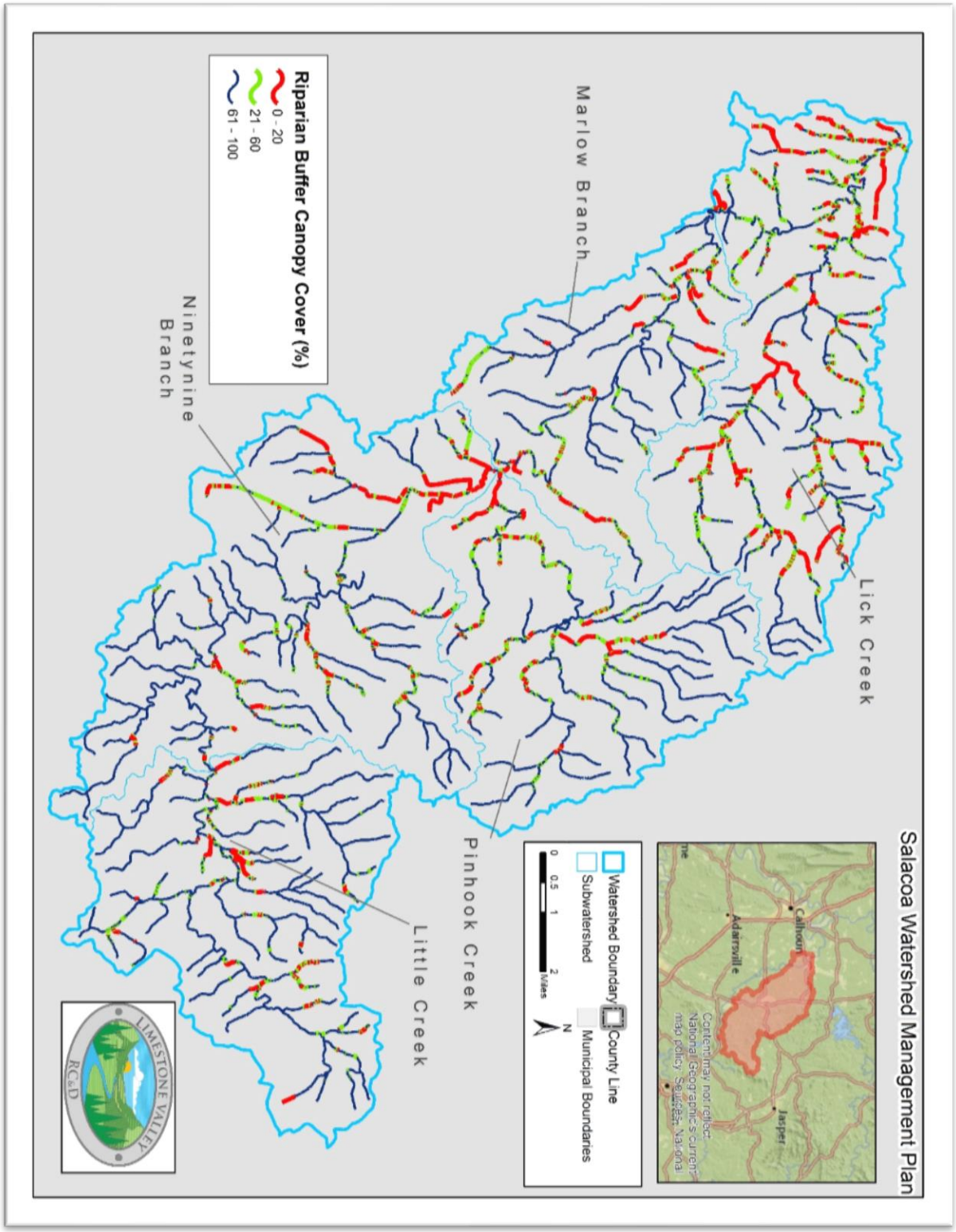
The areas having insufficient riparian zones are depicted in

Figure 12. A map depicting riparian buffer condition within the Salacoa Creek Watershed. Streams depicted in yellow represent areas within the riparian buffer that have less than 20% canopy coverage. For purposes of this analysis, the 0-20% class is being considered "bare ground" and could be used to identify potential sources of sediment and other stressors. Percentage of stream length in this first classification ranges between 8% and 26%, with the highest percentage found in the Lick Creek Sub-watershed. Buffer analysis shows several areas within the watershed lacking in riparian buffers, primarily in the wider valley regions of the watershed and in the Lick Creek Watershed. Much of this acreage lies on grazing lands where a lack of riparian buffers when combined with cattle access can increase bank erosion, and thus sediment introduction, into Salacoa Creek. In addition, lack of buffering in the sod farms also can have significant impact, particularly when the sod is removed. Improving these buffers would reduce bank erosion and sedimentation issues and improve water quality within the watershed. Buffers are regulated by the State of Georgia in Section 12-7-3 of the Georgia Erosion and Sedimentation Act of 1975. An amendment issued in May of 2009 states that a 25-foot buffer shall be established along the banks of all state waters. The Gordon County Unified Land Development Code, adopted on January 1, 2009 (and revised on December 7, 2010), also states that the minimum buffer width will be 25 feet. Designated trout streams in Georgia require a buffer of 50 feet

Table 15. Percent of Total Stream Length by Percent Canopy Cover within the Salacoa Creek Planning Area

Subwatershed	Percent of Total Stream Length by Percent Canopy Cover					
	0-20	***20-40***	***40-60***	***60-80***	***80-100***	***Total***
Lick Creek	26%	10%	9%	14%	40%	100%
Little Creek	8%	3%	4%	9%	76%	100%
Marlow Branch	13%	6%	7%	13%	61%	100%
Ninetynine Branch	12%	4%	5%	9%	69%	100%
Pinhook Creek	11%	6%	7%	10%	67%	100%

Figure 12. A map depicting riparian buffer condition within the Salacoa Creek Watershed. Streams depicted in yellow represent areas within the riparian buffer that have less than 20% canopy coverage.



3.7 Impervious Surface Cover Analysis

Impervious surface cover was also investigated as an indicator of development and consequently where stormwater runoff has increased over time. This investigation was intended to provide some insight as to whether development is a contributor to the impairments, as well as consider the potential need for additional stormwater practices, Green Infrastructure, and management as additional development ensues.

Impervious surface cover in the watershed is shown in Figure 13. Additionally, Table 16 and Table 17 show the distribution of impervious surfaces within each subwatershed. Impervious surface values were grouped into "High", "Medium", and "Low" categories for clarity purposes.

As confirmed during field observations, a majority of the impervious surfaces are restricted to Fairmount, Ranger, highways, and commercial areas adjacent to highways. This analysis was limited to the 2011 NLCD impervious surface data. Although, impervious surface has likely increased over time, this analysis confirms observations noted during field work for this planning document.

Figure 13. Impervious Surface Cover in the Salacoa Creek Watershed- Impervious Surfaces are represented by pink and red tones. Darker reds indicate higher percentages of Impervious surfaces.

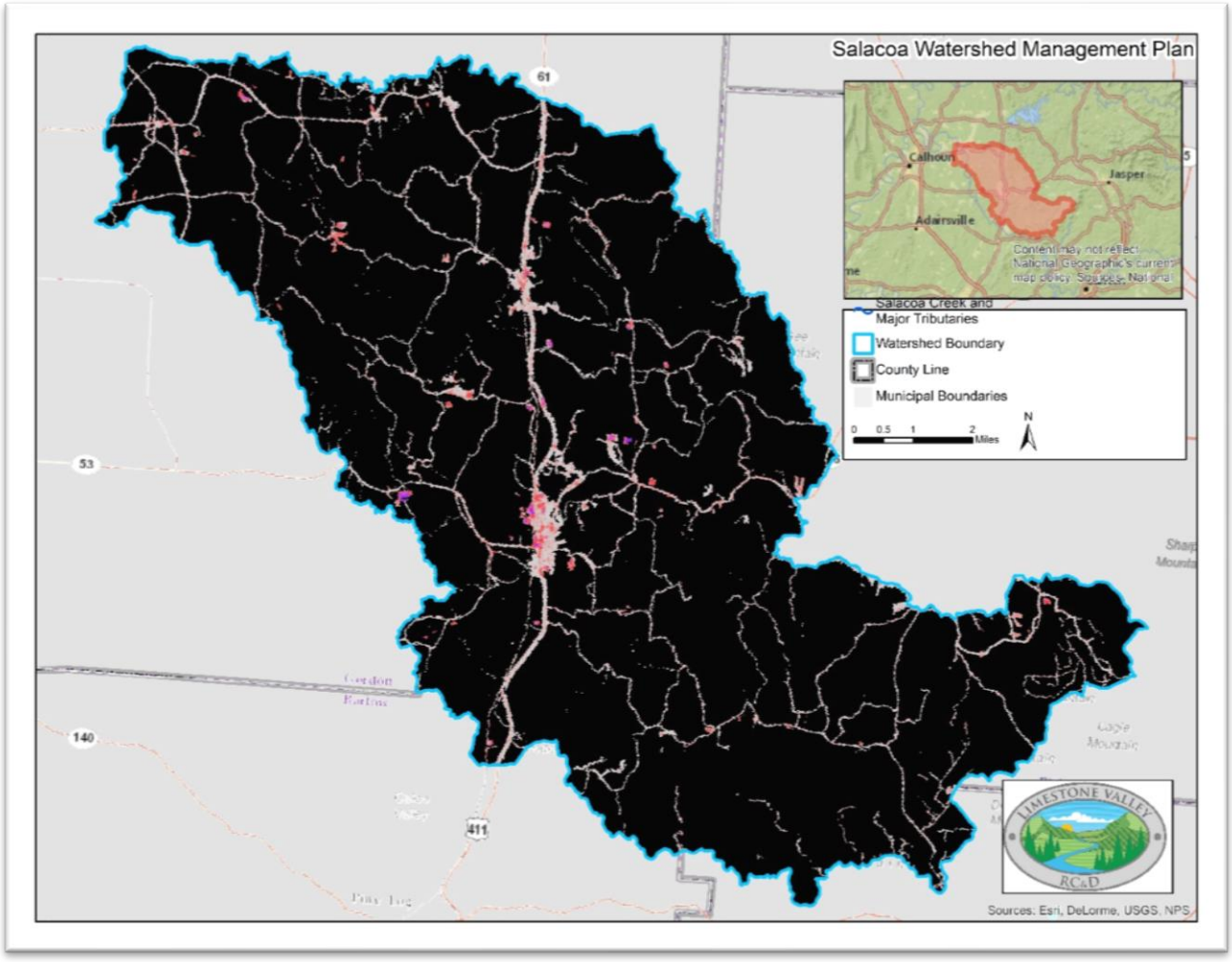


Table 16. Acres and Percent of Subwatershed by Impervious Surface Category

Impervious Surface (%)	Lick Creek 031501020705		Little Creek 031501020701		Marlow Branch 031501020704	
	Acres	%	Acres	%	Acres	%
Low (10 - 30)	41,334	99.7%	28,659	99.9%	36,099	99.8%
Medium (30 - 60)	76	0.2%	16	0.1%	51	0.1%
High (60 - 100)	32	0.1%	5	0.0%	28	0.1%
Grand Total	41,442	100.0%	28,681	100.0%	36,179	100.0%

Table 17. Acres and Percent of Subwatershed by Impervious Surface Category (cont'd)

Impervious Surface (%)	Ninetynine Branch 031501020702		Pinhook Creek 031501020703		Total	
	Acres	%	Acres	%	Acres	%
Low (10 - 30)	57,209	99.8%	57,155	99.7%	220,457	99.8%
Medium (30 - 60)	72	0.1%	96	0.2%	310	0.1%
High (60 - 100)	43	0.1%	57	0.1%	167	0.1%
Grand Total	57,325	100.0%	57,308	100.0%	220,933	100.0%

3.8 STEPL Analysis

To analyze the potential load reductions that could be achieved through watershed restoration, a STEPL model—designed by the EPA—was built for the Salacoa Creek Planning Area. The STEPL model (Spreadsheet Tool for Estimating Pollutant Load) is a spreadsheet tool that uses algorithms to calculate nutrient and sediment loads from different land uses and the load reductions that could occur from the implementation of BMPs. Although the STEPL model is capable of modeling nutrients as well, for purposes of this plan we used the model to analyze the potential sediment load reductions that might be achieved during implementation of this watershed management plan. Future versions of this model will include Fecal Coliform loading, but is not yet available.

The STEPL model can be utilized at the field-level up to the HUC-12 level. For our purposes, we modeled each of the five HUC-12 watersheds within the Salacoa Creek Planning Area. The model requires land use and precipitation data to calculate outputs. The model calculates annual sediment load by using the Universal Soil Loss Equation (USLE) and sediment delivery ratio. Potential sediment loads for the HUC-12 watersheds within our planning area are presented in Table 18.

The STEPL model calculates potential load reductions through use of BMPs in multiple ways. When dealing with specific project-level BMPs, such as streambank stabilization at a particular site, STEPL allows the user to calculate a refined load reduction based on the length and height of the bank, soil type, as well as the severity of erosion. However, since outreach to specific individuals and projects was not an objective of this plan, this type of approach would not be suitable. Alternatively, STEPL can calculate potential load reductions by identifying a particular BMP—Stream bank stabilization, filter strips, etc—and applying that to a proportion of specific land-uses within each subwatershed.

For this exercise, we assumed a Livestock Exclusion BMP would be applied to 25% of the pastureland area within each subwatershed. We also assumed a grass filter/buffer strip BMP could be applied to 35% of the cropland within each subwatershed. Estimated loads and load reductions based on these assumptions are presented in Table 18. Based on this approach, initial rounds of implementation could potentially reduce loads by 577 tons/year. The addition of green infrastructure and Urban BMPs—not included in this model, but a significant factor contributing to non-point source sediment—could also significantly affect load reductions.

Table 18. Estimated Loads and Potential Load Reductions Calculated Using the STEPL Model

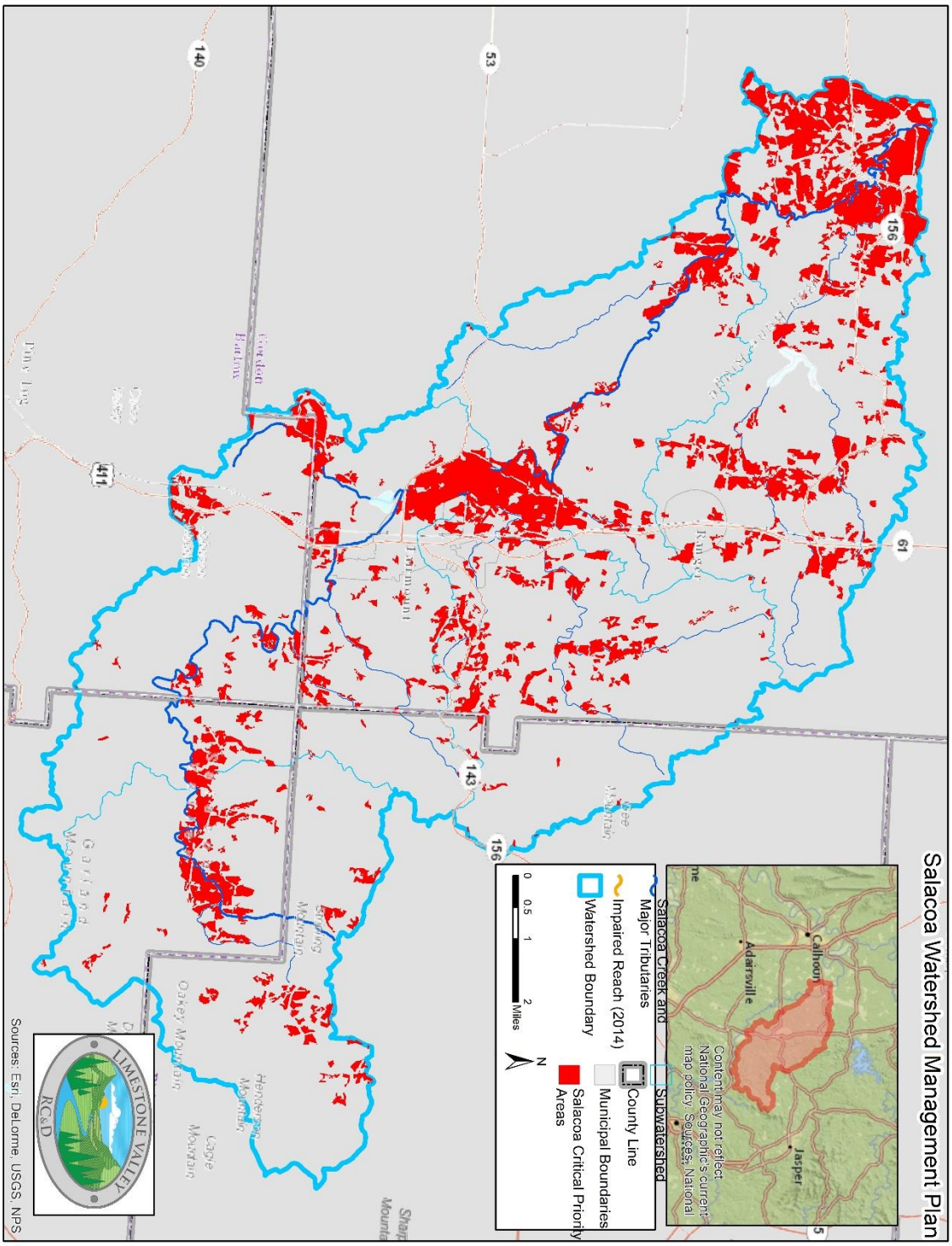
Watershed	Sediment Load (no BMP)	Sediment Load (with BMP)	Percent Reduction
	tons/year	tons/year	%
Lick Creek	1831	1612	12
Marlow Branch	793	710	10
Pinhook Creek	1027	935	9
Ninetynine Branch	1299	1180	9
Little Creek	838	772	8
Total	5787	5210	10

It should be noted that the total estimated sediment load we calculated with STEPL is significantly lower than the load calculated by the 2009 TMDL and is confounding. Future work in this area should reconcile differences in the model. However, this approach still provides a high-level estimate of load reductions that can be achieved through implementation. It can also be used during implementation as a planning tool to maximize the efficacy of implementation funds. Likewise, it can be used as a tool to track load reductions as more specific project-level BMPs are implemented.

3.9 Critical Priority Areas Analysis

Using land use and riparian buffer analysis data compiled and analyzed for this watershed plan, critical areas within the watershed were identified to prioritize future implementation efforts. Critical areas focus on the intersection of poor riparian canopy cover and agricultural land within the planning area. The map below depicts these areas in red.

Figure 14. Critical Implementation Areas Identified within the Salacoa Creek Planning Areas



4 Pollutant Source Assessment

This section of the WMP identifies significant sources of impairing pollutants within the watershed. The most significant issues in the watershed stem from sedimentation and excessive fecal coliform loads. The two major categories of pollutants addressed in this section are point and nonpoint sources. The following information was gathered through both research and stakeholder input during WMP formation.

4.1 Nonpoint Sources

Nonpoint source pollution (NPS) comes from many diffuse sources, as opposed to point source pollution which originates from a single source. NPS encompasses a wide range of pollutants distributed across the landscape and washed into streams during rain events. 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. Since there are few potential or permitted point sources in this watershed, most of the pollutants are assumed to originate from NPS. Although the management of particular parcels will not be discussed within this plan, it is apparent that the most prevalent nonpoint source pollution issues in the watershed relate to insufficient riparian buffers along streams, livestock access to streams, the application of poultry manure, failing septic systems, streambank erosion, stormwater runoff, undersized culverts, drainage ditches and tile drains from agricultural fields, unpaved roads and potentially others.

4.1.1 Agriculture

Within the Salacoa Creek Watershed, pasture and hay make up 10,637 acres or approximately 12.5% of the land in the watershed. Cultivated crops make up 746 acres or 0.9% of the watershed area. When excluding forestlands with traditionally low NPS levels, overall farming lands (>13.4%) are the dominant land use in the watershed likely contributing significant nonpoint source pollution loads. Land in farms can be subdivided into use categories of cattle, horse, and chicken operations with each subgroup potentially contributing significantly to nonpoint source pollution loading.

Although failing septic and “straight-piping” may contribute to pathogen loading, the general consensus from both the TMDL and the local population is that pathogen loading is predominantly originating from

livestock. While some farms fence their cows from the creek, most do not. Cattle regularly are seen standing in the creek. In addition, rain events wash pathogens from the adjacent fields and high use areas directly into the creek, particularly where there is no buffer zone.

Due to the significant volume of dry chicken manure spreading in Gordon County, it is likely to be a prime contributor to the fecal coliform loading of the creek. As of January 1, 2009, General NPDES Permits were in place or applied for by 31 Poultry operations in the four-county region. The number of poultry farms has increased drastically since then, so the permits for dry manure poultry farms has only increased and with it the potential for non-point source pollution for fecal coliform bacteria in the runoff. In addition, local advisors suspect that the fields are saturated with phosphates and indeed, in other areas of the Coosa Basin, nutrient trading is being researched.

Additional input of pathogens and nutrients can also be due to proximity of chicken houses to the creek and its tributaries. Furthermore, the practice of injecting waste into the soils as a soil amendment is increasing in the watershed. Not only is it occurring on the largest farm in the watershed, but also on at least two additional farms. Monitoring should indicate if this practice is adding fecal coliform loads to the creek.

Beef cattle are generally maintained in pastures with the exception of winter feeding, while dairy cattle are more often than contained for production purposes. Both beef and dairy cattle (as well as other livestock) can contribute to raised levels of fecal coliform if feces left in pastures eventually washes into the streams during runoff events or becomes inundated in floodplains. When cattle, have continuous access to streams, they have the ability to directly deposit much of their waste into streams. In addition, the access leads to trampling of riparian vegetation, loss of bank stability, and often eventually collapse of stream banks. Bank instability issues often lead to continuous significant sediment loading into streams.

The increase in sod farms is also a source for sediment loading, since the drainage waterways dug through the farms have no buffers and lead directly into the stream. In addition, the sediment itself is also a potential dwelling/ source/ load for pathogens. Since pathogens adhere to sediment particles and can survive longer while in sediment, the actual abundance of coliforms may be higher and more persistent than actually measured. (Burton, et al., 1987)

4.1.2 Wildlife

Depending on the animals present within the watershed, 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. Wildlife on the valley floor, in particular geese and ducks, are present in significant numbers and may, however, have a more pronounced impact on water quality. The north-to-south orientation of the valley provides a natural flyway for both geese and ducks during migrations. In

addition, there are numerous lakes pocketing the watershed providing excellent habitat for waterfowl. Waterfowl are considered significant contributors since they spend a large portion of their time on surface waters and deposit feces directly into the host water body. Of concern in the watershed is Salacoa Creek Park and in particular Salacoa Lake, a recreational lake maintained by Gordon County, and utilized for fishing, boating, and swimming. The ever increasing numbers of Canada Geese not only populate the lake during migrations, but also spend increasing amounts of time on the lake throughout the year. The lake, due to shallow depth and a muddy bottom, is potentially becoming an incubator for feces left by the waterfowl. 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*), may also contribute small amounts to the load, but local hunters have been removing them as fast as possible.

The large proportion of forested lands in this watershed suggests that wildlife may be contributing to the fecal coliform load, however our data from the forested lands indicate minimal impacts. Regardless, 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.

4.1.3 Urban/Suburban Runoff

Sediment pollution can originate from many sources in an urban or suburban area, such as Fairmount or the newer developments in the outer reaches of the watershed. 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. Assisting the communities of Fairmount and Ranger with the installation of various, additional stormwater practices and other green infrastructure may be able to reduce these issues in the Salacoa Creek Watershed.

Pathogen loading is likely arising from several sources, particularly since the levels increase so substantially after rain events. Since the housing density is low and only 200 houses are connected to the Fairmount waste water treatment plant, septic systems are utilized throughout the watershed. Septic discharge could be an issue, particularly considering the clay soils which restrict infiltration during rain events. Additionally, maintenance of older septic systems as well as piping waste directly into streams are also issues according to the local ordinance officer. The Gordon County Public Health department has indicated several areas where septic systems may need rehabilitation.

Targeting these issues in the Salacoa Creek Watershed should lead to more effective water quality improvement efforts during the implementation of this plan. When considering failing septic systems as contributors of fecal coliform bacteria in our streams, it is important to look at current systems in the ground, as well as anticipate those that come along with new development. Landowners experiencing septic failures would likely be more motivated to fix them 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 few permitted point sources in the watershed, and it is assumed that the majority of impairing pollutants result from NPS pollution. Many of the poultry farms operate dry manure spreading under a general NPDES permit.

Only the Fairmount Wastewater Treatment Plant is directly permitted, GA0046388 but other industries may create a pollution source. They are:

- Redbone Ridges MSW Landfill at 1224 Pleasant Hill Road Ext NW in Ranger
- Pine Hall Brick Company in Fairmount and on Hwy 53 west of Fairmount
- J M Huber Corporation which operates an Aluminum Trihydrate and Magnesium Hydroxide processing facility in Fairmount to make non-halogen fire retardant additives.

5 Watershed Improvement Goals

This section of the WMP outlines the overall goals for the watershed improvement process in the Salacoa 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

5.1.1 Restoration

The primary objective of this WMP is to outline a framework that will lead to the restoration of the Salacoa Creek Watershed to achieve and maintain compliance with state standards. Three segments have been placed on Georgia's 303 (d)/305 (b) list, totaling over twenty-five 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 or macroinvertebrate 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. Should these groups not revisit these streams, a local effort may be made to sample them again to see if biotic assemblages have improved.

5.1.2 Anti-degradation

Through water quality sampling data obtained during the formation of this WMP, it was recognized that the entire watershed contained sources of fecal coliform and sediment, and that in addition to the current impairments, other stream segments had at least some 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 should 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.

5.1.3 Education

The third and final objective identified in this plan is to educate local citizens on the uniqueness of their watershed, 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 will be used as a means to reach a broad audience in the community. Additionally, while an initial Adopt a Stream workshop has already resulted in a cadre of volunteers, additional trainings will enhance the volunteer group in the watershed to collect and analyze water samples on a monthly basis as part of the

Georgia Adopt-A-Stream Program. These Adopt-A-Stream volunteers will also conduct a watershed observation twice a year and macroinvertebrate sampling in the fall and spring of each year. Other specific examples include demonstration green infrastructure, stream cleanups, rain barrel workshops, native tree planting and canoe cleanup floats down local waterways.

5.2 Load Reduction Targets

The impaired segment along lower Salacoa Creek is the result of past fecal coliform conentrations exceeding state standards. A TMDL was created for fecal coliform impairments in the Coosa River Basin that included this segment in 2009. This TMDL included an estimate of the reduction of fecal coliform loadings likely to result in de-listing of the segment. The percent reduction calculated for the Salacoa Creek segment in this plan is 62%.

The impairment of Lick Creek and Salacoa Creek for Biota are linked to sediment impacts in the watershed. A 2009 TMDL for Lick Creek listed a 0% reduction in sediment since a majority of the load is considered to be legacy sediments and not considered current loading. The estimated load reduction for the listed segment of Salacoa Creek is 92%.

6 Pollution Reduction

This section explores management programs and strategies (structural and non-structural) that currently exist within the Salacoa 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.

6.1 Existing Conservation Programs

Currently, a number of conservation programs exist in the Salacoa Creek Watershed to assist land owners and managers in protecting and conserving soil, water, and natural resources. These conservation programs involve federal agencies as well as a variety of state and local government entities. Many of these conservation programs are utilized throughout the United States to conserve and protect natural resources. As a primary component of the Salacoa Creek Watershed Management Plan, only those conservation efforts specifically addressing fecal coliform and/or sedimentation reduction will be discussed in this section.

6.1.1 Current Structural Programs and Practices

With the majority of land use in the Salacoa Creek Watershed categorized as either forest or agriculture, it is felt management measures directed at these two land use categories will have the greatest overall impact on improving water quality in the watershed, also be coupled with stormwater infiltration measures and septic system rehabilitation. The following description of structural management programs have proven to be effective in both forest and agriculture settings and have been generally well received by the landowner even though participation is voluntary and funding is on a cost share basis. These management measures which assist in controlling pollutant loads resulting in decreased levels of fecal coliform and/or sedimentation include reduction in the availability of pollutants from manure, fertilizer, and pesticides as well as the management of stormwater runoff which reduces erosion and sedimentation. A variety of programs are currently available to assist landowners in the Salacoa Creek Watershed with the development and implementation of voluntary conservation management plans.

There are several existing structural conservation programs implemented within the Salacoa Creek Watershed (

Table 19); 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 19. Existing Structural Conservation Programs

Structural Measure	Responsibility	Description	Impairment Source Addressed
Clean Water Act Section 319 Nonpoint Source Grants	US EPA, GA EPD	Makes Federal funding available for impaired watersheds to address nonpoint source pollution concerns and ultimately seek to move toward de-listing impairments.	Agriculture/ Residential/ Urban
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
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
National Fish Passage Program	USFWS, National Fish Passage Program	Works to address barriers to the movements of aquatic organisms as well as improve aquatic habitats.	Biotic Communities
Septic System Permitting and Inspection Program	North Georgia Health District/ County Health Departments	Septic system repairs and installations are permitted and inspected by North Georgia Health District Staff. This not only ensures that systems are functioning, but also that they are installed by a licensed individual according to state regulations	Urban/Residential
Stream, Riparian Buffer, and Streambank Improvement Efforts	USFWS, Partners for Fish and Wildlife Program	Works to address stream habitat, riparian buffer, and streambank issues on private lands through a cost-share program aimed at areas key to fish and wildlife habitat improvement.	Agriculture/ Biotic Communities/ Residential

Many programs also provide non-structural practices in the Salacoa Creek Watershed and most are not unique to the area (Table 19). 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 20. Existing Non Structural Conservation Programs

Non-Structural Measure	Responsibility	Description	Impairment Source Addressed
Army Corps of Engineers Regulatory Program	USACE	Conducts permitting for Section 404 of the Clean Water Act, which regulates the discharge of dredged or fill materials into US waters of the US, including wetlands.	All inclusive
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
Endangered Species Act	USFWS	Among other things, this act ensures projects with a Federal nexus avoid deleterious impacts on listed aquatic organisms and their habitat.	Impacted Biota/ Sedimentation
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
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
Land Conservation and Preservation	US Forest Service, TNC	Conservation and preservation of lands within the upper Holly Creek Watershed generally lead to appropriate management measures for water quality, aquatic organisms, and habitat.	All inclusive
UGA Cooperative Extension Program	Gordon Co. Extension Office	Assists with general agricultural assistance, which includes providing suggestions for soil and water conservation.	Agriculture
Keep Bartow Beautiful	Keep America Beautiful affiliate	Education and restoration projects focused on stormwater, litter prevention, and general environmental protection.	All Inclusive

6.2 Proposed Conservation Program for the Salacoa 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, a more comprehensive approach is recommended to ensure solid progress is achieved toward meeting the watershed goals. The following proposed program, the Salacoa Creek Watershed Restoration Program (SCWRP), would be an endeavor

partially funded by Clean Water Act (§319), NWQI and other 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.

6.2.1 Proposed Structural Practices of the Salacoa Creek Watershed Restoration Program

Based on water quality analyses 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 lower watershed. Indeed, the entire watershed impacts the lower watershed, therefore BMP installations need to implemented throughout the watershed instead of only those locations in proximity to the impaired segments themselves. Emphasis should be placed on each of the major sources of pollutants which include agriculture, failing septic systems, forestry and stormwater runoff.

Since agricultural activity encompasses a large proportion of land use within the watershed, the SCWRP 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 most of the agricultural lands of the watershed have inadequate riparian buffers. Projects to improve riparian buffers or buffer on contours would help reduce both fecal coliform and sediment pollution by acting as a physical barrier to runoff during rain events, particularly since dry manure spreading on fields is widely used.

Since sod farms are increasing in the watershed, providing BMP's that can demonstration riparian buffering without reducing sod growth are also crucial for sediment reduction, particularly in Lick Creek subwatershed.

Altogether, many types of agricultural BMPs will be installed as a part of the SCWRP possibly including, but not limited to cattle exclusion devices and watering troughs, native species filter strips/ buffer zones, hillslope stabilization, reduced tillage, contour buffers, conservation reserve buffers, roof runoff structures, certified nutrient management plans, and also sediment control plans for silviculture sites. 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.

Failing septic systems were determined by the stakeholder group to be a secondary contributor to the fecal coliform bacteria load in the watershed. The SCWRP 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.

The rapid rise of the creeks after storm events, water quality data and the existence of impacted biota impairments led the stakeholders to desire an emphasis on stormwater BMPs, especially streambank stabilization as well as green infrastructure. 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 (green infrastructure, retention ponds, etc.). Demonstration green infrastructure installations would both assist with education as well as reduce the stormwater entering the creek.

While not listed for nutrients, local authorities feel it will only be a matter of time since fields are already saturated with phosphates. Nutrient trading is being studied elsewhere in the Coosa Basin and may need to be revisited in the future.

6.2.2 Proposed Non-Structural Practices of the Salacoa Creek Watershed Restoration Program

Efforts to educate and inform the public should also accompany the cost-share programs funded through the SCWRP. Investing in conservation practices while demonstrating their effectiveness to other landowners leads toward better land management practices in hopes the practices then spread across 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, creek 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 SCWRP, an outreach plan should be developed for every grant that is received. 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, other opportunities to connect to their creeks are possible. In addition, the new program should include promotion of the watershed improvement process to local stakeholders to further develop and maintain program momentum through participation at community events such as the July 4th picnic and others. 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 three 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 (SCWRP) 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 accomplished by increasing the available agricultural BMP cost-share opportunities, creating a septic system repair cost-share program, assisting in the stabilization of problematic streambanks, improving local stormwater management, 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 local county health departments, particularly the Gordon County Health Department. The NRCS will assist with technical advisement with respect to agricultural projects. Calhoun Utilities and other stakeholders will assist with streambank projects, green infrastructure installations 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 Clean Water Act §319 grants meshed with NWQI grants and other funding. The stakeholder recommended program, as outlined here, would cumulatively fund over $1,145,000 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 (including cattle access control, streambank stabilization, riparian enhancement, etc.), septic repairs and pumpouts, and stormwater improvement projects. Due to the dominance of forests and agriculture in this watershed, allocation of potential funds should favor Agricultural BMP's (60%) followed by septic system repairs and pumpouts (20%), and stormwater projects(20%), though stormwater is likely to get more attention as

development continues. Adjustments can be made when necessary to capitalize on successful efforts and ensure we learn from less desirable outcomes.

7.2.1 Cost-Share Rates and Priority Areas

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.

Stormwater 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. When the high costs of these practices are prohibitive, perhaps a portion of the cost-shares could be offset by donated advisement, planning, and expertise. In addition, the utilization of donated labor to assist with or complete stormwater, streambank biostabilization, and riparian planting projects may contribute to cost-share obligations. On private lands, the cost-shares should incentivize landowners with considerable streambank concerns to act to improve their properties while assistance is available.

For septic system repair projects and pumpouts, 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 Salacoa 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 in the downstream reaches, all areas of the Salacoa 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 should be considered to reflect the anticipated water quality improvement. For example, a septic system within 100 feet of an impaired stream would 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

To allow momentum to build in the community and ensure success, 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 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, but also through local retail establishments and church groups.
- Issue press releases for successful BMP installations.
- Maintain the agricultural BMP program throughout the implementation process.

Agricultural BMPs should focus on restricting cattle access to streams, enhancing riparian zones, stabilizing streambanks, and installing buffers for heavy use areas. Restricting access must involve replacing the water source that is removed through fencing, which often includes cost-sharing on pipelines and troughs. In addition, conduct a PCR analysis to determine most common sources of pathogens in the waterway. 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 #2: Create a septic system repair and pumpout cost-share program in the watershed.

MILESTONES:

- Identify local certified septic system contractors interested in participating in the program.
- Hold meetings with Public Health representatives to design program.
- Establish initial cost-share criteria based on proximity of system to state waters.
- Maintain the septic repair and pumpout program throughout the implementation process.

The repair process should involve the submission of bids from locally-owned businesses with an interest in participating on grant projects. Bids should be requested from three or more contractors for each repair, and the homeowner should be allowed to choose which bid to accept. The rate of cost-share should be considered when possible on a sliding scale that will result in offering more assistance to projects that will likely result in the greatest load reductions.

OBJECTIVE #3: Create a Green Infrastructure project cost-share program in the watershed.

MILESTONES:

- Hold meetings with the City of Fairmount, local industries, Calhoun Utilities and stormwater experts to determine appropriate projects.
- Seek to incorporate trustee labor to cover cost-share contributions for projects in Fairmount.
- Advertise the available grant money for projects on private lands through local media.
- Issue press releases for successful stormwater and streambank biostabilization projects.
- Maintain the program throughout the implementation process.

OBJECTIVE #4: Reduce pollution inputs through education and outreach.

MILESTONES:

- Offer activities to the public to learn more about the creek through hands on education events and creek celebrations. Additional stream events can include stream snorkeling, kayaking, tubing, and fishing derbies.
- 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. During the planning period, we offered one Adopt a Stream workshop for the Scouts, resulting in many Scouts and Leaders becoming Adopt a Stream volunteers. With that start, more outreach events should be offered. Stream cleanups, creek walks/floats, and rain garden and rain barrel 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 #5: Implement BMPs to achieve load reductions specified in the TMDL.

MILESTONES:

- Identify farmers willing to cost-share on agricultural BMP projects such as: access control, riparian enhancement, heavy use area stabilization, and streambank stabilization.
- Identify areas in Fairmount and Ranger where stormwater projects could be completed.
- Identify homeowners within targeted subwatersheds with failing or without proper septic systems.
- Implement septic repairs and pumpouts in the watershed.
- Implement agricultural BMPs in the watershed.
- Implement stormwater BMPs in the watershed.
- Estimate load reductions from projects when possible.
- Implement outreach and education activities

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, stabilize eroding areas, 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. Stormwater projects should be implemented in urban areas as well.

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 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 Salacoa 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 Indicators to Measure Progress

The number of completed projects (e.g. septic system, agricultural, stormwater, streambank stabilization, etc.), as well as 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 acceptance 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 delisting 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 and macroinvertebrates according to their scheduled rotations in order to determine whether biotic integrity has improved and to potentially de-list streams. It may be possible to engage consultants with appropriate expertise to potentially work with them to assess the biotic integrity of the impacted biota segments should funding be provided.

7.5 Technical Assistance and Roles of Contributing Organizations

This section will focus on the roles of various groups anticipated to make new or additional contributions to make the watershed restoration effort a success. An organization seeking to implement this WMP should rely on technical expertise from the NRCS with respect to agricultural BMP implementation, and the North Georgia Public Health District and local county public health departments 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 21.).

Table 21. Table of Roles and Responsibilities for the Implementation of this Watershed Management Plan

Organization Roles and Responsibilities		
Organization Name	**Organization Type**	**Description of Role in Salacoa Creek WMP Implementation**
Calhoun Utilities	Utility	Provide donated services in order to aid the restoration efforts. Analyze water samples for fecal coliform and TSS concentrations, which will be

		collected by project partners throughout implementation of this plan. Oversee stormwater green infrastructure installation.
Gordon County Government	County	Provide local oversight, maps, and assistance
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 biotic monitoring at sites in the watershed that can reveal improvements or de-list impairments.
Georgia Environmental Protection Division	State Agency	Administer Clean Water Act Section 319 Grants to provide funding for this restoration program. Conduct monitoring rotations at sites in the watershed for fecal coliform bacteria that can reveal improvements or aid in de-listing 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 District	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 Holly Creek Restoration Project and assist in marketing its outreach efforts.
US Fish and Wildlife Service	Federal Agency	Provide recommendations for culvert and barrier assessment and replacement activities. Provide guidance related to stream restoration projects that utilize natural channel design methods. Consult on any project that may potentially impact instream aquatic habitat.
University of Georgia Cooperative Extension	State Agency	Assist in marketing efforts for program components and outreach events.
Coosa River Basin Initiative	Local Non-profit	Serve as a vehicle to promote the Salacoa Creek Restoration Project and assist in marketing its outreach efforts
Keep Bartow Beautiful	Bartow County Government	Outreach and education partner as well as advisor on Green Infrastructure
City of Fairmount	Local Government	Provides meeting space and assistance
The Nature Conservancy	Non profit	Assist in marketing efforts for program components and outreach events.

7.6 Getting Started

A goal of approximately 25% watershed treatment has been set to be accomplished by 2030 (assuming funding needs are met). This treatment strategy is believed to potentially be enough to de-list multiple segments, although it is possible more funding may be necessary to de-list all impaired streams. Efforts to begin working towards the de-listing of impaired stream segments will begin soon after the approval of this plan.

8 Education and Outreach Strategy

Education and outreach are key elements to achieving and sustaining the goals of improving the Salacoa Watershed. Not only do we need our watershed stakeholders involved, we need the community actively participating in protecting the creek. Local stakeholders would like to see some non-traditional approaches integrated into the traditional outreach strategies utilized for this process. The goal is to reach as many residents in the watershed as possible through the education and outreach measures. Not only can the watershed restoration seek to put volunteers to work in ways that assist with cleaning up Salacoa Creek, enhancing the riparian buffer, reducing non-point source pollution, and sampling water quality parameters, they should be encouraged to have fun on the creek, reconnecting to the creek so they have a sense of shared ownership of both the resources of the creek and the requirement to protect it. With each commitment from a citizen to volunteer their time, the likelihood of successful watershed restoration increases.

The following is a list of suggested events that could be held in the watershed. A value could be placed on many of these events through calculating volunteer labor, supplies, or other in-kind donations. Flyers places in locally appropriate grocery stores, restaurants, and farm supply stores are a great way to get the word out, as are radio and Television PSA's. Stakeholders suggested that it is very important to show the economic value of tourism when showcasing the area's resources.

- Creek Days and Fishing Derbies at the new park or elsewhere.
- Educational activities for farmers and citizens about the need for trees in the riparian zone to enhance the flow of the creek long term as well as replanting and volunteer stabilization projects.
- Green Infrastructure is important not only for residents, but business and industry in the watershed. Hold workshops and perhaps create a Creekside trail in Fairmount with demonstration green infrastructure for all to see.
- Stormwater Mitigation Plans for chicken farms, industry, and municipalities
- Adopt a Stream workshops and Rivers Alive Clean ups
- Ecotourism: Creek Snorkeling, Creek Tubing, Birdwatching, Wildflower walks, paddling
- Investigate the potential for a Blue Way Trail
- Agricultural Tourism
- Small Farmer/ New farmer education workshops
- Workshops for DIY stream stabilization, rainwater collection systems, and green infrastructure.
- Litter awareness campaign with Keep Bartow Beautiful. Need to create Keep Gordon Beautiful chapter.
- Educational activities with scouts, 4H, Church youth groups and at schools.

In addition, volunteers could be recruited for the following activities:

Riparian Tree Plantings
Press releases as well as student skits or videos could educate the public on the need for a riparian zone and stream shading. Flyers and press releases would advertise the availability of trees and live stakes to be planted along streams in the Salacoa 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. Riparian tree planting events with volunteers could also be held on the banks of streams and creeks in the watershed. The primary purpose would be to utilize volunteer labor to plant trees in an effort to increase the riparian buffer within the watershed, but also to increase education concerning 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.

Rain barrel and Rain Garden Workshops
Rain Barrel and rain garden workshops have proven to enthuse participants since they have a tangible take home from the workshop. In the past, these events have generated overwhelming interest from local communities, and have attracted the most enthusiastic volunteers. Furthermore, rain barrels, or other rainwater collection devices, are desired by a diverse array of citizens including both farmers and homeowners, which is the exact demographic that is needed to implement BMPs on residential and agricultural lands. For the purposes of conducting outreach through a 319(h) grant project, this outreach activity would have the primary objective of incentivizing rain barrel construction and installation to reduce NPS pollution, but would also serve as the sounding board from which to advertise other 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 Salacoa Creek's water quality issues (with watershed map visual aids), and the opportunity to work to construct and take home a free rain barrel for their home or barn. 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.

Adopt-A-Stream Workshops
These events are designed to train volunteers on how to use Adopt-A-Stream (AAS) monitoring equipment to sample water quality parameters and inform them of non-point source pollution issues. The first workshop was held in May, 2018. At these workshops, volunteers will 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).

River's Alive Cleanup

Rivers Alive cleanup event could be established across the Salacoa Watershed and beyond in order to provide outreach activities for volunteers in the local communities. Many sites could be set up. At each site throughout the cleanup event, a recruiting effort could be made with volunteers to garner stakeholder involvement for the planning process, disseminate information about the Salacoa Creek project, and provide general education on the NPS issues that threaten the local water quality.

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 Salacoa Creek. Maps and handouts should be distributed at stops along the way to discuss streambank erosion, 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.

9 Implementation Plan

Table 22. Implementation Timeline

Timeline: 12 years. 4 phases. First application for funding to be submitted fall of 2018.

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Apply for funding	X			x			x			x			
Agricultural BMP installation		x	x	x	x	x	x	x	x	x	x	x	x
Stormwater BMP installation			x		x		x	x	x	x	x	x	x
Septic Tank rehab		x	x	x	x	x	x	x	x	x	x		
Streambank stabilization			x	x	x	x	x	x	x		x		
Nutrient Management plans		x	x	x	x	x	x	x	x	x			
Native species replanting in buffer zones and at park		x	x	x	x	x	x	x	x	x			
AAS training and network		x		x		x		x		x		x	
Rivers Alive Cleanup	x	x	x	x	x	x	x	x	x	x	x	x	x
Education and Outreach activities	x	x	x	x	x	x	x	x	x	x	x	x	x
Re evaluate plan and update						x					x		

9.1 Estimates of Funding

As discussed in Section 6, many programs are already offered within the Salacoa Creek Watershed with the goal of reducing NPS pollution. Despite these projects, impairments persist in the area. In order to estimate the cost associated with the de-listing of impaired segments within the watershed, several approaches were taken. The septic system BMP needs were estimated based on information obtained from Gordon 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. NRCS cost estimates were then used to determine the funding needed to accomplish watershed improvement goals. Although the primary concern when estimating costs is ensuring that amounts are sufficient to delist streams, it is also important to consider the demand for the practices locally and consider funding limits from the 319 program. This iterative process was led by Limestone Valley RC&D Council, and considered stakeholder input. Ultimately, recommendations are to pursue funding in the amount of approximately $1,145,000 over four grant cycles, which is both practical and likely sufficient for meeting watershed goals.

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 implementing four 319(h) grants has been set to be accomplished by 2030, which is believed to likely be sufficient to de-list impaired segments.** In order to lay the framework to accomplish this, Table 7.7.a. was created to outline the recommended approach for fund requests, and collectively represents BMP installation costs excluding landowner contributions. These values are displayed at 60% of the total cost in order to better describe federal funding needs.

Table 23. ***A display of estimated financial requests for each of four multi-year 319 or NWQI grants sought by an organization attempting comprehensive watershed restoration. The proportions are derived by stakeholder recommendations, and the amounts were estimated using local knowledge, EPA statistics, and GIS analysis.***

	Agricultural BMP and Stream bank	Septic System Rehab	Green Infrastructure and Urban Streambank	Outreach and Education	TOTAL
Proposal 1 - 2018	**$180,000**	**$40,000**	**$50,000**	**$20,000**	**$290,000**
Proposal 2 - 2021	**$150,000**	**$40,000**	**$60,000**	**$30,000**	**$280,000**
Proposal 3 - 2024	**$120,000**	**$30,000**	**$90,000**	**$30,000**	**$270,000**
Proposal 4- 2027	**$100,000**	**$25,000**	**$120,000**	**$20,000**	**$265,000**
					$1,145,000

10 Summary of Nine Elements

The following is a summary of the Nine Elements addressed in the Salacoa 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 Salacoa Creek Watershed has streams that fail to meet the criteria within the State of Georgia for pathogens and impacted biota, which respectively tend to result from fecal contamination and excessive sediment loads. Load reductions of these pollutants are necessary in two 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 and stormwater 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, stormwater and streambank stabilization projects, 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 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, stormwater infiltration measures 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 watershed.

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. 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 Gordon County, North Georgia Health District, County Health Departments, 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.

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

The proposed implementation schedule is found in Section 7 and initially estimates implementation activities to occur through 2030. This includes water quality monitoring and implementation activities (e.g., agricultural BMPs, 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 septic, stormwater, streambank stabilization, 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 entire Salacoa 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 2021 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 impaired 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 whether) 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

NPS - Nonpoint Source

NRCS - Natural Resource Conservation Service

RC&D - Resource Conservation and Development Council

SQAP - Sampling and Quality Assurance Plan

TMDL - Total Maximum Daily Loads

WMP - Watershed Management Plan

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Southern Clubshell information

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Appendix A

Riparian Canopy Cover Analysis

Introduction

A desktop spatial analysis of the Salacoa Watershed Study Area was performed to assess the general condition of the riparian corridor regarding woody vegetation. This analysis focused on defining the degree to which stream segments were considered "wooded" or "forested" as determined by the National Land Cover Database (NLCD) Tree Canopy Cover Product (Homer 2015). The NLCD provides data on land cover and land cover change at a 30-meter resolution. Specifically, the Analytic Tree Canopy Cover Product, used in this assessment, models the average tree canopy cover within a given pixel and assigns the percent coverage value to that pixel. Of note, the model does not have a height restriction so it is not possible to qualify the height of the canopy within the study area. Also, due to the relatively low-resolution of the data – 30 meters – this assessment is intended as a high-level metric to help identify watersheds within the study area that may require more analysis to identify potential stressors.

Methods

Reference datasets used in this analysis are as follows:

- National Land Cover Database Analytic Tree Canopy Cover (Homer 2015)
- National Hydrography Dataset Flowlines (USGS 2014)
- Watershed Boundary Dataset (WBD 2017)

HUC-12 Subwatersheds within the Salacoa Creek Study Area (HUC10 - 0315010207) included in this analysis are as follows:

- Lick Creek – 031501020705
- Little Creek – 031501020701
- Marlow Branch- 031501020704
- Ninetynine Branch- 031501020702
- Pinhook Branch- 031501020703

Analysis began by extracting data from the NLCD Tree Canopy Cover Product and National Hydrography Dataset (NHD) for the Salacoa Creek Study Area. The NLCD data was then converted from raster to vector format to facilitate intersecting the NLCD data with NHD flowlines. Once converted, the NLCD data were intersected with NHD flowlines, applying the a percent canopy coverage value to each stream segment. NHD flowlines were then intersected with the NHD Watershed Boundaries to facilitate analysis by sub-watershed.

Output from the GIS dataset was exported to a Microsoft Excel format for further analysis. Percent canopy cover was classified into discrete categories of 20 percent increments. Discrete classes are intended to allow faster identification of potentially stressed subwatersheds.

Results

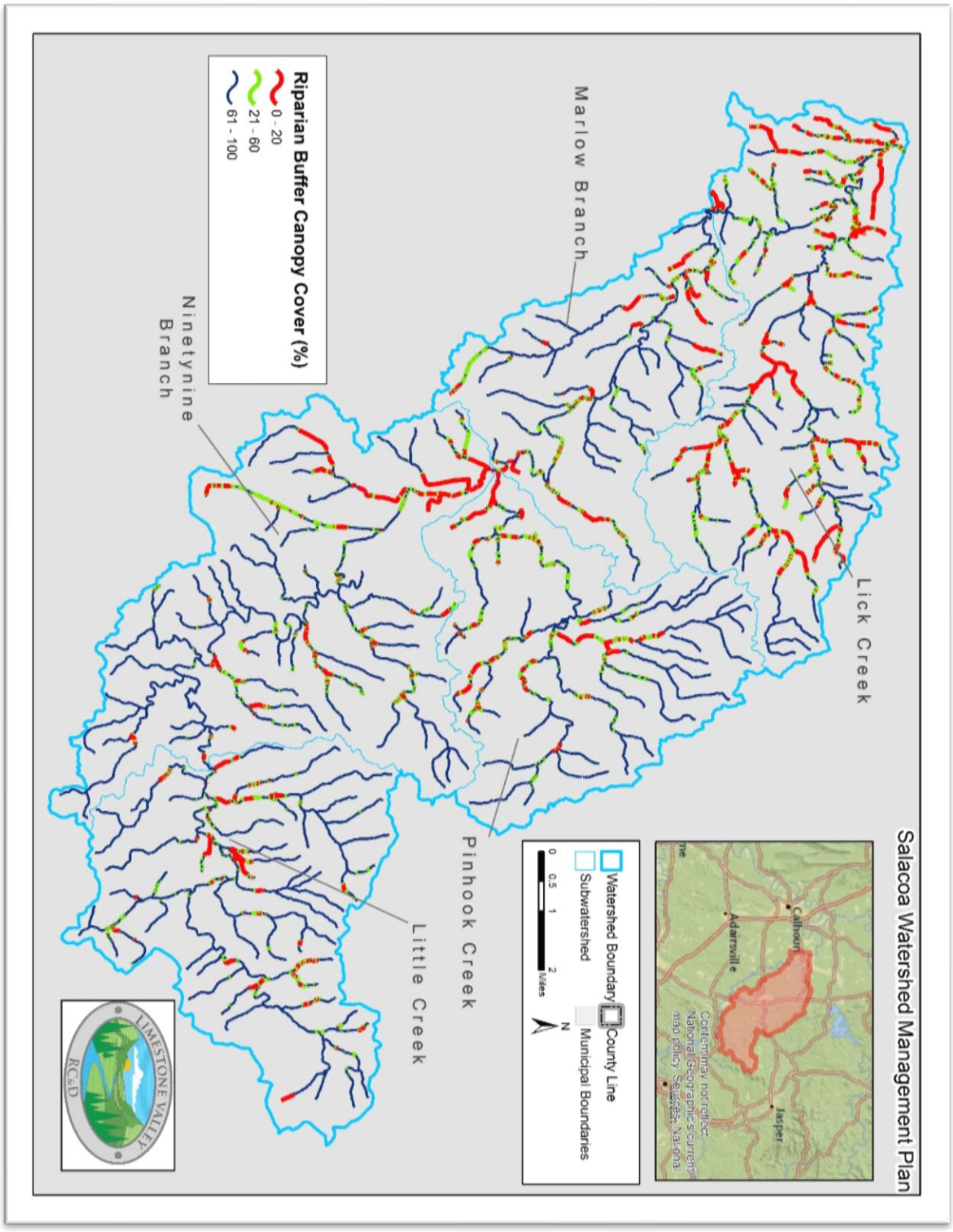
For purposes of this analysis, the 0-20% class is being considered "bare ground" and could be used to identify potential sources of sediment and other stressors. Percentage of stream length in this first classification ranges between 8% and 26%, with the highest percentage found in the Lick Creek Sub-watershed.

Table 24. Miles of Stream by Percent Canopy Cover

Subwatershed	Miles of Stream by Percent Canopy Cover					
	0-20	***20-40***	***40-60***	***60-80***	***80-100***	***Total***
Lick Creek	19.23	7.48	6.83	10.26	29.27	73.07
Little Creek	5.08	1.80	2.87	5.72	48.74	64.21
Marlow Branch	5.45	2.45	2.91	5.50	25.62	41.94
Ninetynine Branch	9.17	3.38	4.19	7.06	53.92	77.72
Pinhook Creek	5.67	2.85	3.31	4.87	33.19	49.89
Total	44.60	17.96	20.11	33.41	190.75	306.84

Percent of Total Stream Length by Percent Canopy Cover

Subwatershed	Percent of Total Stream Length by Percent Canopy Cover					
	0-20	***20-40***	***40-60***	***60-80***	***80-100***	***Total***
Lick Creek	26%	10%	9%	14%	40%	100%
Little Creek	8%	3%	4%	9%	76%	100%
Marlow Branch	13%	6%	7%	13%	61%	100%
Ninetynine Branch	12%	4%	5%	9%	69%	100%
Pinhook Creek	11%	6%	7%	10%	67%	100%


Salacoa Watershed Management Plan
Lick Creek
Marlow Branch
Ninetynine Branch
Pinhook Creek
Little Creek
Riparian Buffer Canopy Cover (%)
0 - 20
21 - 60
61 - 100
Watershed Boundary
County Line
Subwatershed
Municipal Boundaries
N
Calhoun
Adairsville
Jasper
LIMESTONE VALLEY
RC&D

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Watershed Boundary Dataset (WBD). 2017. Coordinated effort between the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS), the United States Geological Survey (USGS), and the Environmental Protection Agency (EPA). The Watershed Boundary Dataset (WBD) was created from a variety of sources from each state and aggregated into a standard national layer for use in strategic planning and accountability. Watershed Boundary Dataset for HUC10 - 0315010207. Available URL: "https://datagateway.nrcs.usda.gov/" [Accessed 09/05/17].

Appendix B

Targeted Water Quality Monitoring Plan

Targeted Water Quality Monitoring Plan for the Salacoa Creek Watershed (HUC 10- 0315010207) in Gordon County, Georgia

Objectives

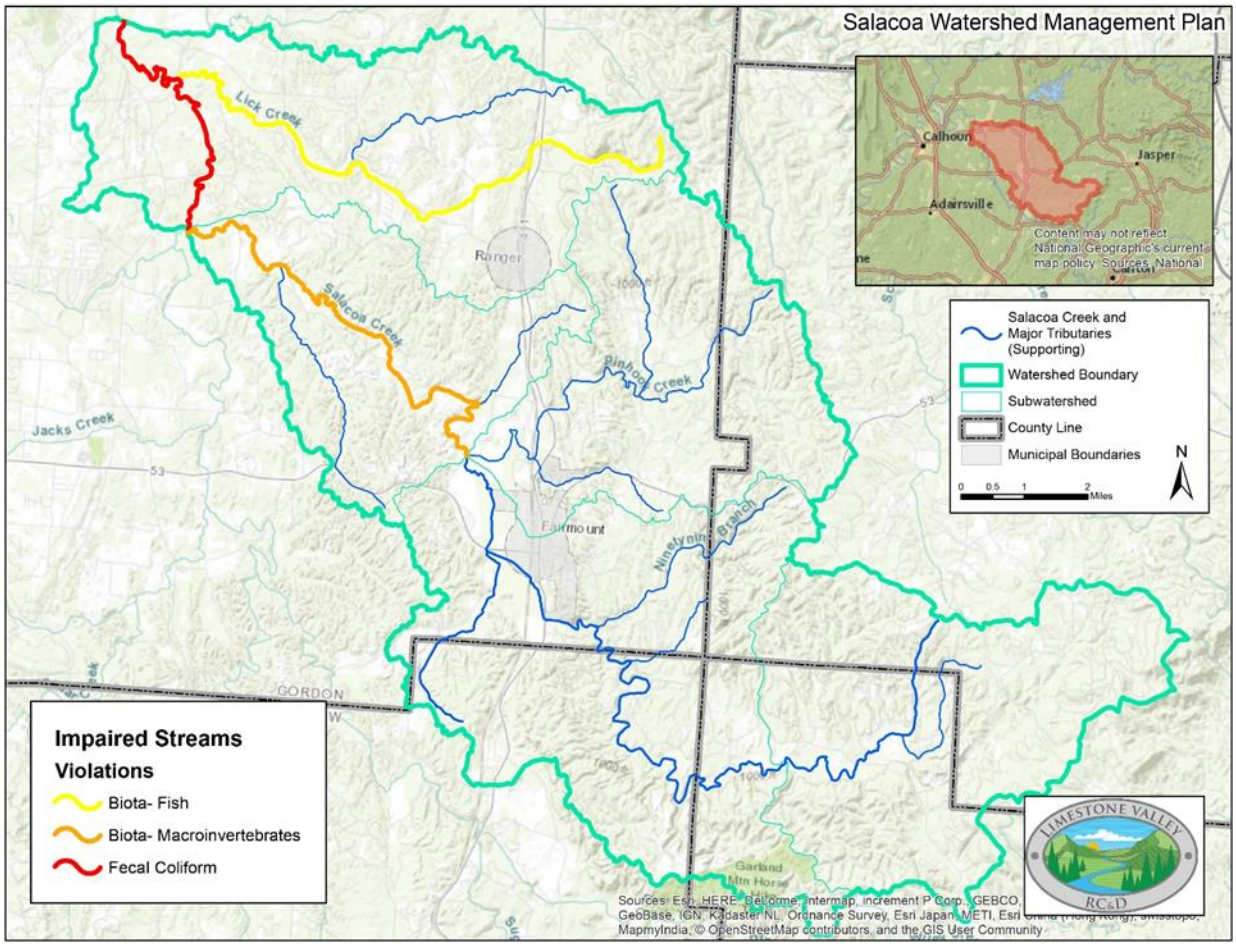
Our main objective for this targeted water quality monitoring plan in the Salacoa Creek Watershed is to provide an updated overview of the extent of impairment and condition of the creek to update the baseline against which improvements to the creek can be measured. The creek is listed as impaired due to E. coli, and biotic measures of fish and macroinvertebrate populations. Excess sediment is the major contributing factor to the biotic impairments. Data to be collected will include temperature, dissolved oxygen, pH, total suspended solids, phosphates, nitrates, and fecal coliform. Collection of the aforementioned parameters will also help prioritize impacted areas of the watershed before implementing watershed restoration projects.

Background

Salacoa Creek Watershed (HUC 0315010207, formerly 0315010206) spans across four counties in Georgia to include Pickens, Cherokee, Bartow, and Gordon. Salacoa Creek begins in Pickens County on Henderson Mountain and winds its way through Cherokee to Bartow and largely flows through Gordon County. The main creek in the watershed is the Salacoa with tributaries to include Lick Creek, Little Creek, Marlow Branch, Ninetynine Branch and Pinhook Creek. In total the watershed drains over 84,000 acres of land. Throughout the area the primary land cover is composed of deciduous forest (45.6%) followed by evergreen forests (19.3%) and pasture land (12.5%). As a whole the watershed is in the Ridge and Valley Ecoregion of Northwestern Georgia.

Of the nearly 116 square miles of the Salacoa Creek watershed, there are two spans of the creek that are impaired. An 8 mile stretch does not meet standards for macroinvertebrate biota. This parameter is usually caused by the impact of sedimentation in a creek. Sedimentation largely occurs from stream bank erosion, runoff from timbering practices and unpaved roads, and other sources, however the definitive cause has not been determined. Another 6 miles of Salacoa Creek is noted as impaired due to fecal coliform. Numerous causes could be the source of this impairment, but it has not yet been determined. Fecal coliform impairment could be caused by failing septic systems, agricultural runoff, or animal waste from livestock, wildlife, and pets.

Lick Creek (HUC 031501020705) is an impaired tributary of Salacoa Creek. There are two spans of Lick Creek equaling 11 linear miles that are listed as impaired due to fish biota. The 2009 TMDL also noted an area of concern to be that the macroinvertebrate biota was ranked as just fair. This is an important factor considering an increase in sedimentation could lead to the additional impairment of the stream due to macroinvertebrate biota. Both of these concerns are usually caused by sedimentation which can be decreased through stream bank stabilization and other erosion control projects.



Sampling of the water quality parameters mentioned previously will evaluate risk for these areas and potential impact of improvements completed in the watershed. Overall, the restoration projects spurred by this information will lead us closer to delisting Salacoa and Lick Creeks.

Table 1. Impaired stream segments within the Salacoa Watershed including the miles of stream impairment and criteria violated.

Water body (Impaired Miles)	Criteria Violated
Salacoa Creek (8 miles)	Macroinvertebrate Biota
Salacoa Creek (6 miles)	Fecal Coliform
Lick Creek (7 miles)	Fish Biota

Lick Creek (4 miles)	Fish Biota

Project Coordinator

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 contact is:

Adam Kennon

Limestone Valley RC&D Council

55 Quartermaster Circle

Ft.Oglethorpe, GA 30742

Phone: 865-306-2327

kennonadam@gmail.com

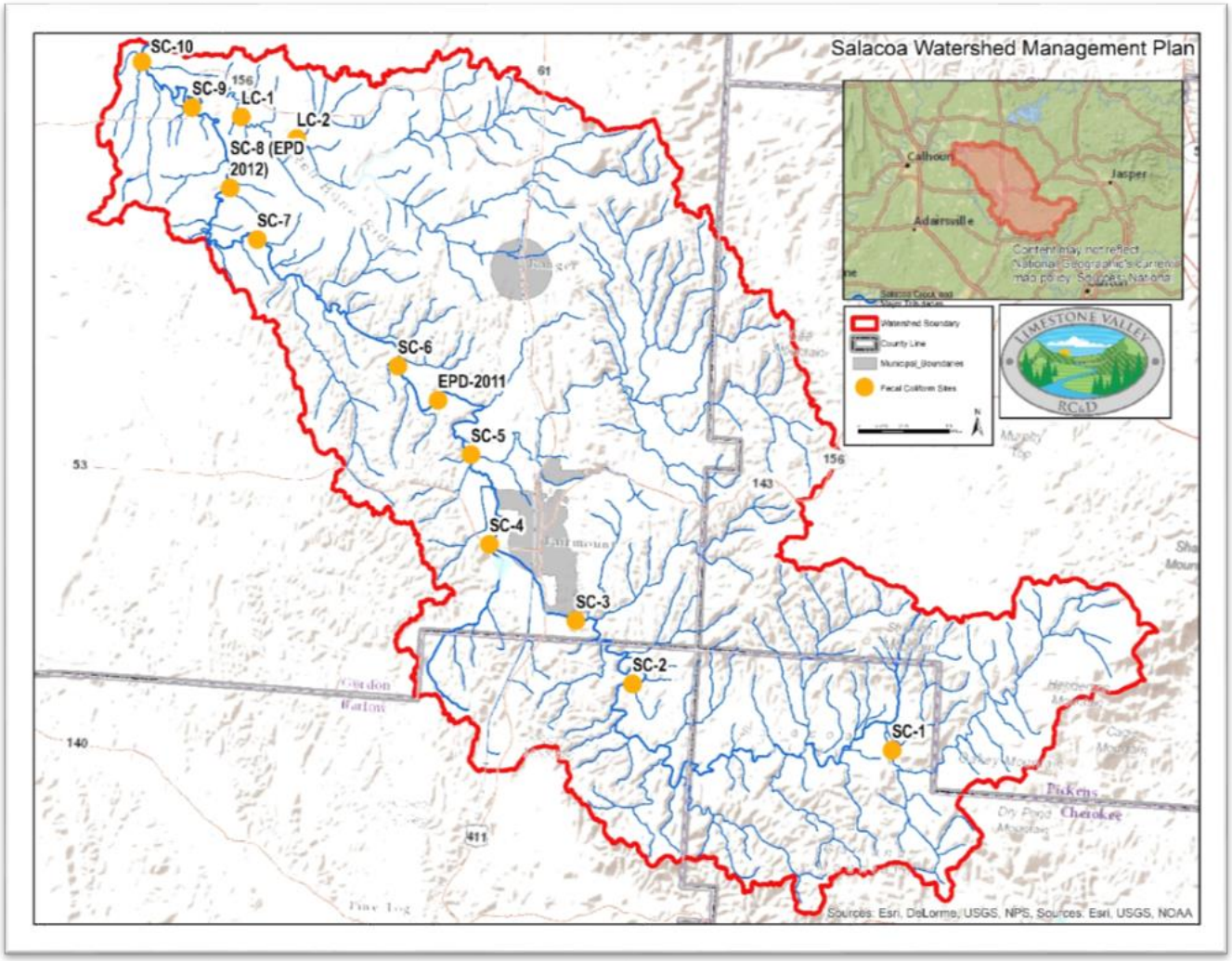
Part Two: Sampling Plan

Delineation of Study Area:

The Salacoa Creek Watershed (HUC) is predominantly composed of forest land, which accounts for 65% of the landscape (Appendix 1). Most of the remaining landscape is in agricultural land including hay, pasture and row cropping. Sediment load sources in the watershed include forestry practices, livestock grazing, and bank erosion associated with insufficient riparian corridors and excessive stormwater runoff. Fecal coliform inputs are likely a combination of cattle in the creek, spreading of chicken litter in the fields, and failing septic tanks.

Sampling Sites:

Eleven sampling sites have been established mainly at road crossings and easily accessible spots along the Salacoa Watershed. The sites were selected at various points along the watershed to help understand pollutant and sediment contributions from the various tributary streams and sections of the Salacoa itself. One of these sites, the Redbud Rd bridge, has been historically monitored by the USGS as well as the GA EPD. Another on Lovebridge has also been utilized by the EPD. We have included sites on the major tributaries down to the mouth of the creek. Below is the list of sampling sites along the Salacoa in order from the headwaters near Henderson Mountain to its confluence with the Coosawattee.



Salacoa Site S 1: 34.39078, -84.59514 Salacoa Road at Jerusalem Church

Salacoa Site SC2: 34.40316, -84.67168 Salacoa Road SE

Salacoa Site SC3: 34.41758, -84.68926 Irwin Mill Road SE

Salacoa Site SC4: 34.41758, -84.68926 HWY 53

Salacoa Site SC5: 34.41758, -84.68926 Sam Hunt Road

Salacoa Site SC6: 34.47636, -84.74526 Covington Bridge Road SE

Salacoa Site SC7: 34.47636, -84.74526 Knights Bottom Road SE

Salacoa Site SC8: 34.47636, -84.74526 Langford Road NE

Salacoa Site SC9: 34.47636, -84.74526 Red Bud Road

Salacoa Site SC10: 34.47636, -84.74526 J Slagle Road NE

Salacoa Site PL1 (Pine Log): 34.47636, -84.74526 Covington Bridge Road SE

Salacoa Site LC1 (Lick Creek): 34.47636, -84.74526 Langford Road NE

Salacoa Site LC2 (Lick Creek 2): 34.47636, -84.74526 Pleasant Hill Road

Water sampling parameters

Parameters to be sampled for Salacoa Creek will be fecal coliforms, total suspended solids, nitrates, phosphates, and ammonia as well as dissolved oxygen, temperature and pH. Most of the water samples will be collected at selected sites and analyzed at the Calhoun Utilities accredited laboratory facility. Dissolved Oxygen, Temperature and pH data will be collected on site with YSI meter, which will be calibrated prior to each use. Water samples will be collected regularly (once per calendar month) for a year at each site.

Fecal coliform bacteria concentrations will be measured in colony forming units per 100 mL from water samples collected at each site. Two sets of sampling data will also be collected to determine the geometric mean, sampling 5 times within a 30 day period with no two samples collected within 24 hours of each other.

Rainfall along the watershed will be noted at the time of sampling. Physical features of stream will also be recorded, including, but not limited to, stability of the stream banks, water level, color of water, landscape, and general flow rate. These are important variables to note due to variations in sampling from rain events.

Georgia EPD will provide biological monitoring as part of their regular rotations to determine whether the biotic integrity of the stream has changed.

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

For fecal coliform sampling, the vast majority of samples will be collected from bridges via bucket and rope. In the event the bridge makes a poor sampling site due to insufficient depth or other factors, the samples will be taken where a quality sample can be collected from a similarly well-mixed area in the same general location. Collection will be performed after the bucket is rinsed in the stream. The sample bottles will be fastened in the bucket and lowered to collect water directly from the stream. An additional sample of water will be collected for other lab analyses. The samples for fecal coliform analysis will then be capped and put on ice and delivered to Calhoun Utilities within four hours of collection. For sampling additional parameters (temperature, dissolved oxygen, and pH), the YSI probe will be lowered using a long cord into the water at mid-depth.

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 Fort Oglethorpe, Georgia, for a period of no less than three years. Electronic and hard copies of the files will be retained.

Appendix C

Stakeholder Meeting Notes

Salacoa Watershed

First Stakeholder Meeting

July 26,2017

Bontekoe- Welcome

Tuck- Introductions

-NWQI explained

NRCS

Salacoa

EPA 319 standard will be used in planning

- Doug Cabe explains NWQI funding areas. Salacoa 1 of 4.

Tuck- Explanation of the 9 steps

- Stakeholder value
- o Real world knowledge
- o Community Support
- Timeline laid out
- Impairments explained
- o Map
- o Cumulative effects (downstream impairment)
- Use area map ----- a printed copy provided to be noted on by attendees
- Improvements explained
- o 4 implementations currently in process by LVRCD
- o List possible improvements
- Next meeting will be early 2018

Barbra (EPD)- introduction of EPD- Explanation of importance of a plan

Notice to participants that they will have the presentation emailed to them along with a blank copy of the survey and maps.

Questions/ comments:

Alex- TNC- culvert identification

Barbara EPD- how do you plan to do water sampling

Calhoun Utility- ID/ comment on logging effect on sediment

Cabe- Comment on changing land use

Calhoun utility- Leased land with old timber roads not maintained/ erosion issue

Barbara- what is the prevalence of poultry farms? Group commentary- over 500 in the area

Barbara comments- capture efforts on North Georgia partnership

Coosa/ North Georgia regional water plan almost complete

What is the amount of septic in area; green infrastructure;

Bartow- comments that they have done green infrastructure and it is expensive- target only when needed.

Other comments- Sod farms along the creek and flooding issues contribute to sediment and erosion

Other comments- Donna from Gordon county- has made Poultry GIS map layer

Other comments- deer carcass dumping by creeks is an issue

Other comments- 180 acres were donated recently for watershed conservation.

Salacoa Creek Watershed Stakeholder Survey

Please answer the following questions about the Salacoa 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 Salacoa Creek? Please list them in order from what you think are the most significant to the least significant sources.

2. The section of Salacoa Creek from the confluence of Pinhook Creek to the confluence of Pinelog Creek is listed as impaired due to poor macroinvertebrates sampling results and sediment reduction have been recommended. What do you think leads to poor macroinvertebrate survey results in this stream segment?

3. Lick Creek, which headwaters begin west of Highway 411 and flows to Salacoa Creek near Red Bud Road, is listed as impaired due to poor fish sampling results, and sediment reductions have been recommended. What do you think leads to poor fish survey results in this stream segment?

4. What types of projects tdo you think will be most valuable to de-listing efforts for these creeks? 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 project are likely to be best received by residents in this watershed?

Please make any additional comments on back.

Salacoa Creek Watershed Stakeholder Meeting 2

May 31, 2018

Bontekoe: Welcome and Introductions

Sutton: Draft form of the WM plan in Powerpoint.

Quantify the number of possible non point source and reduce loads.
Impairments
Biotic listings in Lick Creek and Middle Salacoa with sediment listed for reduction.
Lower Salacoa listed for fecal, with possible source Pine Log creek outside the scope of this WMP.
Inputs include:
Runoff from chicken litter and fields from fields. Rain events increase fecal runoff.
Litter management
Fecal coliform reading higher after rain.
Remediation measures for managing nutrients: CNMP, Buffer zones 25-30 feet
PCR analysis to better determine source of fecal contamination
Septic tank repairs

Comments from stakeholders:
Should add Native species
Overgrazing over seeding pastures
Filter strips
Injection of waste products, increase in phosphorus and Coliforms is increasing, but needs to be managed

Sutton: What would you add to the list?

Stakeholders:
Education and outreach
Sediment
Steam bank stabilization
Buffering Sod farm
Storm water/ Green Infrastructure
Sediment control BMP

Sutton: According to TMDL we don't have to reduce the sediment in Lick Creek. It's legacy sediment.
But need a 92% load reduction total GOAL in the main stem of Salacoa.
Project Idea . Work with Gordon County at their Knight's Bottom property: Bottomland Forest Park restoration timber management plan from timber harvest. To turn it back to native Forest.
Jerry Crawford needs demonstration in the storm water/green infrastructure.
Stakeholder: Farm across creek from sewage treatment plant. next to park is nutrient loading from human waste from out of state. They also own land in Pine Log creek. Are spraying on creek Bartow Co.
Outreach can help Salacoa
Access points needed to get people in the creek and on the creek.
Add more adopt a stream trainings.

Mr Bradfords hunting land
Fishing derby
Incentivize AG tourism and ecotourism eco reasons not to pollute streams.

Timeline - 11 years then update the WMP.

NWQI continue to fund projects in other watersheds.
Apply for 319 in in late 2018 . NWQI and other funding as well to provide Economic incentives for folks to improve practices.

Stakeholder committee will review the document in August.