Little River
Watershed Management Plan

August 2013

Prepared for the
Central Savannah Resource,
Conservation and Development
Council, Inc.

resource management strategies

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resource management strategies

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Introduction

The purpose of developing this Watershed Management Plan (WMP) for Little River is to provide a tool that demonstrates a holistic approach to water quality management by actively engaging stakeholders within the watershed in the selection of management strategies that will be implemented to solve the problems.

This document is not regulatory. Its preparation process engages stakeholders to recognize issues and provide feedback on how to deal with them, as well as to develop momentum and contribute to the restoration effort. The ultimate goals of this plan identified by the Advisory Committee are for the impaired segment to meet state water quality standards and for stakeholders and landowners in the watershed to become more knowledgeable concerning watershed issues and how to go about managing the landscape to minimize water quality concerns.

Stream Selection

In 2005, the Georgia Environmental Protection Division (EPD) developed a TMDL Evaluation for fecal coliform for streams in the Savannah River basin[1] which includes Little River. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a water body based on the relationship between pollutant sources and instream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The Evaluation identified the six-mile segment of Little River as partially supporting its designated use of fishing[2] and requiring a fecal coliform load reduction of forty-six percent[3] to meet water quality standards. Wildlife, agricultural livestock, and urban runoff were identified as typical sources of non-point source contamination[4] in the river basin, although no specific sources were identified for the Little River. The recommendations in the Evaluation are as follows:[5]

- Development of an appropriate water quality monitoring plan
- Implementation of management practices to include: compliance with NPDES permit limits and requirements; adoption of NRCS Conservation Practices; and, application of Best Management Practices (BMPs) appropriate to agricultural or urban land uses, whichever applies.

An initial TMDL Implementation Plan was developed as part of the Evaluation for the Savannah River basin. There was no implementation plan specifically for Little River. The Implementation Plan includes a list of best management practices and provides for an initial implementation demonstration project to address one of the major sources of pollutants identified in the TMDL while State and/or local

[1]Georgia Department of Natural Resources, Total Maximum Daily Load Evaluation for Thirty-Two Stream Segments in the Savannah River Basin for Fecal Coliform, January 2005.

[2]Ibid., p. 2.

[3]Ibid., p. v.

[4]Ibid., p.18.

[5]Ibid., pp, 35-36.

agencies work with local stakeholders to develop a revised TMDL implementation plan. It also includes a process whereby GA EPD and/or Regional Commissions or other GA EPD contractors will develop expanded plans.[6]

A revised TMDL Implementation Plan was developed in 2007. [7] The revised plan specifically applied, in part, to Little River[8] and recommend the following management practices to reduce fecal coliform loads to stream segments:[9]

- Sustained compliance with NPDES permit limits and requirements where applicable;
- Adoption of NRCS Conservation Practices for primarily agricultural lands;
- Application of BMPs appropriate to specific agricultural and urban land uses;
- Further development and streamlining of mechanisms for identifying, reporting, and correcting illicit connections, breaks, and other sanitary sewer system problems;
- Adoption of local ordinances requiring periodic septic system inspection, pump out, and maintenance where appropriate; and,
- Ongoing public education efforts on the sources of fecal coliform and common sense approaches to lessen the impact of this contaminant on surface waters.

The revised Implementation Plan encouraged local governments and municipalities to develop a water quality monitoring program. These programs can help pinpoint various fecal coliform sources as well as verify the 303(d) stream segment listings. This will be especially valuable for those segments where listing was based on limited data. In addition, regularly scheduled sampling will determine if there has been some improvement in the water quality of the listed stream segments.[10]

TMDL Evaluation and Implementation plans identified wildlife, agricultural livestock, and urban runoff as potential sources of excessive fecal coliform contamination in the Little River HUC-10 watershed (0306010501). The quantity and type of pollutants found in a waterbody are directly related to the land uses within the watershed.

After review of existing Evaluations and Plans by the Advisory Committee, the Committee defined the following items as overall objectives of this Watershed Management Plan that could lead to successful goal attainment:

- Reduction of E.coli numbers in surface waters to state water quality standards thereby reducing fecal coliform contamination.

- Developing and maintaining project support by promoting public awareness, understanding, and stewardship; offering effective opportunities for public education, training, input and participation; and providing readily available technical and information based resources.

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[6]Ibid., p.38.

[7]Georgia Department of Natural Resources, State of Georgia Revised TMDL Implementation Plan Savannah and Ogeechee River Basins, Revision 01; June 15, 2007, Partially Supporting Streams due to Fecal Coliform Bacteria.

[8]Ibid., p.1.

[9]Ibid., p.4.

[10]Ibid., p.5.

As the Committee continued to develop the Watershed Management Plan, specific actions were identified and designed to meet the specific objectives. This process was used to ensure that the proposed actions would be able to objectively achieve the goals of the Watershed Management Plan. As such, the development of this Watershed Management Plan is consistent in terms of matching practical actions with appropriate and measurable objectives, and appropriate and measurable objectives with identified improvement goals.

Formation of Advisory Committee

The development of the plan relied upon the participation of an Advisory Committee which represented the Little River HUC-10 watershed and consisted of major property owners, elected officials of cities and counties, land trusts, regional agencies, and, state and federal agencies that would assist with plan implementation. Three public meetings (conducted in November 2012, and in February and May of 2013) were held with the Advisory Committee to engage the public in the process of designing an implementation plan. Most members were invited to take part in the process due to their professional interests and familiarity with previous stakeholder efforts. All members were informed of what was expected of them throughout the plan's development. A few Committee members were consulted more regularly due to their expertise and willingness to provide additional support. 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 watershed management plan. Finally, approval was sought for the document to serve as the plan on which implementation efforts will follow to restore and maintain the watershed.

A list of Advisory Committee members and their contribution(s) is found in the Appendix.

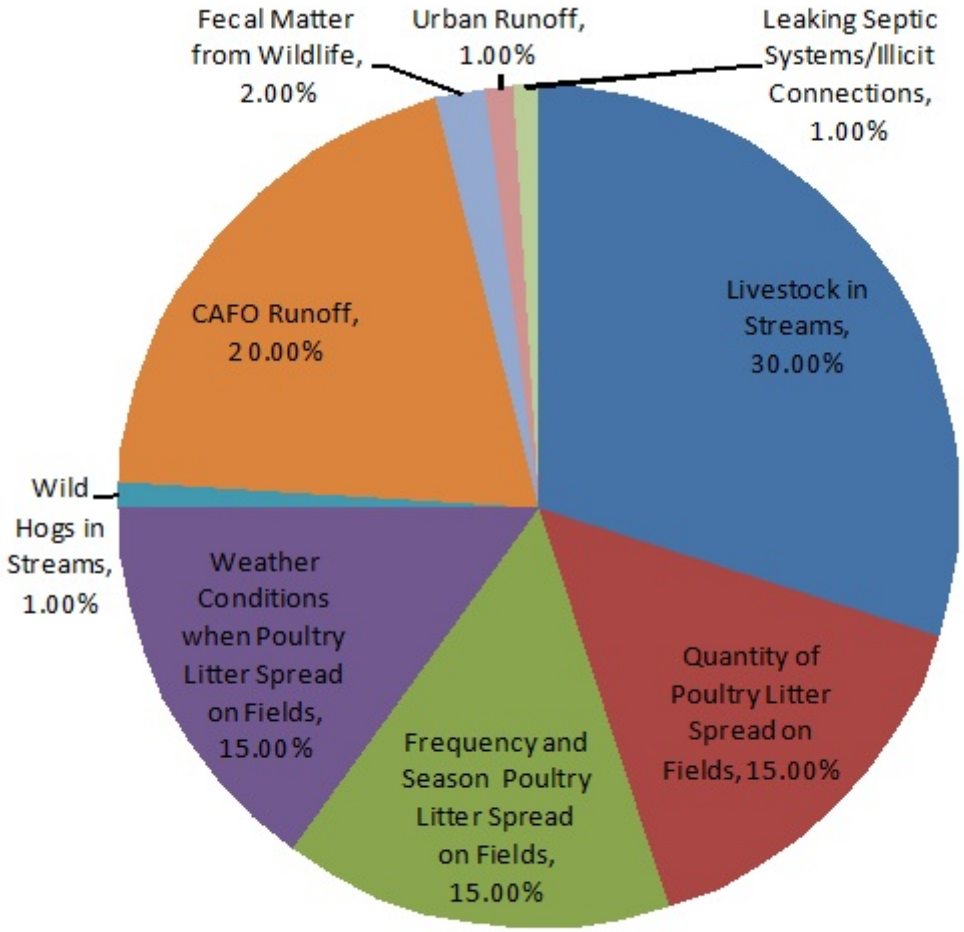
Source Assessment

The TMDL Evaluation for the Little River established a 46% reduction in fecal coliform loads to meet water quality standards for fishing

Based on the TMDL Evaluation, TMDL Implementation Plan, water quality monitoring, visual survey, land use, tax assessor data, and Advisory Committee input, the water quality impairment and potential causes are listed below.

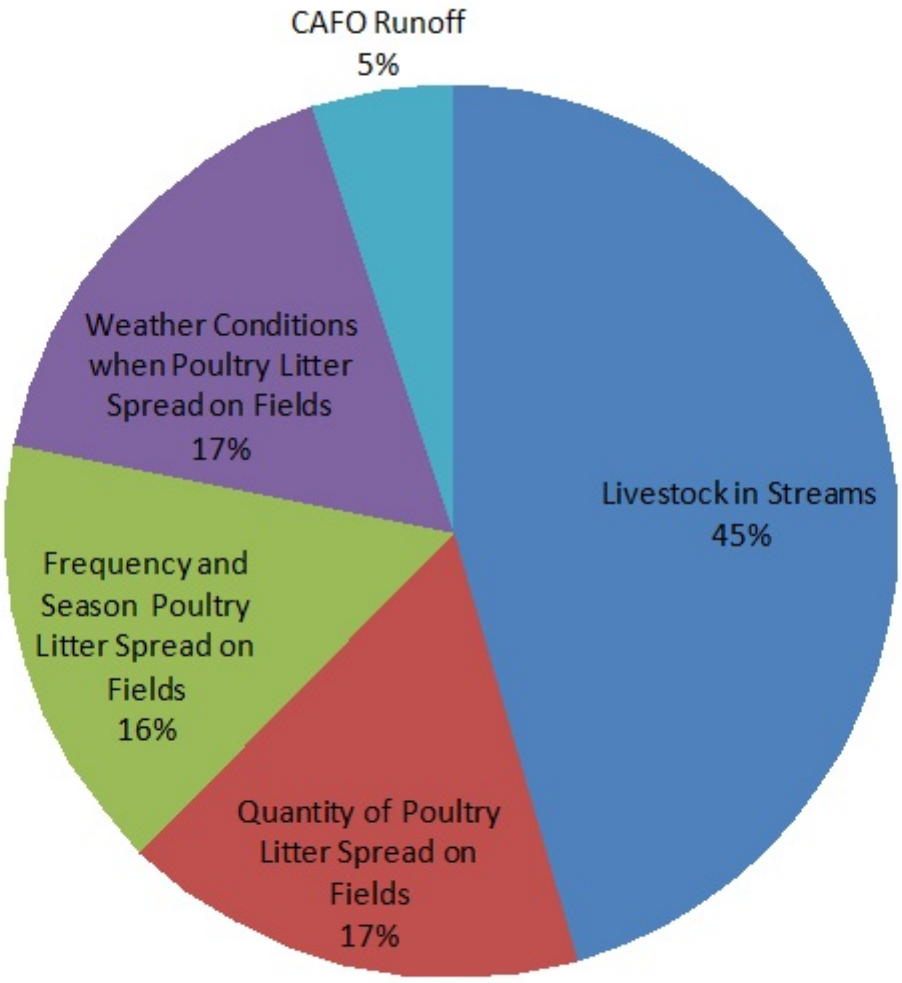
Identified Impairment	Potential Source/Cause
Fecal Coliform	Livestock in Streams
	Quantity of Poultry Litter Spread on Fields
	Frequency and Season Poultry Litter Spread on Fields
	Weather Condition when Poultry Litter Spread on Fields
	Wild Hogs in Streams
	CAFO Runoff
	Fecal Matter from Wildlife
	Urban Runoff
	Leaking Septic Systems/Illicit Connections

Percentage of Possible Pollution Source/Cause



After identification of the possible sources of contamination, the Advisory Committee, based on their knowledge of local conditions, identified agriculture as the primary source of pollution that could be addressed under this Plan. The Advisory Committee established the following pollution reduction goals:

Reduction Percentage Goals of Possible Pollution Source/Cause



Assessment and Characterization of Current Conditions

The Little River HUC 10 watershed comprises 136,779.50 acres of primarily agricultural and forested lands and lies in parts of Oglethorpe, Greene, Wilkes, and Taliaferro counties, and parts of the cities of Maxeys, Woodville, Union Point, and Crawfordville.. The North Fork Little River begins just east of Maxeys in Oglethorpe County and flows south through Oglethorpe, Taliaferro, and Wilkes counties where it joins with the South Fork Little River to form the Little River that flows until it joins the Savannah River in the J. Strom Thurmond Reservoir, a 70,000 acre reservoir. The backwater from the lake extends far up into the Little River creating an arm of the lake. See Map 1.

Within the HUC 10 watershed is the six-mile segment of the Little River (confluence of North and South Forks to Kettle Creek near Washington) that is included on Georgia's 305(b)/303(d) list as not supporting its designated use of fishing due to non-point source fecal coliform contamination. The designation of this segment as "not supporting" is based on sampling data from June 2002 at Georgia EPD's sampling station located at Sandy Cross Road, 1.7 miles upstream from the confluence with Kettle Creek with GPS coordinates of 33.650833, -82.832778. This road is also referred to as Wilkes County road number 192.

Physical and Natural Features

Hydrology

The Little River HUC 10 watershed is comprised of 453.03 stream miles and 524.23 acres of lakes. Major streams in the watershed include North Fork Little River and its tributary Syls Creek, South Fork Little River and its tributary, Sherrills Creek, and Kettle Creek, a tributary to Little River which is formed at the confluence of the North and South Little rivers. All major streams have numerous tributaries throughout their respective reach. Small ponds are scatted throughout the watershed and the majority are located either at the headwaters of, or adjacent to, the minor tributaries.

Soils

Soil surveys have been published by the U.S. Department of Agriculture Soil Conservation Service for each county in the Little River watershed. All of watershed is contained within the Southern Piedmont Major Land Resource Area (MLRA). Dominant soils of the Southern Piedmont have mostly clayey subsoils and kaolinitic mineralogy. Well-drained very gently sloping to strongly sloping Appling, Cecil, Davidson, Hiwassee, Madison, Pacolet, and Wedowee series are found on uplands. Ashlar, Gwinnett, Louisburg, Madison, Pacolet, Wedowee, and Wilkes series are located on the steeper slopes.
In some localities, these soils contain coarse fragments. Cartecay, Chewacla, Congaree, Toccoa and Wehadkee series are in alluvial flood plains. See Map 3. Erosion control is important when cultivating these soils.

Soils of the Piedmont are acidic and low in nitrogen and phosphorus. In many cases, much of the original topsoil has been eroded leaving the clayey subsoil exposed. The less steep slopes and areas where the topsoil has not been completely eroded are adapted to corn, cotton, soybean, and grain sorghum production. Although row crops are productive in this region, the area is better adapted to pasture production.

The following table depicts the Little River watershed generalized soils and provides a general description of the soil associations found in the watershed.

Table 1: Soils		
Soil Series	**Characteristic**	**Acres**
Pacolet-Madison–Cecil	Well drained	63857.90
Pacolet-Madison–Davidson–Cecil	Well drained	18914.68
Mecklenburg-Iredell-Enon–Davidson	Moderately well drained	7383.53
Wilkes-Toccoa-Mecklenburg-Enon-Davidson	Well drained	11723.79
Georgeville	Well drained	25060.72
Toccoa-Georgeville	Moderately well drained	9838.85

Source: STATSGO Database, USEPA, 1998.

Climate

The Little River watershed is characterized by mild winters and hot summers. Average annual precipitation is ~47 inches per year. Precipitation occurs chiefly as rainfall, and to a lesser extent, as snowfall. Rainfall is fairly evenly distributed throughout the year, but a distinct dry season occurs from mid-summer to late fall. Rainfall is usually greatest in March and least in October. The average annual temperature in the watershed ranges between a low of 49.5 and a high of 73.1 degrees F.[11]

Habitat

This watershed's ecosystem provides habitat for diverse species of aquatic and terrestrial wildlife including white-tailed deer, opossum, raccoon, a variety of songbirds, fox, horned owl, timber rattlesnake, turtle, frog, salamanders, and a variety of fish.

There are no threatened or endangered species identified in the watershed; however, concentrations of wild hogs are reported in the watershed's wetlands. Feral hogs can destroy crops, livestock pastures, wildlife habitat, and degrade water quality.

Feral hogs impact water quality largely due to behavior related to their physiology. Due to the absence of sweat glands, feral hogs commonly wallow in and near water sources to keep cool. However, wallowing damages riparian areas and increases sedimentation. Simultaneously, hogs defecate in and around the water source increasing levels of bacteria and nutrients. In some cases, water quality degradation can be so severe that the waterbody cannot support contact recreation (swimming, wading, etc.) or aquatic life.[12]

Groundwater Recharge Areas

The Georgia Department of Natural Resources mapped areas of high, average (or medium), and low susceptibility of groundwater to pollution in Georgia. This map is commonly known as Hydrologic Atlas 20 or the Groundwater Pollution Susceptibility Map of Georgia. The Little River watershed is located in a "low" groundwater pollution susceptibility area. However, within a pollution susceptibility area are significant groundwater recharge areas. These areas are mapped on the Hydrologic Atlas 18 or the Groundwater Recharge Area Map of Georgia.

[11]NRCS Climate Information.

[12]Jared Timmons, James C. Cathey, Nikki Dictson, and Mark McFarland, Feral Hogs and Water Quality in Plum Creek, AgriLIFE Extension, 2011.

The significant groundwater recharge areas are subject to pollution from spills, discharges, leaks, impoundments, applications of chemicals, injections and other human activities in the watershed. Once in the aquifer, pollutants can spread uncontrollably to other parts of the aquifer thereby decreasing or endangering water quality for an entire region. Once polluted, it is almost impossible for a groundwater source to be cleaned up.

A majority of structures in the watershed receive drinking water from wells. Maxeys, Woodville, and Crawfordville receive their drinking water from groundwater sources. Union Point receives its drinking water from a surface water source, the Sherrill's Creek Reservoir. See Map 4.

There are a number of groundwater recharge areas in the Little River watershed; however, no recharge area intersects the Little River impaired segment.

Floodplains

Floodplains are located throughout the watershed with the most significant along the North Fork, lower South Fork, Kettle Creek, and the lower reach of the Little River. See Map 5.

Wetlands

The watershed includes long, interconnected wetlands on the North and South Fork Little Rivers. However, wetlands in the Kettle Creek subwatershed are fragmented and only become extensive near its confluence with the Little River. See Map 6.

Topography

Elevations in the watershed are gently sloping and range from 298 feet to 810 feet. See Map 7.

Land Use and Population Characteristics

Land Cover

The watershed's physical landscape is fairly homogenous with the stream flowing generally southeastward. Land cover in the watershed has been divided into fifteen categories as shown in Table 2, below, with forest separated by composition. The watershed encompasses 136,779 acres with forest the dominant land cover at 84% and agricultural, 11%. Residential land accounts for <1% of the watershed. See Map 8.

While forest is the predominant land cover, no fecal coliform reductions are called for in this category due to significant compliance with silvicultural BMPs[13]. Only agricultural land is targeted for fecal coliform reductions.

[13]Results of Georgia's 2011 Silvicultural Best Management Practices Implementation and Compliance Survey, p.3, Georgia Forestry Commission, April 2012.

Table 2: Land Cover	
Land Cover Classification	**Acres**
Open Water	276.88
Low Intensity Residential	427.06
High Intensity Residential	27.34
Commercial/Ind/Trans	49.56
Barren Rock/Sand/Clay	64.28
Quarries/Mines	13.26
Transitional	5,701.28
Deciduous Forest	45,741.93
Evergreen Forest	56,155.45
Mixed Forest	13,161.85
Pasture/Hay	7,435.97
Row Crops	7,210.14
Urban/Recreational Grass	114.38
Woody Wetlands	389.19
Emergent Herbaceous Wetlands	10.90
TOTAL	**136,779.48**

Source: Georgia Land Cover Dataset, 2006

Forest

Currently 115,049 acres or 84 percent of the watershed is covered by forest. The forest is comprised of 41 percent evergreen, 33 percent deciduous, and 9 percent mixed hardwood/deciduous.

Agriculture

Approximately 14,646 acres (11 percent) of land within the watershed is pasture/grassland. While this may include some unforested non-farm land, it is assumed to be primarily agricultural—used either for active livestock grazing, poultry houses, or as other non-productive pasture land. Land is almost equally divided between pasture/hayfield and row crops. The Advisory Committee indicates that there are few row crops in the watershed.

According to the TMDL for thirty-two stream segments in the Savannah River Basin, 2005, agricultural livestock were identified as a potential source of fecal coliform to streams in the Savannah River Basin which includes the Little River watershed. The animals grazing on pastureland deposit their feces onto land surfaces, where it can be transported during storm events to nearby streams. Animal access to pastureland varies monthly, resulting in varying fecal coliform loading rates throughout the year. Beef cattle spend all of their time in pastures, while dairy cattle and hogs are periodically confined. In addition, agricultural livestock will often have direct access to streams that pass through their pastures, and can thus impact water quality in a more direct manner (USDA, 2002).

According to the 2007 Census of Agriculture, the most recent available data, the number of poultry farms in each of the counties increased, cattle farms decreased except in Oglethorpe County, and swine farms increased in Oglethorpe and Wilkes counties. However, it is important to note that this information is only available at the county level and does not necessarily provide a measure of the number of farms in the watershed.

Table 3: Number of Farms by County, 2002-2007				
	Greene	**Oglethorpe**	**Taliaferro**	**Wilkes**
Poultry				
2002	21	58	0	18
2007	34	96	2	34
Cattle				
2002	185	237	56	284
2007	153	243	40	241
Swine				
2002	2	11	2	5
2007	1	20	1	7
Source: Census of Agriculture, 2007.				

CAFO and LAS Permits

Confined animal feeding operations (CAFOs) are considered a point source of pollution by Georgia EPD. These operations must therefore obtain an NPDES permit. The watershed is home to various agricultural operations including poultry, dairy, and swine operations, all of which can be a source of non-point source pollution. Operators are regulated, in part, based on the size of the operation. Large (1000+ animal units) CAFOs are regulated under the National Pollutant Discharge Elimination System (NPDES). Mid-sized operators (301 to 1,000 animal units) with liquid manure handling systems must apply for a state Land Application System Permit (LAS). Operators with fewer than 300 animal units are subject to the Clean Water Act, are not allowed to have discharge to surface waters, and should use nutrient management planning.

Two types of NPDES permits can be issued; a federal individual permit for a facility where there is a high potential for violations of water quality standards or a general permit issued to a state that covers a group, or category, of dischargers with similarities that warrant a general permit. LAS permits are issued by the State of Georgia.

The Cabiness Dairy, LLC, located in Maxeys, and the Taliaferro County Hog Farm located in Sharon, are the only facilities in the watershed operating under a Federal NPDES permit. Both permits are for wet manure. These facilities may be eligible for funding for BMPs under a 319(h) grant provided the practice for which funding is sought is not specifically required or recommended in the Comprehensive Nutrient Management Plan (CNMP) associated with the permit on the property. BMPs above and beyond what is specific to the property's CNMP may be eligible for funding on a case-by-case basis. See Map 12.

Monitoring data indicates that the Cabiness Dairy is likely a major source of water contamination in the North Fork Little River. The Athens office of Georgia EPD is aware of problems at the Dairy that contribute to water quality issues in the N. Fork Little River. EPD is working with the Dairy to identify and implement solutions. Additionally, GAEPD indicated that the Dairy is eligible for EQIP funds but, the Dairy's owners would need to pursue those funding opportunities for any applicable projects.

There is one pending NPDES application for dry manure in the watershed.

Operating under an LAS permit issued by the state is Mossland Farms, a swine farm located in Stephens. This facility is eligible for BMP funding under a 319 (h) grant.

Operations not under an NPDES or LAS permit are required to submit a nutrient management plan (NMP) or conservation management plan (CMP). The committee identified the need to increase education on the development of NMPs or CMPs and appropriate quantity of, and periods to, spread poultry litter..

The Advisory Committee identified agriculture as a significant contributor to fecal coliform bacteria loads within the watershed with the largest percentage coming from livestock, primarily beef cattle, and spreading of poultry litter on pastures either in too great a quantity or at inappropriate times of the year.

Wildlife

According to the GAWRD, the impact of wildlife on fecal coliform contamination varies widely. The animals that spend a large portion of their time in or around aquatic habitats are the most important wildlife sources of fecal coliform. Waterfowl, most notably ducks and geese, are considered to potentially be the greatest contributors of fecal coliform. This is because they are typically found on the water surface, often in large numbers, and deposit their feces directly into the water. Other potentially important animals regularly found around aquatic environments include racoons, beavers, muskrats, and to a lesser extent, river otters, and mink. Population estimates of these animal species in Georgia are not available. Concentrations of beaver have been reported in the watershed; however, water quality monitoring data does not demonstrate their impact, if any, on water quality.

White-tailed deer have a significant presence in the watershed with an estimated population of 35 deer per square mile. According to GAWRD, fecal coliform bacteria contributions to water bodies from deer are generally considered less significant than that of waterfowl, racoon, and beaver due to a greater portion of their time being spent in terrestrial habitats. This is also true for other terrestrial mammals such as squirrels and rabbits, and terrestrial birds. While feces deposited on the land surface can result in the introduction of fecal coliform to streams during runoff from storm events, in the warm, humid environments typical of the southeast, there may be considerable decomposition of the fecal matter thus resulting in a decrease in the associated fecal coliform numbers introduced to streams during runoff from storm events by terrestrial mammals.

Urban Runoff

Stormwater runoff is a contributor to fecal coliform contamination. Domestic and urban animals contribute fecal coliform to the landscape, which is washed into the streams during rain events. Similar contributions in urban environments often originate from leaks and overflows from sanitary sewer systems, illicit discharges, and leaking septic systems.

Leaking septic systems were identified by the Advisory Committee as the only potential source of urban contamination. Approximately 454 acres (0.3%) of the land within the watershed are currently being used for residential purposes. This very small percentage is spread throughout the watershed, primarily as farm residences or small lot (<3 acres) residential properties.

County Boards of Health and the Geogia Department of Human Resources regulate the siting and installation of septic systems up to 10,000 gallon tank capacity. Larger systems are permitted by

GAEPD. However, property owners are responsible for properly operating and maintaining the septic system to increase life expectancy and prevent failures.

Residential land accounts for <1 percent of the watershed. Only Crawfordville and Union Point operate public sewerage systems. The remaining structures in the watershed utilize individual septic systems. Properties less than 3 acres were mapped in an effort to identify potential areas where, due to the density of homes, there may be potential contamination from individual septic systems. See Map 13. Monitoring may be warranted in the areas where homes are concentrated to determine if they contribute to water quality contamination.

According to the County Health department, there are no clusters of failing septic tanks. However, there is no requirement in the watershed that septic tanks be periodically pumped so there is a likelihood of some tank failures but their location is unknown. Given the expectation of little population growth in the watershed, the lack of supporting data, and the lack of financial resources available through the grant to address septic tank related water quality issues in the watershed, the Advisory Committee determined that tracking and addressing potential septic tank failures would not be further addressed in this plan.

Residential

Approximately 454 acres (0.3%) of the land within the watershed are currently being used for residential purposes. This very small percentage is spread throughout the watershed, primarily as farm residences or small lot (<3 acres) residential properties.

Commercial

Commercial and service-related uses currently occupy fewer than 50 acres in the watershed. Most of the commercial uses are in the cities and consist of individual properties or the downtown business district.

Land Use

Existing land use data from county comprehensive plans evidences that the watershed is primarily agricultural with more than 95% of land devoted to agricultural use. Little change is planned reflecting the lack of projected population growth in the watershed. Further, since the only public water or sewer is available in the some of the cities, any future development is anticipated within proximity of existing utilities. See Map 9.

Table 4: Land Use		
Character Area	**Existing Land Use (Acres)**	**Future Land Use (Acres)**
Agriculture/Forestry	130,398.95	132,211.76
Commercial	25.73	36.89
Industrial	20.38	0.00
Mixed Use	0.00	624.57
Park/Recreation/Conservation	1,157.81	1,150.62
Public/Institutional	453.80	301.65
Residential	3,948.50	2,156.55
Transportation/Communication /Utilities	766.96	334.09
Undeveloped/Unused	43.18	0.00
TOTAL	136,815.31	136,816.14

Source: Greene County Comprehensive Plan, 2004–2024; Oglethorpe County Comprehensive Plan, 2005-2025; Taliaferro County Comprehensive Plan, 2005-2025; Wilkes County Comprehensive Plan, 2009-2029.

Tax Digest Classification

Tax digest data indicates that less than 4 percent of the watershed is classified as residential and more than 93 percent is classified as some type of agricultural use. This data varies slightly from land cover and land use data and is a better indicator of how land is actually used. See Map 10.

Table 5: Tax Digest Classification		
Digest Classification	**Total Acres**	**Percent of Watershed**
Residential	5,012.65	3.67
Commercial	204.60	0.15
Industrial	37.63	0.03
Exempt	1,756.26	1.29
Agriculture	35,571.85	26.06
Preferential Ag	5,521.66	4.05
Conservation	86,019.24	63.02
Not Available	2,364.23	1.73

Source: 2011 Tax Digest for Greene, Oglethorpe, Taliaferro, and Wilkes counties

Demographics

No population data exists solely for the Little River watershed; however, data indicates that three counties will see a population increase for the period 2010 - 2030 (Greene, 25%, Oglethorpe, 25%, and Taliaferro, 2%). Wilkes County has seen a steady population decrease since 1980 of between one and three percent each decade. A two percent population decrease is anticipated 2010 -2030. Data for Crawfordville, Union Point, and Woodville demonstrate that their respective populations have declined since 1980 and will continue to decline through 2030. Maxeys population will remain relatively unchanged with an estimated growth of eight persons.[14]

Despite the significant population increase anticipated for Greene and Oglethorpe counties, it is unlikely that this will impact the Little River watershed. Greene County's growth corridor is in the vicinity of Greensboro and Lake Oconee. Oglethorpe County's growth area is in the western portion of the county adjacent to Athens-Clarke County. Both are well outside the Little River watershed.

[14]US Bureau of the Census, 2012.

Waterbody and Watershed Conditions

Visual Survey

The purpose of a visual survey is to determine if there are observable problems on the stream and to characterize the environment the river flows through. The visual survey helps pinpoint areas that may be the source of water quality impairments and determine the overall condition of the stream.

A visual survey of the HUC 10 watershed was conducted on November 30, 2012. Because of a prolonged drought, stream flow was low and slow in the upper watershed. The lower reach of the watershed demonstrated little to no flow instead evidencing unconnected pools in the stream channel. The upper reaches of the stream evidenced clear water, with the exception of the area immediately downstream of the dairy in Maxeys, with slow but obvious flow. The middle reach, in the vicinity of State Route 44, water became cloudy with occasional areas of sheen. Stream flow was barely visible. At the confluence of the North and South forks, the stream bed was largely dry but, where there was water, it was pooled and very cloudy to muddy. Throughout the watershed, stream banks were severely eroded with banks ranging from 3' to 5'.

Streams within the watershed appear to have adequate vegetated buffers where property adjacent to the North or South Fork Little River or Little River was forested. However, where pastures were adjacent to the above-mentioned streams, buffers were minimal and no fencing was observed that would keep livestock from the stream. In no case was livestock observed in these pastures during the survey.

No wildlife were observed with the exception of beaver activity at Highway 44 and South Fork Little River. However, beaver are reported by the Advisory Committee to exist throughout the watershed. See Appendix for detailed survey sheets.

Water Quality Standards

Bacteria are microscopic, single-celled organisms. Under favorable conditions they can reproduce rapidly and can form colonies that are visible without magnification. Most bacteria are beneficial, however, some are pathogenic (or disease causing) and result in human health problems.

Coliform bacteria are members of the Enterobacteriaceae family. While some coliform bacteria can be naturally found in soil, the type of coliform bacteria that lives in the intestinal tract of warm-blooded animals and originates from animal and human waste is called fecal coliform bacteria. Escherichia coli (*E.coli*) is one subgroup of fecal coliform bacteria. The presence of fecal coliform bacteria indicates the possible presence of pathogens. *E.coli* bacteria are good indicator organisms of fecal contamination because they are associated with warm-blooded animal wastes, generally live longer than pathogens, are found in greater numbers, and are less risky to culture in a laboratory than pathogens. However, their presence does not necessarily mean that pathogens are present, but rather indicates a potential risk to human health.

Sources of fecal bacteria can include urban and agricultural runoff, leaking sewer lines and septic systems, and wildlife. Georgia's water quality standards set a maximum number of colony forming units (cfu) at 200 per 100 milliliters from May through October, or 1000 per 100 milliliters from November

through April. Values in excess are in violation of the bacteria State water quality standard. In addition, a single sample in excess of 4000 cfu per 100 milliliters from November through April can also trigger adding a stream segment to the 303(d) listing. Georgia EPD monitoring data of the Little River impaired segment from 2002 that initiated the listing is as follows:

Table 6: EPD Monitoring Data Little River at Wilkes Co. Rd. 192 near Washington, Georgia

Date	Observed Count	Fecal Coliform Geometric Mean
02.28.02	330	
03.04.02	4600	
03.14.12	700	
03.18.02	230	703
05.20.02	220	
06.04.02	790	
06.10.02	330	
06.20.02	330	411
07.02.02	330	
08.29.02	1100	
09.09.02	330	
12.02.02	50	
12.04.02	80	
12.09.02	20	
12.16.02	330	72

Source: TMDL Evaluation, Savannah River Basin, January 2005.

Water Quality Data

More recent water quality monitoring has been undertaken by the UGA Cooperative Extension, Wilkes County, under a contract with the Central Savannah RC&D. Monitoring is under a GAEPD-approved Targeted Monitoring Plan. The purpose of a Targeted Monitoring Plan is to identify sources or "hot spots" of pollution caused by ruptured or overflowing sewer lines, leaking septic tanks, storm drains, agricultural operations, wildlife, pet waste, and other sources. None of these potential sources were identified during the visual survey with the exception of possible agricultural operations. Pasture were adjacent to narrow stream buffers.

Monitoring sites were selected based on upstream land use and to help isolate the most likely causes of impairment or locations of pollutant sources in the watershed. See Map 11 for site locations.

Sites are monitored for *E.coli* and conductivity. Specific conductivity is the ability of a substance to conduct electricity. Conductivity of water measures the dissolved ions or salts in a stream and can be used as an indicator of pollution. High levels can indicate nutrients or other dissolved chemicals in the water column. Based on water quality standards and known levels of stream impairments for Piedmont streams, the maximum level of specific conductivity is 80 FS/cm. Documented changes in conductivity readings warrant further investigation.

Table 7: Little River Watershed Monitoring Data											
	Monitoring Date										
	09.05.12	**10.17.12**	**11.19.12**	**12.19.12**	**1.16.13**	**2.18.13**	**3.19.13**	**4.13.13**	**5.13.13**	**6.20.13**	**7.29.13**
Site 1 *E.coli*	TNTC	667	333	TNTC	1400	2833	3133	233	633	TNTC	933
Site 1 Conductivity	272	116	106	180	124	128	157	130	131	151	138
Site 2 *E.coli*	1233	100	0	433.3	700	133	1100	125	533	866	600
Site 2 Conductivity	126	221	214	145	143	96	102	333	104	144	73
Site 3 *E.coli*	366	0	1233	200	1700	666	1366	266	233	1100	333
Site 3 Conductivity	173	146	225	126	142	120	116	131	128	115	120
Site 4 *E.coli*	33	0	33	166.6	366	366	466	333	166	533	367
Site 4 Conductivity	91	110	101	89	118	92	100	116	99	126	80
Site 5 *E.coli*	66	833	0	466.6	700	266	933	166	66	767	333
Site 5 Conductivity	174	289	241	140	132	95	112	122	104	126	81
Rain (24 hrs prior to sampling)	1/2"-1"	0"	0"	~1"	0"	0.08"	0.77"	0.05	0"	0"	0"

TNTC - Too numerous to count.
Wet weather sample

Wet versus dry weather sampling may help identify general sources of the bacteria. For example, during dry weather, continuous sources are more easily detected, such as leaking septic tanks or wildlife. Sources that would increase in-stream bacteria levels due to runoff, such as storm water outfalls or field runoff, may be easier to identify during wet weather sampling.

The current Georgia bacterial standard for fresh water is based on fecal coliform and varies with the designated use of the water. However, based on studies, USEPA concluded that E.coli was the preferred indicator organism for fresh waters. Using an illness rate of 8 illnesses per 1,000 swimmers (the estimated rate associated with the fecal coliform standard of 200 cfu/100 ml), the regression line was used to find the associated concentration. This associated concentration for E. coli was a geometric mean of 126 cfu/100 ml.[15]

USEPA recommendations for E.coli based on primary contact with the water are as follows:

Illness Rate/1000	Geometric Mean/100mL	Single Sample/100mL
8	126	235
9	206	300
10	206	383
11	263	490
12	336	626
13	429	799
14	548	1021

E.coli counts that exceed 1000 cfu/100 ml warrant special action. A “high” bacterial count may be a one-time event or occurrence but, more sampling is encouraged. While many of the above data exceed 235 and are therefore considered “high”, only Site 1 has consistently exceeded 1,000 cfu/100 ml in both dry and wet weather sampling.

[15]Scientific Basis for Bacterial TMDLs in Georgia, June 2006, pps. 13, 15.

Site 2 has seen spikes in *E.coli*; however, neither the Advisory Committee nor the Visual Survey identified the potential cause of the increased *E. coli* counts. If periodic spikes continue, further study may be warranted.

Site 3 reflects conditions in the Kettle Creek subwatershed. Elevated results have occurred in three sampling periods and during dry weather sampling.

The data from Site 5 indicates some activity below Site 4 that is contributing to the streams contamination but, the activity is unknown.

Input from the Advisory Committee identifies the following potential causes of contamination:

- Site 1: N. Fork Little River - runoff from fields at the Cabiness Dairy, large feedlot at the Cabiness Dairy located next to the stream, possible septic tank contamination from structures located in Maxeys, and a goat farm on Poplar Creek Road, tax parcel 061-78, where the goats have access to the stream. The Poplar Creek Road parcel also includes a series of wetlands and based on comments concerning wetlands in other parts of the watershed, likely has beaver.

  Though well down-stream from Site 1, the Committee reports a large network of wetlands with significant beaver activity in the area of Bairdstown Road, which includes a tributary to N. Fork Little River.

- Site 2: S. Fork Little River - The Committee was unable to pinpoint the reason for the spikes at Site 2. It could be that the data from Site 2 was simply the diluted contamination from Site 1. However, the Committee did note increased wild hog activity in the area as well as, potentially, beaver. The Committee also questioned the impact of a cluster of parcel <3 acres on Springfield Road just upstream of Site 2; however, a Committee member reported that only two or three homes had been built so, it is unlikely that leaking septic systems are a contributing factor.

- Site 3: The Committee identified both over-spreading of poultry litter and spreading litter during the non-growing season as potential sources of contamination.

Data from sites 4 and 5 are consistently within the acceptable range and the Committee could not identify any potential contaminant sources in the area. While non-point source contamination should be addressed throughout the watershed, the focus should be on the subwatersheds where monitoring sites 1-3 are located. Those subwatersheds are Upper N. Fork, South Fork, and Kettle Creek. See Map 2.

Non-point Source Discharge

Non-point sources are those which supply pollutants to surface water diffusely, rather than as a definite, measurable quantity at a single location. These sources typically involve land activities that contribute bacteria, sediment, and/or nutrients to surface water as a result of runoff during and following rainfall. Typical non-point sources fecal coliform bacteria include wildlife, agricultural livestock, and urban development.

Agriculture was identified in the TMDL Evaluation as a potential non-point source pollutant in the watershed.[16] Since 2003, the NRCS, through the Environmental Quality Incentives Program (EQIP) and

[16]Ibid.

Conservation Technical Assistance program, has installed a variety of BMPS in the watershed in an effort to prevent or reduce the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. Of the thirty-two types of BMPs developed or installed, nine help address fecal coliform contamination, and of those, eight specifically address non-point source fecal coliform pollution and controls.

BMPs specifically addressing non-point source pollution that have been installed in the watershed are contour farming, critical area planing, nutrient management, fencing, pipeline, composting facility, stream crossing, and water well. Contour farming, critical area planting, and nutrient management affected 1,621.10 acres. A total of 26,177.10 ft of fencing and pipeline were installed. Seventy-seven percent of fencing has been installed in the S. Fork Little River subwatershed and 53% of the livestock pipeline was installed in the Lower North Fork watershed. See Appendix for list of installed BMPs by subwatershed.

Land Management Ordinances and Activities

A suite of land management ordinances are used by the local governments in the watershed, though ordinances are only as effective as their enforcement. A number of ordinances are model ordinances developed by the State of Georgia and require property owners to meet state standards regarding stream buffers (25'), require protection of wetlands, require larger lot sizes in groundwater recharge areas where there is no public sewer, regulating land-disturbing activities, etc. Zoning ordinances typically have the greatest variation among jurisdictions but the ordinances in the watershed communities, particularly the counties, are similar and focus on the types of permitted agricultural uses and their location relative to other uses in order to reduce the potential for conflict with non-agricultural land uses. The impact or siting of uses on water quality is not addressed.

A list of land management ordinances implemented in the watershed can be found in the Appendix. No changes to ordinances or the adoption of new ordinances are recommended due to the lack of development in the watershed anticipated through 2035.

Recommended Best Management Practices

Potential management solutions identified to control pollutant loadings from priority sources are agricultural best management practices and education outreach to agricultural producers that address fecal coliform contamination and nonpoint source pollution. Agricultural BMPs appropriate to address fecal coliform contamination include:[17]

- anaerobic digester – ambient and controlled temperature
- closure of wastewater impoundment
- composting facility
- critical area planting fencing use exclusion
- heavy use area
- manure storage facility
- manure transfer
- nutrient management
- pasture and hayland planting pipeline
- stream crossing
- waste facility cover
- waste treatment lagoon
- water facility
- well water

[17]Best Management Practices for Georgia Agriculture, Georgia Soil and Water Conservation Commission, January 2007.

Implementation of agricultural BMPs throughout the watershed has been ongoing since 2003 and are documented in the Appendix. Unfortunately, there is no ongoing collection monitoring data since the stream's designation as "not supporting" to demonstrate the impact of installed BMPs on water quality.

Based on input from the Advisory Committee, continued installation of BMPS should be considered with specific concentration on insuring that all producers have nutrient management plans or conservation management plans, as appropriate, and that those plans are correctly implemented. Additionally, based on current water quality monitoring, new BMP installation should focused on three subwatersheds, Kettle Creek, Upper North Fork, and South Fork. Additionally, a watershed-wide educational component is needed to educate, in part, producers on the impact of their activities on water quality and programs available to assist with installation of structural controls.

The Advisory Committee, using values of 1 through 5 with 1 being the best, ranked potential management practices that can be implemented in the watershed using the following criteria:

- Critical Area – Will the management measure be implemented effectively within the identified critical areas in the watershed?
- Estimated Effectiveness – How effective will the management measure be in reducing contamination?
- Cost Effectiveness – Is the practice cost-effective when compared to the impact the measure will have on contamination?
- Public Support – Will the measure have public support?
- Maintenance – What level of maintenance is required for the measure to function optimally?
- Added Benefits – Are there water quality benefits in addition to reduction of fecal coliform contamination?

The Advisory Committee determined ranking values based on their knowledge of the producers in the watershed and the likelihood of their support of the individual practice, implementation, and level of maintenance and its relative expense to the operator. Practices were also evaluated for their benefits relative to cost due to the limited funding available for practice installation.

Table 8: Management Measures Practices								
Management Measure and Practice Number	**Critical Area (Rank 1-5)***	**Estimated Effectiveness (Rank 1-5)***	**Cost Effectiveness (Rank 1-5)***	**Public Support (Rank 1-5)***	**Maintenance (Rank 1-5)***	**Added Benefits (Rank 1-5)***	**Cost**	**Average and Comments**
Anaerobic Digester (365, 366)	5	1	5	5	3	3 (reduced herbicide usage and lower weed seed germination).	high cost range not available	3.14- ninety percent reduction in *E.coli* in one day during batch digestion compared to 77 days in manure slurry.
Closure of Wastewater Impoundment (360)	5	2	5	5	2	5	high 0.36 /CF	3.43 – Additional measures may be necessary to minimize erosion and pollution of downstream water sources.
Composting Facility (317)	1	1	5	1	4	3 (air quality)	high 2.65 - 7.04/SF	2.14
Conservation management plan	1	1	1	1	NA	1	low No cost	0.83 - low cost alternative to nutrient management plan.
Critical Area Planting (342)	3	3	2	1	4	1 (reduction in soil erosion)	high 250 - 300/AC	2.33
Fencing	1	1	2	1	2	2 (reduced sediment, nitrogen, suspended solids)	medium 2.10 - 2.70/LF	1.29 - 99% *E.coli* reduction in 2nd order streams.
Heavy Use Area (561)	1	2	4	1	3	2 (reduced soil erosion)	medium – high 1.34 – 5.50/SF	2.17
Manure Storage Facility (313)	4	1	4	3	3	5	medium – high 0.27 - 1.61/CF 4.76 - 6.76/SF cost depends on component of practice	3.33 - 96% reduction in fecal coliform when stored for 2 weeks. Given limited grant funding for BMP installation, cost share of this practice not a priority.

Management Measure and Practice Number	Critical Area (Rank 1-5)*	Estimated Effectiveness (Rank 1-5)*	Cost Effectiveness (Rank 1-5)*	Public Support (Rank 1-5)*	Maintenance (Rank 1-5)*	Added Benefits (Rank 1-5)*	Cost	Average and Comments
Manure Transfer (634)	5	1	4	5	4	2	medium - high 10.42 - 42.13/LF 9.86 /SF 10.12/Gal cost depends on component of practice	3.50 - Promotes proper use of manure and reduce nutrient loads in soil; allows for movement nutrients out of highly concentrated areas. Used as part of NMP.
Nutrient Management Plan (102)	3	1	4	1	1	1	high 5,600 – 1,600/ EA	1.83 - only needed for waste treatment lagoon, manure storage facility.
Pasture and Hayland Planting (512)	1	1	1	1	1	1 (erosion control)	low 100.00 - 378.00/ac	1.00 – 85% reduction in erosion.
Pipeline	3	1	5	3	1	5	Moderate 2.17/LF	3.0 - a component of an alternative water system used to transport water for livestock
Septic Repair	5	5	5	4	1	5	High 1,000 - 10,000	4.17 - No evidence septic systems are source of contamination.
Stream Crossing (578)	1	1	4	1	5	2 (reduce nutrients in stream)	Medium – High 4.70 - 5.26/SF 3.15/In-FT cost depends on component of practice	2.33- better to redirect around water bodies instead of installing stream crossings. If traffic is infrequent, fords have the least impact on overall water quality; practice can result in increased sedimentation, erosion and flooding; requires careful monitoring, maintenance, and safety evaluation.
Use Exclusion (472)	1	1	2	1	1	5	low - medium cost range not available	1.83 - two-year exclusion period is needed or until vegetation is well established.
Waste Treatment Lagoon (659)	2	5	5	4	5	5	medium – high 0.20/CF	4.33 - reduces nitrogen but no information on *E.coli* reduction; required NMP.

Management Measure and Practice Number	Critical Area (Rank 1-5)*	Estimated Effectiveness (Rank 1-5)*	Cost Effectiveness (Rank 1-5)*	Public Support (Rank 1-5)*	Maintenance (Rank 1-5)*	Added Benefits (Rank 1-5)*	Cost	Average and Comments
Water Well (642)	1	1	3	1	1	1	High 6,300 - 11,000/EA	1.33 – provides alternate water source from surface water for animals

* 1 best; 5 worst

Working With The Public

Education is extremely important for increasing public awareness of the water quality problems and offering feasible solutions for remediation and prevention of water quality degradation. The Advisory Committee agreed that public education on water quality issues is the key to implementation of a successful watershed management plan. Some of the objectives for education include educating producers on best management practices for agriculture through the use of conservation management plans, animal exclusion, appropriate spreading of poultry litter, etc.

The goal of education outreach is to promote public awareness, understanding, and stewardship primarily by agricultural producers in the watershed and to provide readily available technical and information-based resources.

Even the best plan for managing watersheds and controlling nonpoint source pollution cannot succeed without community participation and cooperation. An aggressive public outreach and education program, therefore, is essential and must be nurtured. The following education and outreach strategies and ideas would, if implemented, raise the community's consciousness about the importance of water quality.

Outreach Goals

The overarching goal of the outreach campaign is to engage residents in reducing non-point source pollution in the watershed. This will be accomplished by educating the public, and in particular agricultural producers, on water quality issues in the watershed, actions that may be taken to improve water quality, and programs available to assist with water quality improvement projects.

Target Audience

Contamination Source	Target Audience	Specific Target Audience	Priority (1 is highest)
Non-point Source runoff	Agricultural Producers	Livestock and poultry producers located in the riparian zone.	1
Livestock in Stream	Agricultural Producers	Livestock producers with property containing streams accessed by livestock.	1
Failing Septic Systems	Homeowners	Riparian homeowners with septic systems.	3

According to the Advisory Committee, while NRCS and the Georgia Soil and Water Conservation Commission staff are the primary entities with outreach programs, these programs are limited due to

state budget cuts and reduced staff. According to the Advisory Committee, residents, and in particular, agricultural producers are:

- Unaware of watershed boundaries;
- Unaware of water quality issues in the watershed;
- Unaware of sources of contamination; and, are
- Unaware of some of the available assistance programs that address fecal coliform contamination.

Outreach should provide information on the consequences of pollutants, causes of impairments, sources and impairments, and cost to the community. In particular, outreach should demonstrate that BMPs are cost effective for the producers as well as provide information on cost-share opportunities.

Outreach Activities

Suggested activities to implement educational outreach include:

- Contact list
  Develop a database of addresses and email contacts with watershed residents, particularly agricultural producers. The contact list can be used to send residents invitations to meetings and will also be helpful in communicating with stream side property owners about ongoing activities. Notifying residents by email will reduce mailing costs.

- Community Meetings and Presentations
  Hold annual "State of the Watershed" meetings to review watershed planning, water quality issues, restoration programs, implementation goals and resources, and possibly include a guest speaker on a particular issue of concern.

  Hold Agricultural Field Days to feature an installed BMP project in the watershed, and its cost and effectiveness in reducing water quality impairment.

  Release annual summary of Little River State of the Watershed. Document should be uploaded to Central Savannah River RC&D website. This should be a two-page document that presents summary information on the water quality issues in the watershed, the strategy of the WMP, potential solutions to the problems, benefits of remediation, and a case study of a BMP project already completed. Publicize availability of summary to watershed residents through newspapers, as well as directly to government agencies and other Little River watershed advocates and stewards. Summary can be printed and passed out at meetings where presenting a detailed program is not possible.

  Develop newspaper articles on the watershed's water quality issues, septic evaluation, repair, and maintenance, and agricultural BMPs.

  Maintain information on the watershed on the RC&D web page to include a watershed map, State of the Watershed document, educational outreach documents, and available assistance.

Long-Term Monitoring Plan

Instream monitoring is important to gage the recovery of streams after remediation projects are installed, and is also crucial to support partners as they engage in periodic strategic planning of remediation priorities.

Long-term monitoring associated with this watershed management plan will have the following objective:

- To verify long-term, whether water quality meets EPD fishing and drinking standards for fecal coliform following implementation of the measures outlined in this plan.

The most intractable sources of variation are likely to be changes over time. Since the primary source of fecal coliform in the watershed is agricultural runoff, the concentration of fecal coliform will vary seasonally and with variations in precipitation. The most important quality assurance measure will be to sample many times throughout a range of hydrologic conditions.

A long-term monitoring plan for *E.coli* should:

- measure the long-term effectiveness of management practices;
- analyze trends; and
- redefine water quality problems, if any.

Monitoring should be accomplished by Adopt-a-Stream certified personnel and under a GAEPD–approved Targeted Monitoring Plan utilizing Adopt-A-Stream methodologies. This will give a broad picture of water quality conditions in the watershed, a rough assessment of potential pollutant sources and a general assessment of management measure implementation.

Implementation, Evaluation and Revision

Management Strategies

The basic strategy for implementation of this watershed management plan is to create and manage a program that features both structural and non-structural controls within the watershed to address the fecal coliform issues. The goal of this program is to restore the watershed to the extent that the impaired segment as well as all streams in the watershed meet State water quality standards. Measures that will be utilized to accomplish the goals are increasing the available agricultural BMP cost-share opportunities and making available educational opportunities to encourage public participation, particularly among agricultural producers, in the watershed improvement process. The NRCS will assist with technical advisement with respect to agricultural projects. Other stakeholders, including GSWCC, Agricultural Extension, SWCD, and the CSR RC&D will make key contributions to other facets of the program, in particular education and outreach.

Management Plan

A 50/50 cost-share program for agricultural BMP installations will be implemented. Including the match funds, $360,000 has been allocated for BMP installations that target fecal coliform load reduction in the watershed. While inclusion of landowners from the entire HUC-10 watershed will be eligible for program cost-shares, priority subwatersheds, based on water quality monitoring data, have been established by the Advisory Committee. Projects in these subwatershed are likely to have the greatest impact on fecal coliform load reduction in the HUC-10 watershed. Those subwatersheds are Upper North Fork and South Fork Little River, and Kettle Creek.

Implementation Plan and Interim Milestones

This Watershed Management Plan anticipates an implementation period of 5 -10 years. However, specific projects may be implemented over shorter periods. This section outlines objectives that apply across the entire implementation process and measurable milestones that should reveal significant progress.

Implementation Plan

Goal: Implement best management practices to reduce fecal coliform loads by 46% in order to meet water quality standards.

Task	Responsible Agency	Cost	Fund Source	Evaluation Measure	Milestone		
					Short	Mid	Long
					(< 2 yrs)	(2-5 yrs)	(>5 yrs)
***Objective 1**: Reduce fecal coliform loads from agricultural sites*							
Task 1: Identify agricultural producers in watershed.	NRCS	NA	in-kind	Percentage of producers identified.	All	All new producers	All new producers
Task 2: Review NMP or CMP with agricultural producers to insure that they are being appropriately implemented.	NRCS	NA	in-kind	Number of CMPs and NMPs reviewed with producers	All	All new producers	All new producers
Task 3: Identify agricultural producers that have no NMP or CMP and assist with plan development.	NRCS	NA	in-kind	Number of producers identified	All	All new producers	All new producers
				Number of CNP or NMP developed	All	All new producers	All new producers
Task 4: Contact producers for participation in cost-share programs – target producers based on priority subwatersheds.	NRCS	NA	in-kind	Number of producers identified within priority subwatersheds	All	All new producers	All new producers
				Number of applications submitted for cost-share program in priority subwatersheds	10	5	5

Task	Responsible Agency	Cost	Fund Source	Evaluation Measure	Milestone		
					Short	Mid	Long
					(< 2 yrs)	(2-5 yrs)	(>5 yrs)
Task 5: Install BMPs.	NRCS	Varies by BMP. Total cost of all BMPs not to exceed $360,000 collectively in years 1 and 2 (50/50 cost share)	Producer, 319(h) grant, EQIP	Percent of land area of priority subwatersheds affected by BMP program	50	25	25
				Number of participants	10	5	5
				Load reduction estimate	TBD	TBD	TBD
***Objective 2**: Monitor water quality for load reduction achievement.*							
Task 1: Update EPD-approved Targeted Water Quality Monitoring Plan for post-BMP monitoring.	Wilkes County Extension	$300 (3 updates)	319(h) grant, in-kind match	EPD-approved Targeted Monitoring Plan and updated as needed to reflect new pre- and post-BMPs.	100	NA	NA
Task 2: Conduct post-BMP monitoring by AAS–qualified personnel for *E.coli* under EPA-approved Targeted Monitoring Plan during grant project.	Wilkes County Extension	1070.00 supplies; 2208.00 labor; 1200.00 travel	319(h) grant, in-kind match	Number of samples collected	96/yr	NA	NA
				Load Reduction	meet EPD fishing and drinking standards for fecal coliform*	NA	NA

Task	Responsible Agency	Cost	Fund Source	Evaluation Measure	Milestone		
					Short	Mid	Long
					(< 2 yrs)	(2-5 yrs)	(>5 yrs)
Task 3: Undertake long-term water quality monitoring by AAS-qualified personnel under EPD-approved Targeted Monitoring Plan.	Subcontractor TBD	TBD	TBD	Number of samples collected	NA	TBD	TBD
				Load Reduction	NA	meet EPD fishing and drinking standards for fecal coliform*	meet EPD fishing and drinking standards for fecal coliform*
***Objective 3**: Conduct educational outreach.*							
Dedicate page on RC&D website to the Little River Watershed.	RC&D	0	NA	Number of hits to web page.	60	75	75
Develop email database of watershed producers.	RC&D, NRCS	160	319(h) grant, in-kind	Percent of total producers in watershed.	All	All	All
Develop annual "State of the Watershed" document.	RC&D	1000	319(h) grant	Develop document in 2013 and 2014.	All	NA	NA
Upload annual "State of Watershed" to RC&D web page.	RC&D	0	NA	Document uploaded to website in 2013 and 2014	All	NA	NA
Notify newspapers, federal, state, and local agencies, elected officials, watershed Advisory Committee members, and producer organizations in each county in watershed of availability of "State of Watershed: document.	RC&D	100	319(h) grant	Number of individuals and organizations notified.	All	NA	NA

Task	Responsible Agency	Cost	Fund Source	Evaluation Measure	Milestone		
					Short	Mid	Long
					(< 2 yrs)	(2-5 yrs)	(>5 yrs)
Develop, coordinate, and host Field Day.	RC&D, GSWCC, Broad River SWCD, Wilkes County Extension	1000	319(h) grant, in-kind	Number of attendees.	15	NA	NA
Presentations at producer meetings in each of four counties in watershed.	RC&D, GSWCC, Broad River SWCD, Wilkes County Extension	2000	319(h) grant, in-kind	Number of presentations.	6	NA	NA
				Number of attendees per presentation.	10	NA	NA
Develop newspaper articles on Little River Water Quality, focus of pollution control efforts, available assistance programs.	RC&D, GSWCC, Broad River SWCD, Wilkes County Extension	2000	319(h) grant, in-kind	Number of articles published.	4	4	NA

*EPD Fishing and Drinking Standards for fecal coliform

- May through October
  - GM not to exceed 200 MPN/100-ml
  - No individual sample exceeding 400 MPN/100-ml
- November through April
  - GM not to exceed 1,000 MPN/100-ml
  - No individual sample exceeding 4,000 MPN/100-ml

Indicators to Measure Progress

Targeted water quality monitoring will take place monthly until 2015 under a GAEPD-approved Targeted/BMP Monitoring Plan. Monitoring will focus on sampling at predetermined sites upstream and downstream of installed BMPs or cluster of installed BMPs within the watershed in an effort to evaluate improvements in the HUC-10 watershed as well as improvements with respect to location of the BMP.

For more finite objectives, the Evaluation Measure associated with each task in the Implementation Plan will reveal progress that the implementation program is gaining momentum. Referencing these should provide an indication of specific tasks needing more focus. Eligible producer participation rates will be another useful tool in determining the success of grant implementation. Education and outreach participation rates will also be analyzed to help measure progress.

Indicators identified by the Advisory Committee to measure the status of the watershed management process and educational outreach outlined in this Plan are:

Type of Indicator	Specific Indicator
Environmental	E.coli bacteria - Direct water quality measurement.
Environmental	Conductivity - General measure of stream water quality. Significant changes in conductivity could then be an indicator that a discharge or some other source of pollution has entered a stream.
Programmatic	Number of best management practices implemented.
Programmatic	Number of CNMPs written.
Programmatic	Number of hits on Little River web page.
Social	Participation rate in non-point source education outreach programs.

Of greatest importance, is the measure of how the various implementation projects have translated toward the goal of accomplishing the goal of attaining State water quality standards for E.coli within the HUC-10 watershed. Tracking water quality improvements will best indicate progress toward reducing fecal contamination.

Periodic assessment of the implementation schedule and review of accomplishments are necessary to determine whether task milestones are being met.

Long-term Plan Implementation

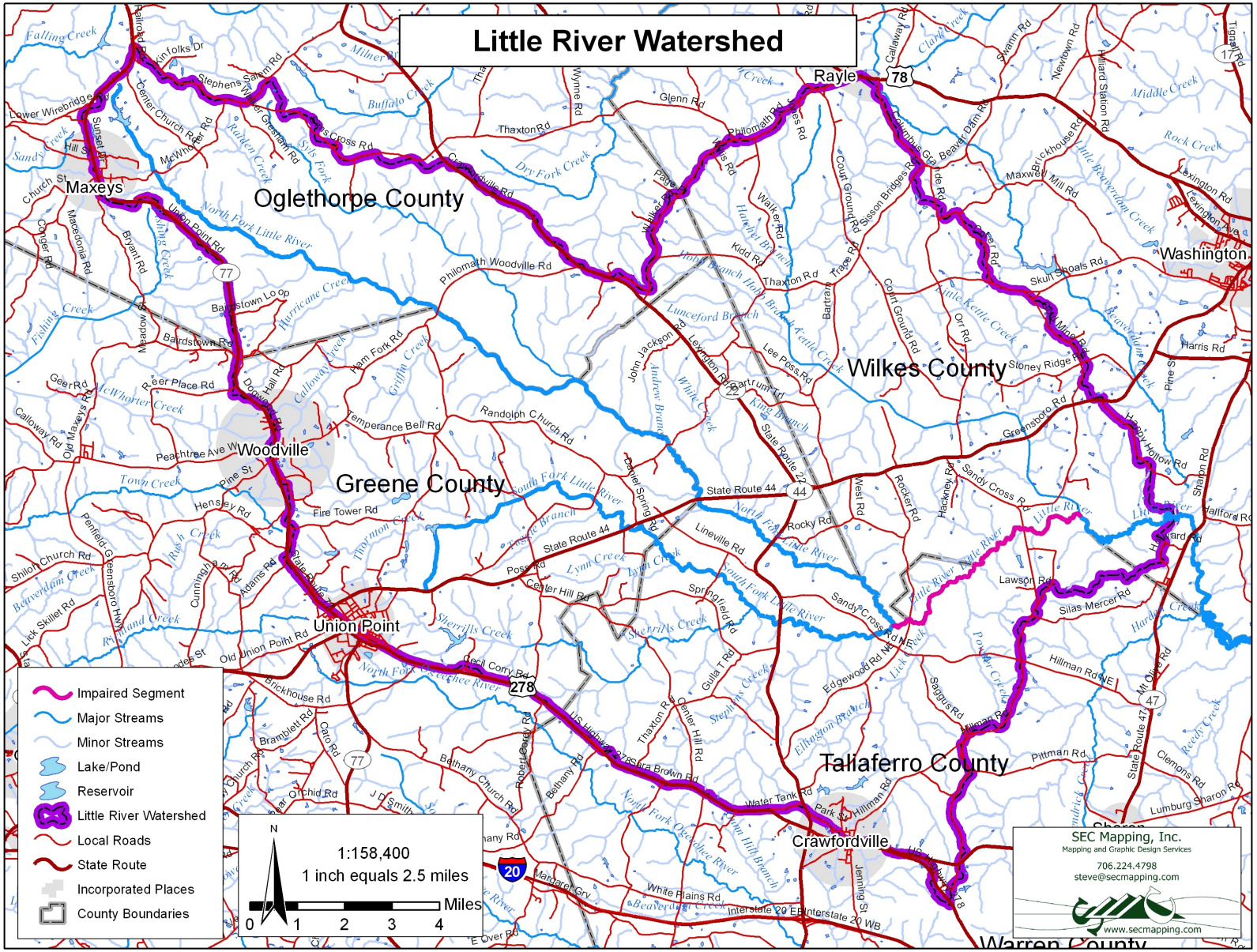
NRCS and SWCD will continue to assist agricultural producers with BMP installation through their respective agency programs. However, funding for other plan implementation activities is available only until 2015. After that, review of plan accomplishments and continued plan implementation will be dependent on available funding.

Abbreviations

BMP - Best Management Practices
CAFO – Confined Animal Feeding Operation
CMP – Conservation Management Plan
CNMP – Comprehensive Nutrient Management Plan
CSR RC&D – Central Savannah River Resource, Conservation, and Development Council
EQIP – Environmental Quality Incentives Program
GAEPD – Environmental Protection Division
GAWRD – Georgia Wildlife Resources Division
GSWCC – Georgia Soil and Water Conservation Commission
LAS – Land Application System
NMP – Nutrient Management Plan
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
SWCD – Soil and Water Conservation Commission
USEPA – U.S. Environmental Protection Agency

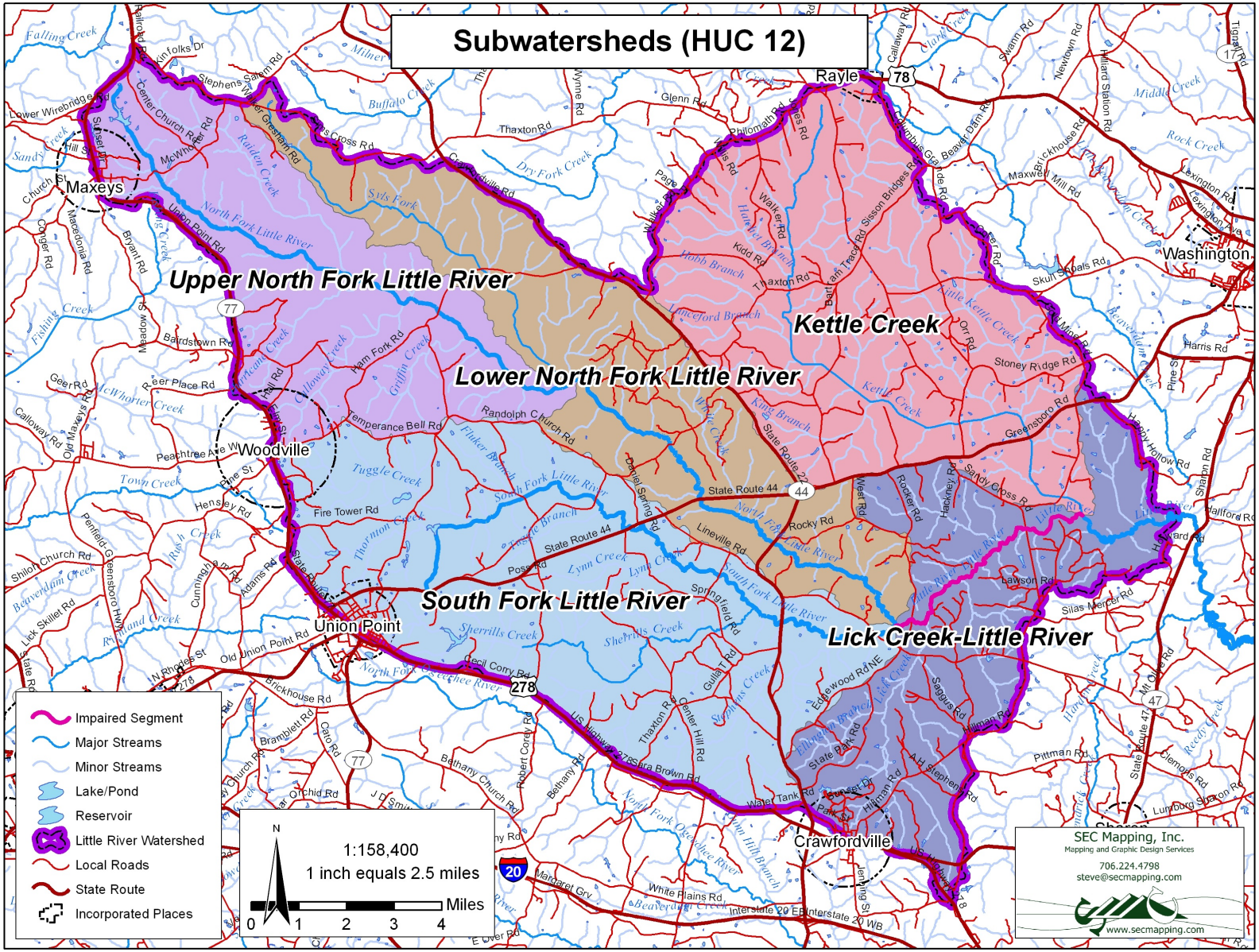
Maps

Map 1: Little River Watershed



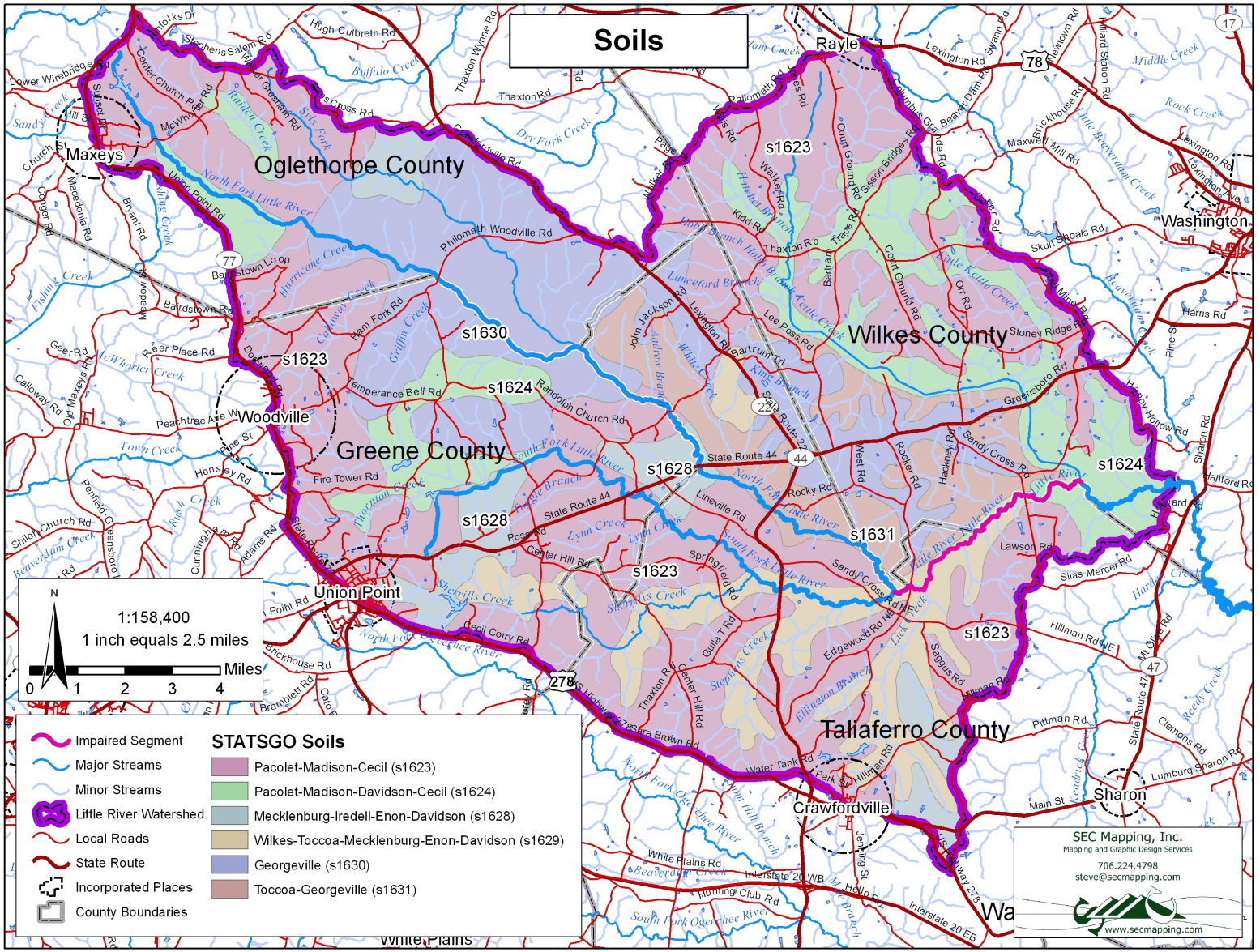
Source: Georgia Hydrologic Unit Boundaries, 8-, 10-, and 12-digit, US Geological Survey.

Map 2: Subwatersheds



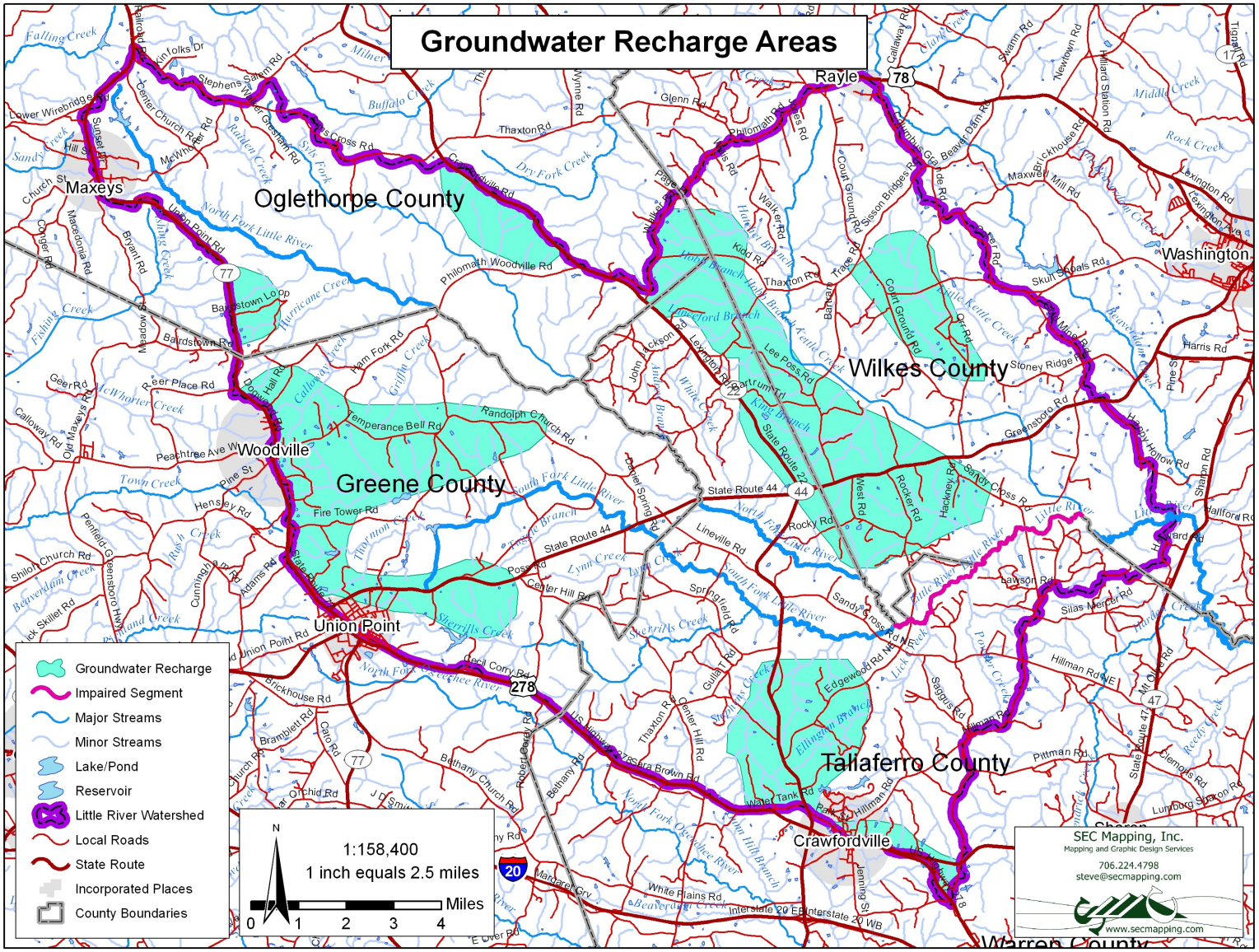
Source: Georgia Hydrologic Unit Boundaries, 8-, 10-, and 12-digit, US Geological Survey.

Map 3: Soils



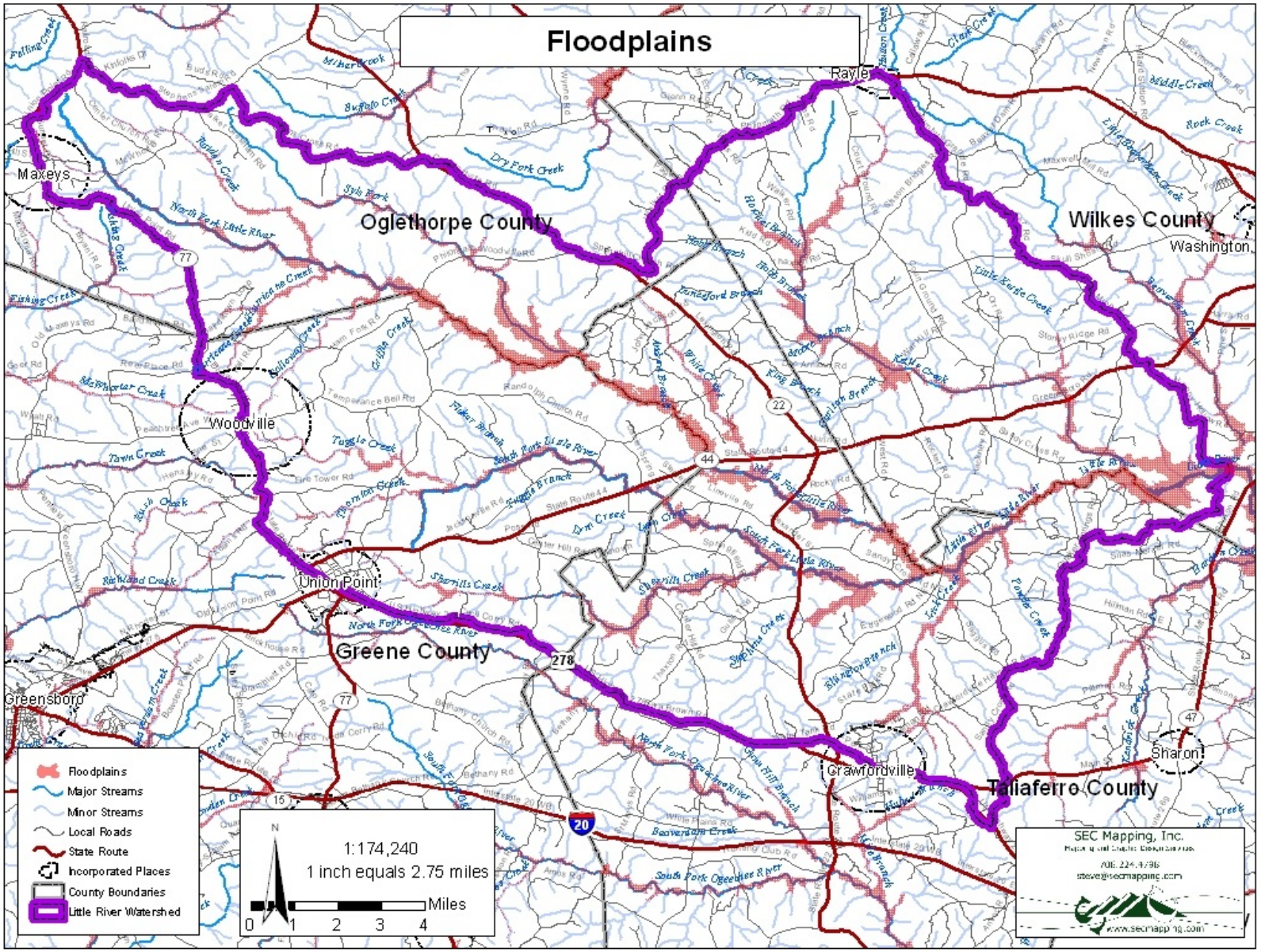
Source: STATSGO Database for CONUS, USEPA, 1998.

Map 4: Groundwater Recharge Areas



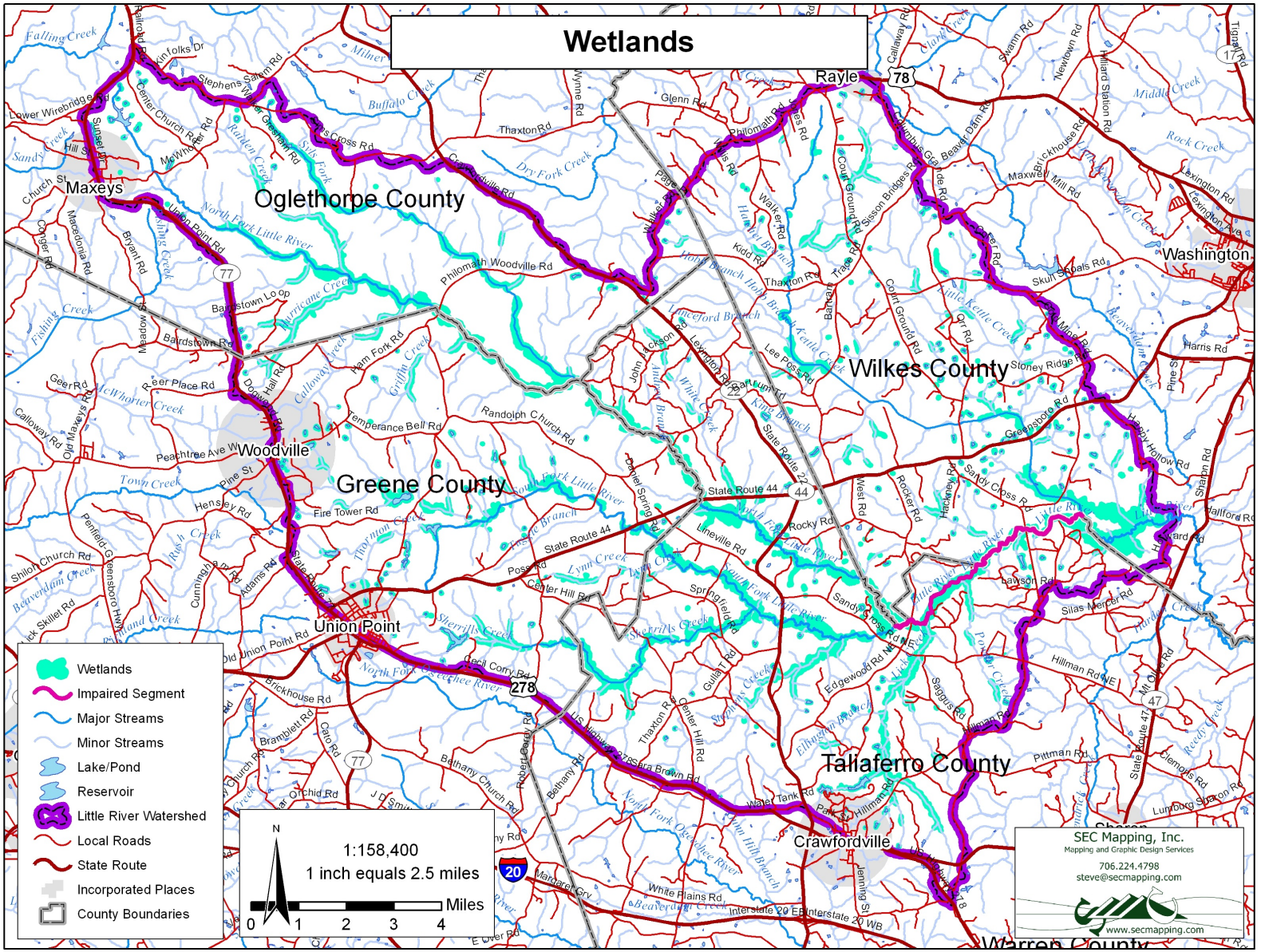
Source: Georgia Hydrologic Atlas 20.

Map 5: Floodplains



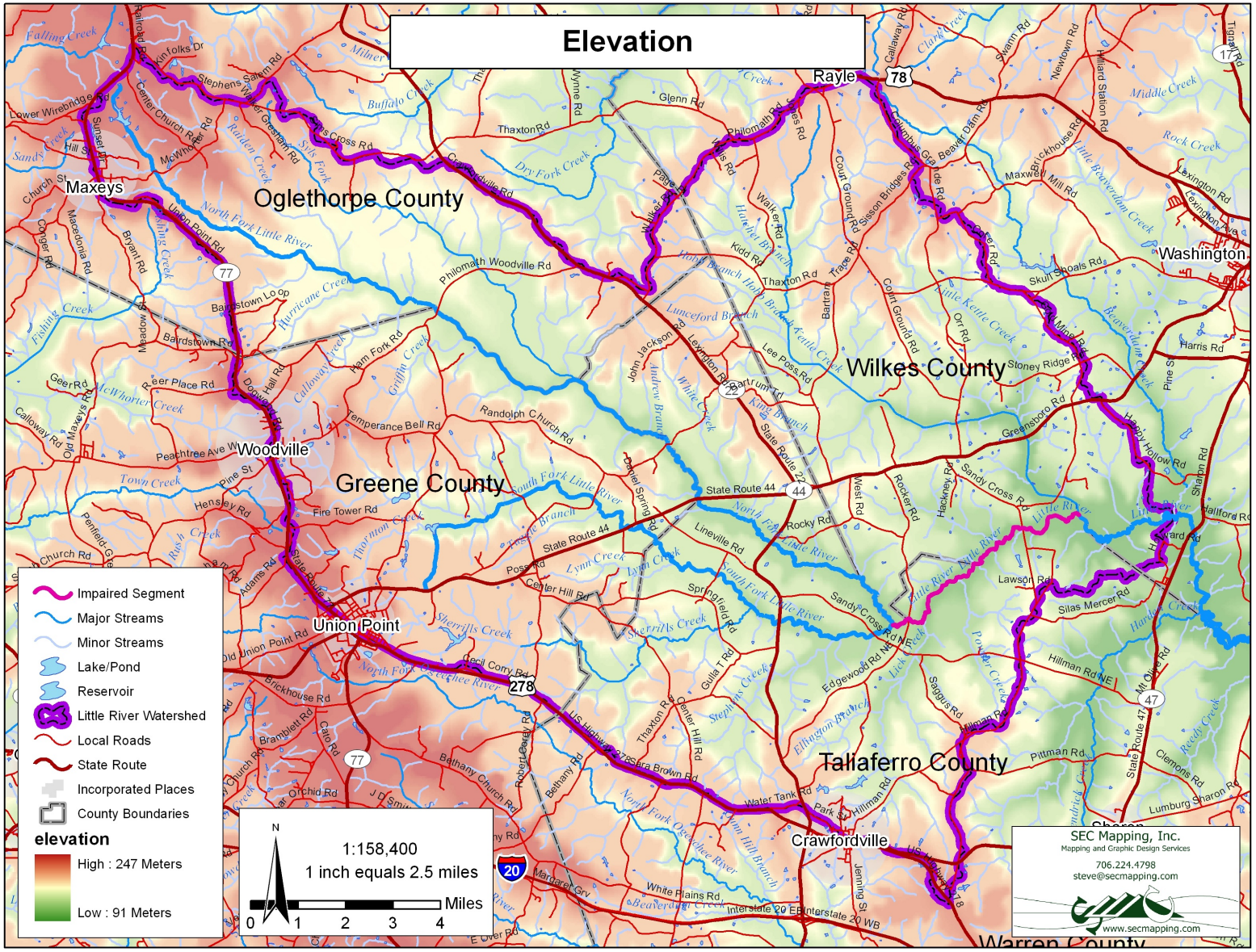
Source: FEMA

Map 6: Wetlands



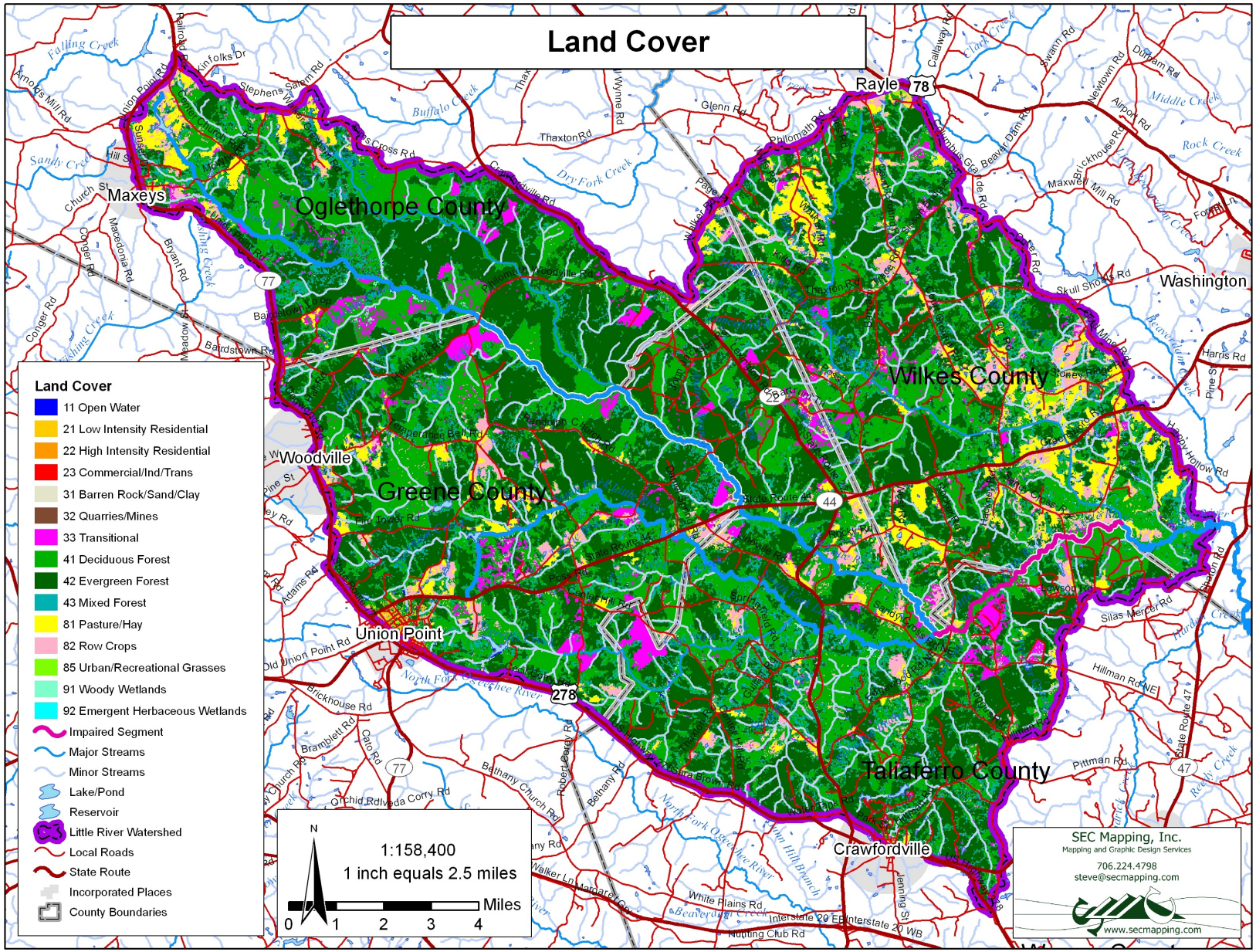
Source: National Wetlands Inventory

Map 7: Elevation



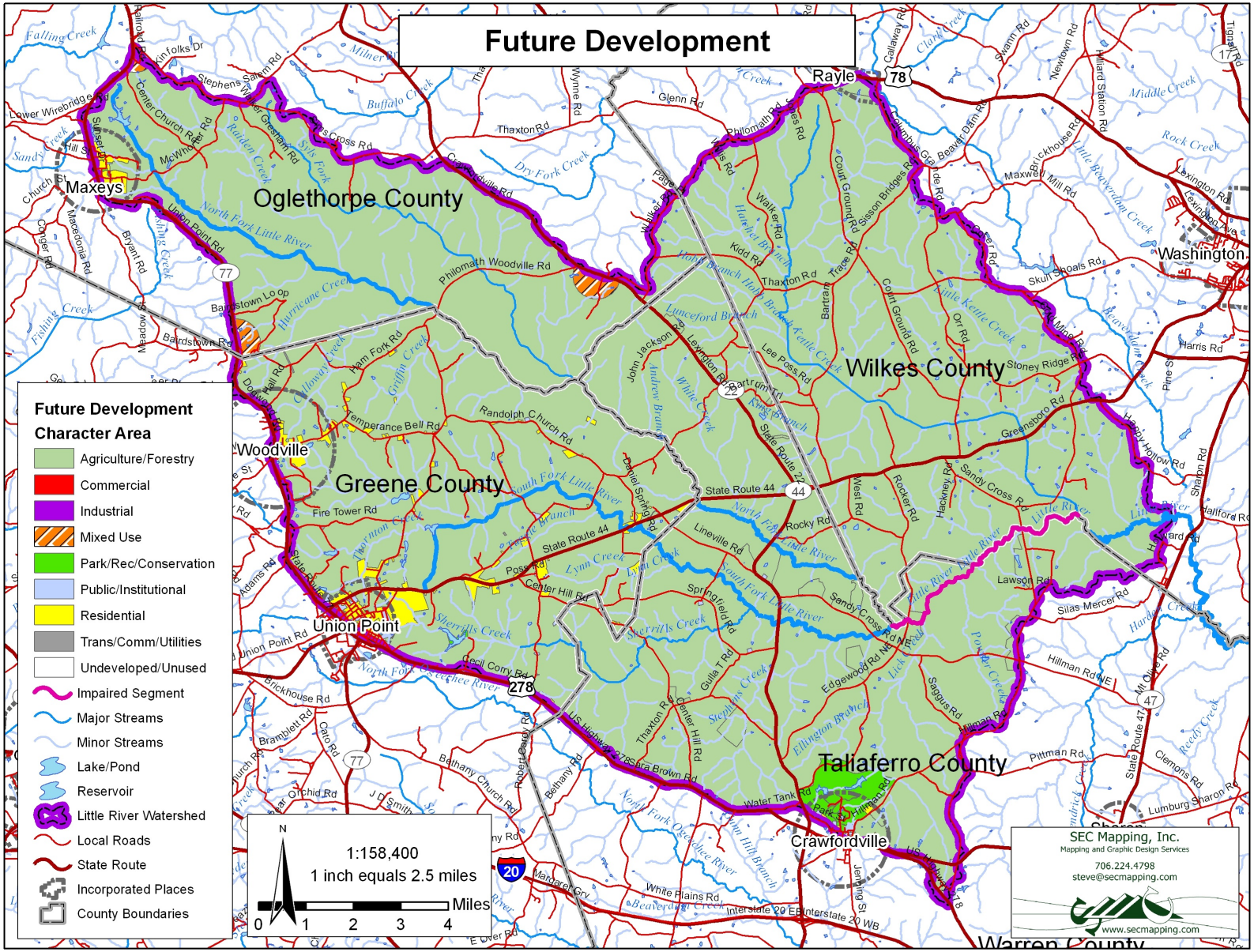
Source: Shuttle Radar Topography Mission, Jet Propulsion Laboratory, California Institute of Technology.

Map 8: Land Cover



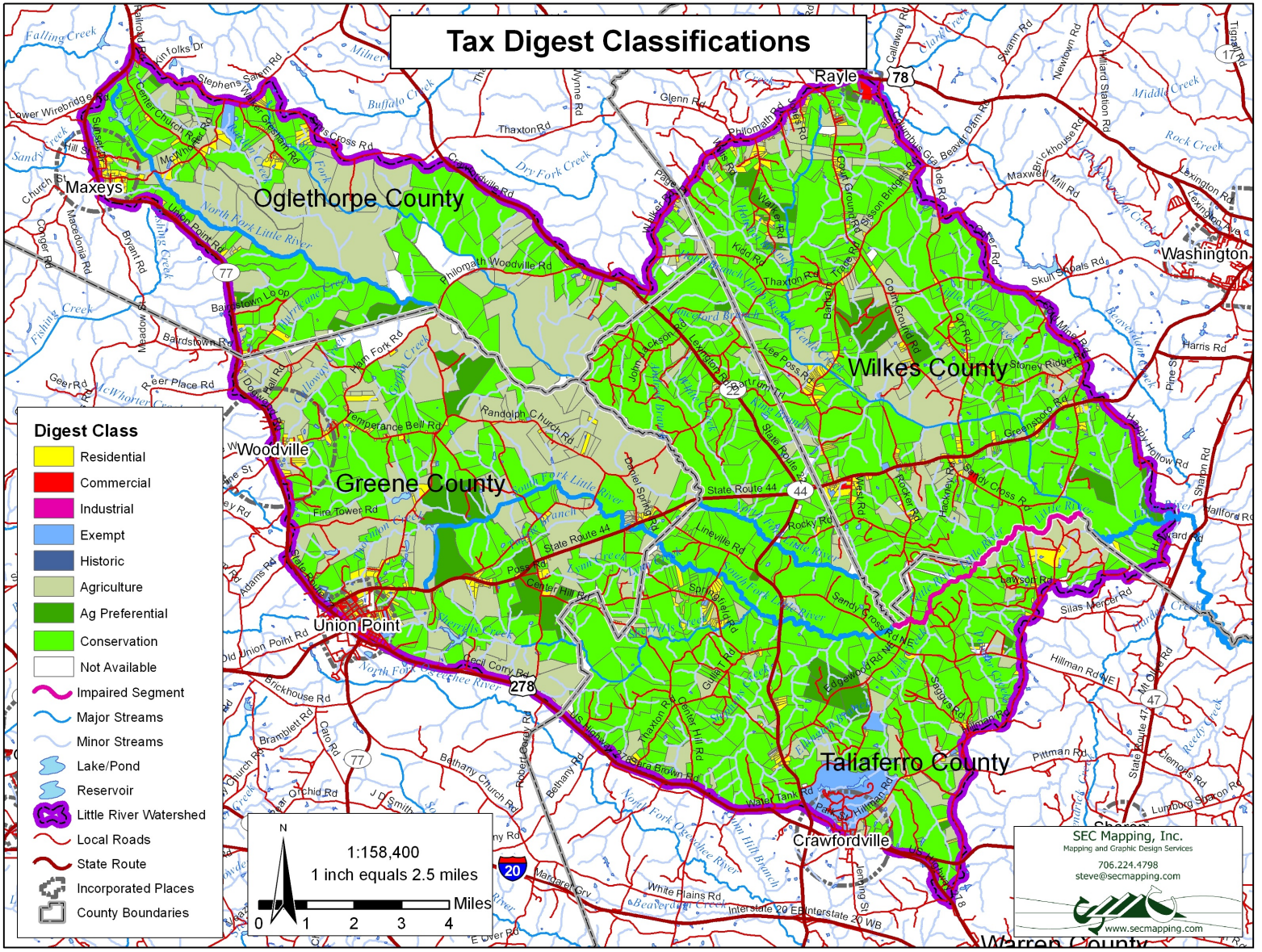
Source: USDA/NRCS - National Cartography & Geospatial Center, 1986 –1993.

Map 9: Future Development



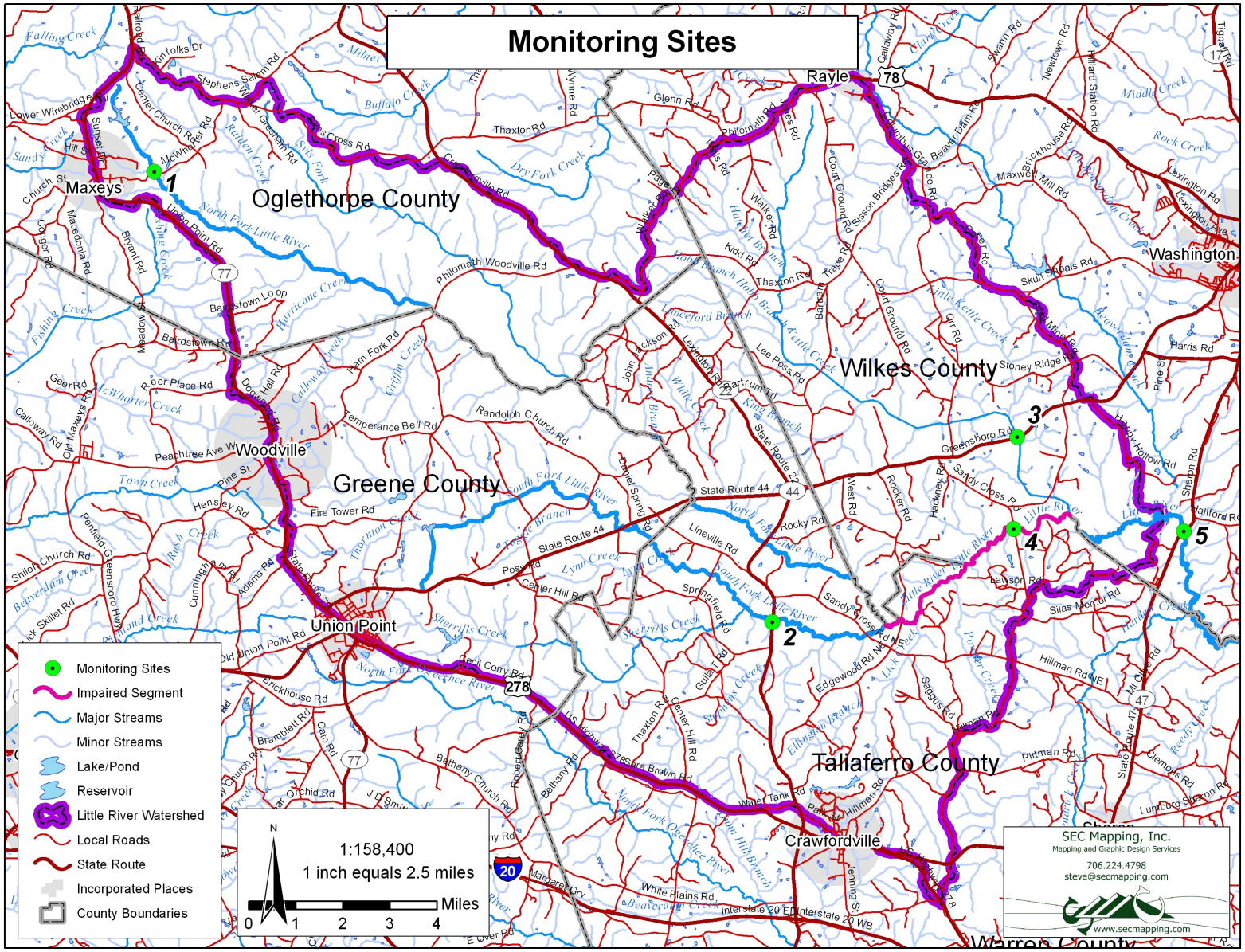
Source: Comprehensive Plans for Oglethorpe County, Greene County, Taliaferro County, and Wilkes County.

Map 10: Tax Digest Classification



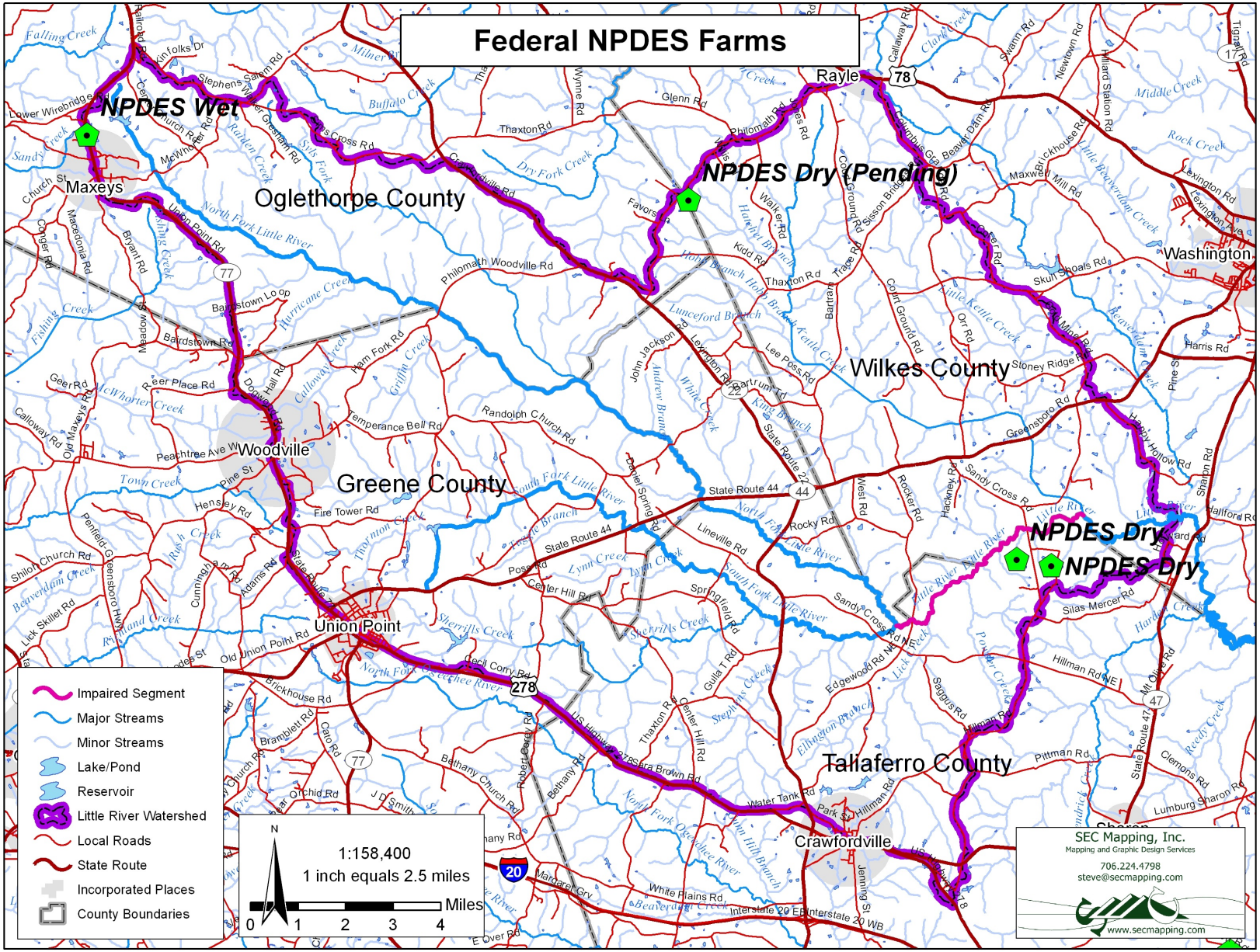
Source: Tax Digests for Oglethorpe County, Greene County, Taliaferro County, and Wilkes County.

Map 11: Monitoring Sites



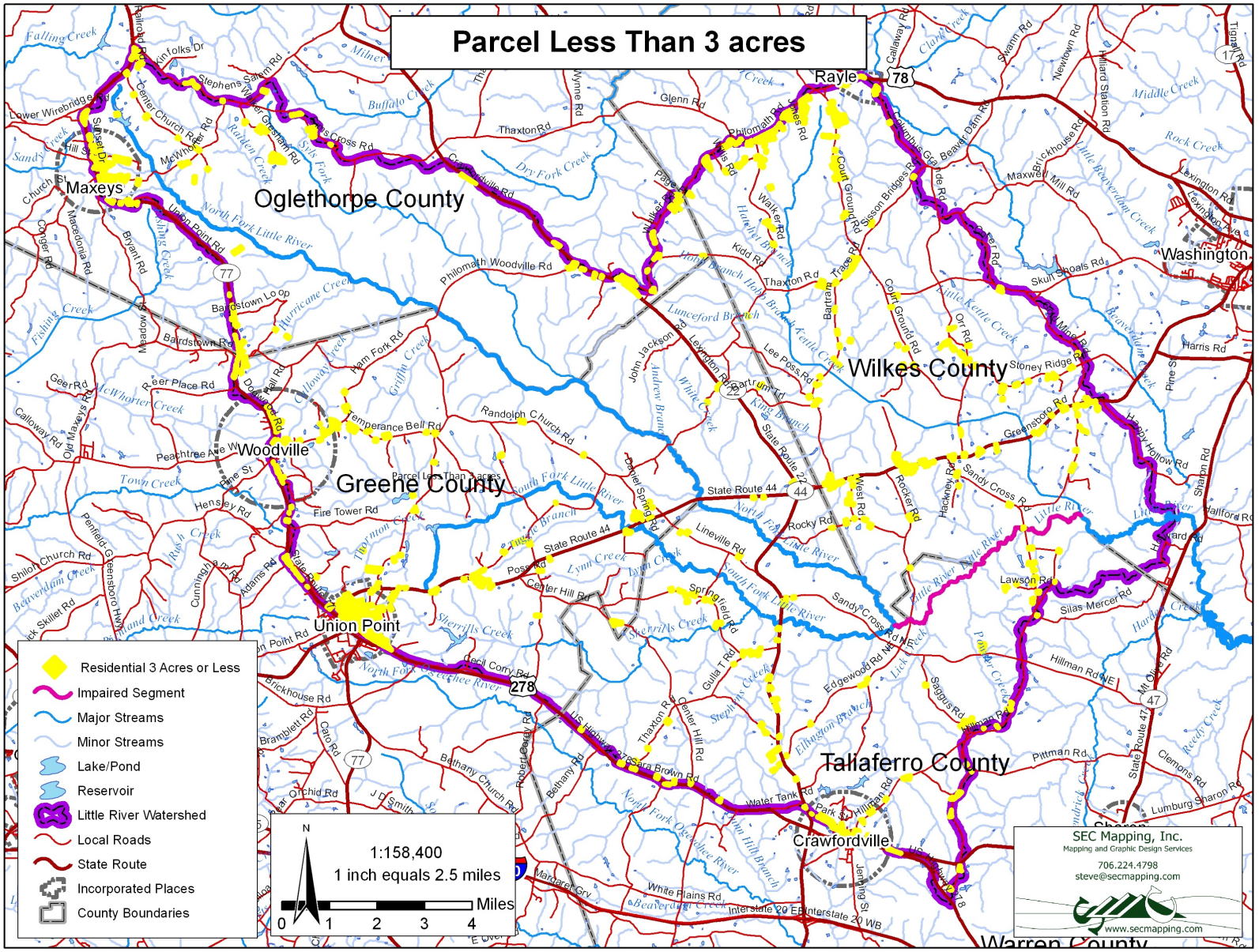
Source: Targeted/BMP Monitoring Plan for Little River, 2012.

Map 12: Federal NPDES Permitted Farms



Source: GAEPD, January 2013.

Map 13: Parcel Less Than 3 Acres



Source: Tax Digest for Oglethorpe County, Greene County, Taliaferro County, and Wilkes County.

Appendix

	Installed BMP Practice by Subwatershed (2003-2012)									
Best Management Practices	**Kettle Creek**	**Lick Creek**	**Lower N Fork**	**S Fork Little River**	**Upper N Fork**	**TOTAL**				
Access Control	0.00	0.00	0.00	3.80	0.00	3.80				
Comprehensive Nutrient Management Plan - Applied	3.00	2.00	0.00	0.00	2.00	7.00		*Non-Point Source Pollution Controls - Fecal Coliform		
Comprehensive Nutrient Management	4.00	2.00	0.00	0.00	0.00	6.00		**Fecal Coliform Control		
Composting Facility*	0.00	1.00	0.00	0.00	0.00	1.00				
Conservation Crop Rotation (ac)	0.00	0.00	0.00	0.00	119.60	119.60		Source: NRCS, 2013		
Conservation Completion Incentive First Year	0.00	0.00	0.00	1.00	0.00	1.00				
Contour Farming (ac)*	0.00	0.00	0.00	0.00	511.80	511.80				
Controlled Stream Access for Livestock Watering	0.00	0.00	0.00	2.00	0.00	2.00				
Cover Crop (ac)	0.00	39.00	113.00	169.10	22.60	343.70				
Critical Area Planting (ac)*	0.00	0.00	0.00	1.30	0.00	1.30				
Fencing (ft)*	1290.00	159.00	2496.00	13642.10	0.00	17587.10				
Forage and Biomass Planting (ac)	41.10	15.00	106.00	57.90	22.60	242.60				
Forage Harvest Management (ac)	141.90	108.20	60.60	68.70	30.70	410.10				
Forest and Trails Management (ft)	11.00	0.00	0.00	0.00	0.00	11.00				
Forest Stand Improvement (ac)	150.00	0.00	0.00	0.00	0.00	150.00				
Heavy Use Protection Area (ft)	0.00	1.50	0.40	1.10	0.00	3.00				
Integrated Pest Management (IPM)	1060.50	361.50	24.00	242.60	453.10	2141.70				
Livestock Pipeline (ft)*	0.00	1027.00	4580.00	2883.00	0.00	8490.00				
Nutrient Management (ac)*	526.90	223.20	0.00	205.30	152.60	1108.00				
Prescribed Burning (ac)	363.20	0.00	236.90	0.00	0.00	600.10				
Prescribed Grazing (ac)	223.10	243.40	0.00	326.60	248.40	1041.50				
Pumping Plant	0.00	0.00	0.00	1.00	0.00	1.00				
Residue Management, Mulch Till (ac)	0.00	0.00	0.00	0.00	119.60	119.60				
Residue Management, Seasonal (ac)	0.00	0.00	0.00	0.00	119.60	119.60				
Roof Runoff Structure	0.00	2.00	0.00	0.00	0.00	2.00				
Stream Crossing*	0.00	0.00	0.00	1.00	0.00	1.00				
Underground Outlet (ft)	0.00	1.00	0.00	0.00	0.00	1.00				
Upland Wildlife Habitat Management (ac)	280.50	0.00	290.00	0.00	5.60	576.10				
Waste Recycling (ac)	570.90	446.40	0.00	0.00	0.00	1017.30				
Waste Storage**	2.00	0.00	0.00	0.00	0.00	2.00				
Watering Facility	0.00	4.00	6.00	13.00	0.00	23.00				
Water Well*	0.00	0.00	0.00	4.00	0.00	4.00				

Little River Watershed Advisory Committee								
First Name	Last Name	County/City	Position/Organization	Contribution				
				Plan Implementation	Affected by Plan Implementation	Provide information for Plan	Provide Info on Existing Programs and Plan	Provide Technical and/or Financial Assistance
Robert	Amos		GSWCC	√			√	√
Ed	Bettross		GA DNR			√	√	
Phillip	Brock	Woodville	Mayor			√		
Kyle	Brown		Farm Service Agency			√		
Philip	Brown		NRCS – Wilkes Co	√	√			√
Jon O.	Cabaniss	Oglethorpe Co	Landowner		√	√		
Eugene	Callaway	Wilkes Co	Landowner		√	√		
Lee	Divenski		Taliaferro County			√		
Carroll & Melvin	Durham	Greene Co	Landowner		√	√		
Andrew	Dyar		GSWCC		√		√	√
Joe	Hardy	Wilkes Co	Landowner		√	√		
Patrick	Hardy		Piedmont SWCD			√	√	
Josh	Hawkins		Oglethorpe County Planning			√		
Hazel	Langrall		Central Savannah River Land Trust			√		
Christian	Lentz		Central Savannah Regional Commission			√		
Byron	Lombard	Greene Co	County Manager			√		
Tommy	Macfie	Taliaferro Co	Landowner		√	√		
Keegan	Malone		GSWCC	√	√	√	√	√
J.H.	Milner	Crawfordville	Mayor			√		
Terrance	O'Neal		NRCS - Greene Co	√	√		√	√
Scotty	Palmer		NRCS	√	√		√	√
Lanier	Rhodes	Union Point	Mayor			√		
Rory	Richardson		NRCS	√	√		√	√
Joe	Riley		Central Savannah RC&D	√		√		√
H	Sharpe		Georgia Forestry Commission			√	√	
John	Stephens	Maxeys	Former Mayor			√		
Steffney	Thompson		Oconee River Land Trust			√		
David	Tyler	Wilkes Co	Co Admn			√		
David	Van Hart		Wilkes County Cattlemans Assoc.		√	√		
Bobby	Walker	Wilkes Co	Landowner		√	√		
Charles	Ware	Taliaferro Co	Chairman			√		
Frank	Watson	Wilkes Co	Wilkes County Extension Coordinator	√	√	√	√	√
Herman	Wheatley		Broad River SWCD	√	√	√	√	√
William	Winkle	Maxeys	Mayor			√		

Land Management Ordinances		
Regulation/Ordinance	**Responsbile Entity**	**Description**
Zoning Ordinance	Crawfordville	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Crawfordville.
Wellhead Protection Plan and Ordinance	Crawfordville	Defines wellhead protection area and measures to protect drinking water source.
Zoning Ordinance	Greene County	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Greene County.
Soil Erosion, Sedimentation, and Pollution Control Ordinance	Greene County	Establishes minimum requirements effecting land-disturbing activities.
Flood Damage Prevention	Greene County	Established minimum standards for new construction in flood hazard areas to reduce damage from flooding.
Aquifer Recharge Protection	Greene County	Establishes minimum standards for certain land uses to minimize aquifer recharge contamination.
Wetlands Protection	Greene County	Establishes minimum standards for certain activities to protect wetlands.
Rules and Regulations for On-Site Sewage Management Systems	Greene County	Permits county enforcement of regulation for on-site sewage management systems.
Zoning Ordinance	Maxeys	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Oglethorpe County.
Road Ordinance	Maxeys	Requires paving of subdivision roads, established road construction standards, requires grassing of rights-of-way.
Soil Erosion and Sedimentation Control	Maxeys	Establishes minimum requirements effecting land-disturbing activities.
Zoning Ordinance	Oglethorpe County	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Oglethorpe County.
Road Ordinance	Oglethorpe County	Requires paving of subdivision roads, established road construction standards, requires grassing of rights-of-way.
Hauling and Logging Operations Ordinance	Oglethorpe County	Requires permit, establishes standards for logging and hauling operations.
Soil Erosion and Sedimentation Control	Oglethorpe County	Establishes minimum requirements effecting land-disturbing activities.
Flood Damage Prevention	Oglethorpe County	Established minimum standards for new construction in flood hazard areas to reduce damage from flooding.
Aquifer Recharge Protection	Oglethorpe County	Establishes minimum standards for certain land uses to minimize aquifer recharge contamination.
Wetlands Protection	Oglethorpe County	Establishes minimum standards for certain activities to protect wetlands.
Rules and Regulations for On-Site Sewage Management Systems	Oglethorpe County	Permits county enforcement of regulation for on-site sewage management systems.
Zoning Ordinance	Taliaferro County	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Taliaferro County.
Rules and Regulations for On-Site Sewage Management Systems	Taliaferro County	Permits county enforcement of regulation for on-site sewage management systems.
Zoning Ordinance	Union Point	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Union Point.

Soil Erosion, Sedimentation, and Pollution Control Ordinance	Union Point	Establishes minimum requirements effecting land-disturbing activities.
Aquifer Recharge Protection	Union Point	Establishes minimum standards for certain land uses to minimize aquifer recharge contamination.
Wetlands Protection	Union Point	Establishes minimum standards for certain activities to protect wetlands.
Tree Ordinance	Union Point	Establishes city's power and authority over all trees within street rights-of way, parks and public places of the city and identified trees on private property
Sherrill's Creek Watershed Protection Ordinance	Union Point	Protects the quality and quantity of the present and future water supply of the city.
Development Code	Wilkes County	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Wilkes County though ordinance is reported to need updating.
Rules and Regulations for On-Site Sewage Management Systems	Wilkes County	Permits county enforcement of regulation for on-site sewage management systems.
Aquifer Recharge Protection	Wilkes County	Establishes minimum standards for certain land uses to minimize aquifer recharge contamination.
Wetlands Protection	Wilkes County	Establishes minimum standards for certain activities to protect wetlands.
Soil Erosion and Sedimentation Control	Wilkes County	Establishes minimum requirements effecting land-disturbing activities.
Zoning Ordinance	Woodville	Establishes standards and permissible uses designed to, in part, conserve and protect the natural, economic and scenic resources of Woodville.
Soil Erosion, Sedimentation, and Pollution Control Ordinance	Woodville	Establishes minimum requirements effecting land-disturbing activities.
Aquifer Recharge Protection	Woodville	Establishes minimum standards for certain land uses to minimize aquifer recharge contamination.
Wetlands Protection	Woodville	Establishes minimum standards for certain activities to protect wetlands.

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Little River Watershed
Visual Survey

November 30, 2012

The purpose of a visual survey is to determine if there are observable problems on the stream and to characterize the environment the river flows through. The visual survey helps pinpoint areas that may be the source of water quality impairments and determine the overall condition of the stream.

A visual survey of the watershed was conducted on November 30, 2012. Photographs and detailed surveys were taken at selected road crossings along the North and South Fork Little River as well as the impaired segment of the Little River. Additionally, a visual survey was made of select tributaries at road crossings to establish the condition of the tributaries.

The North and South Fork Little River and their tributaries flow predominantly through forested and agricultural areas; however, a greater number of stream miles of the tributaries in Wilkes County flow through agricultural land uses. Because of the continuing drought, stream depth is shallow and flow is moderate in the upper watershed. The upper reaches of the watershed generally evidenced clear water with the exception of the area immediately downstream of the dairy in Maxeys. As the stream flowed south, stream velocity decreased until little to no flow was detectable. Along the middle reach of the watershed, in the vicinity of State Route 44, the water became cloudy with occasional areas of sheen and stream flow was barely visible. At the confluence of the North and South forks, the stream bed was largely dry but, where there was water, it was pooled and very cloudy to muddy.

Throughout the watershed, most of the stream channels are shady with occasional open areas adjacent to bridge crossings. Generally, vegetative buffers adjacent to the stream meet state standards, 25', and in most cases are much wider. Where tree buffers are narrow, they are generally adjacent to pasture land.

Streambank erosion is a problem throughout the watershed both on tributaries and the main stems. While there are areas with gently sloping stream banks, the majority of stream banks are steep to vertical, generally 3' - 5', void of vegetation, and tree roots are exposed. Some banks evidence undercutting.

Most segments surveyed contained leaves and some contained fallen limbs and tree trunks. Trash was only found in one stream segment, North Fork Little River at Ham Fork Road. A beaver dam was found on the downstream side of the bridge at Highway 44 and North Fork Little River. Likely, there are other beaver dams in the watershed as beaver are reported to exist in the watershed.

The following pages contain detailed descriptions and photos of each point surveyed as well as drawings of each surveyed area.

Tributary to N. Fork Little River and McWhorter Road

Dirt road crossing. Spring fed stream on North side of road. Culvert under McWhorter Road. Upstream side evidenced a very narrow, no more than 1', stream channel with very little stream flow. Area was flat with small boggy depressions. Upstream side was somewhat open with grasses and scrub next to stream bed and trees beyond the scrub. Downstream side was in total shade and had a pool at base of culvert and water was brownish/green in color with a sheen on surface of pool. Stream bottom was sandy. There were leaves in the stream. Eroded banks on downstream side 2' - 3' in height with exposed soil. The was no odor.

Downstream View

A property owner on the downstream side indicated that his well, in addition to his in-laws which lived next door, produced water with a bad taste. They had bored and drilled wells. The property owner's drilled well was 600' deep. Property owner noted that people were dumping trash into the area tributaries on a fairly regular basis but he tried to periodically remove the trash. He had never noticed the "film" on the water until this year. He also noted a possible beaver dam on the tributary fed by the spring. Property owner was very concerned about activities at the dairy and their impact on water quality.

N. Fork Little River and McWhorter Road

Dirt road crossing. Good flow but shallow, no more than ~2" - 3"depth. Wide stream channel but very narrow stream bed. Water was clear with no odor. Stream bottom was very sandy. Stream banks were 4' - 5' high and heavily eroded with undercuts on both the upstream and downstream sides. There were leaves and fallen tree limbs in the stream. The stream channel under the road was serviced by two large culverts.

Upstream View

Area property owner indicates that about 10 years ago the road flooded and was closed and the culvert had to be replaced with larger culverts.

Downstream View

N. Fork Little River at Ham Fork Road

Dirt Road with concrete bridge crossing with Jersey barriers on side of bridge. Bridge was covered with graffiti. Very shallow, ~2", and very slow flow but clear. There was no odor. Upstream stream channel was wide, ~12' but stream bed was narrow, ~1'-4'. Channel contained large sand bars. Trash in stream, primarily liquor bottles. Upstream side was more open with tall scrub adjacent to the stream channel and trees beyond the scrub. Downstream side had leaves in the water and west side bank was gently sloping but severely eroded. East side downstream bank was steep and severally eroded. Downstream side shady with overhanging trees.

About 8 vultures were at the site.

Upstream View

Downstream View

Highway 44 and South Fork Little River

Concrete bridge crossing on paved road. Shallow water, clear with slow flow upstream and cloudy flow downstream. No odor was present. Bottom appeared to be mucky. Upstream side the stream channel was wide, ~12', but the stream bed was narrow, ~2' - 3' wide. The west bank of the upstream side was very gently sloping and the east side was steeply sloping with periodic undercuts. Both banks were grassed. There were trees beyond the east and west banks. The downstream side had an impoundment formed by a beaver dam ~10' from the bridge edge. The pool formed by the impoundment was greenish in color and stagnant with a sheen on the surface. The area adjacent to the impoundment was open and grassed. Beyond the impoundment, the was a hog wire fence segment that crossed the stream with some tree debris caught next to the fence. There was a narrow tree buffer on both banks with pasture beyond. Banks were gently sloping and well vegetated.

Upstream View

Downstream View

Highway 44 and North Fork Little River

Concrete bridge crossing on paved road. Extremely slow flow. Wide, muddy stream channel with muddy bars, as opposed to sand bars, with animal tracks. Water was muddy. No odor was present. Upstream, the stream was narrow, no more than 2', with trash and tree debris. The stream, due to the low flow, had split into two streams with mud bar in the center of the stream. Riprap was on both banks of the upstream side of the bridge. The area of the riprap was open but wood scrub/shrub was growing in the area just above the riprap. Banks were more gently sloping, vegetated, and demonstrated little erosion. Downstream, the stream was initially wider but quickly narrowed as mud banks were showing on each side of the stream. The banks were gently sloping on the east streamside and steeper, `2' - 3', and eroded on the west streamside. Downstream banks near the bridge were steeper probably a result of the bridge construction in 2004.

Upstream View

Downstream View

Highway 22 and North Fork Little River

Concrete bridge crossing on paved road. Upstream stream channel is ~15' - 20' wide with extremely slow flow. The stream bed was narrow ~1' - 2' and in some segments, there was no flow or just areas of standing pools. Where there was water, it was cloudy with scattered sheen. No odor was present. Stream banks are steep and severely eroded. Downstream, the stream channel was straight and the steam filled its channel though it is unclear as to the stream's depth as the water was green and cloudy and there was a sheen on the water. Both up and downstream had leaves in the water and the downstream also had tree limbs in the water. Banks both up and downstream were periodically eroded.

Upstream View

Downstream View

Rocker Road at Little River

Narrow dirt road with single lane wood bridge. Water was cloudy but no odor was present. Banks steep, greater than 5' and eroded and undercut. Wide stream channel but stream bed was narrow in part with sand bars and wider in other part. Difficult to ascertain depth due to cloudiness of water but likely the depth is shallow. Both up and down stream immediately adjacent to and underneath the wooden bridge, the stream bed was comprised of rocks that sloped up to a central point underneath the bridge. Likely, this is man made as none of the rest of the stream channel evidenced similar rocks. Upstream, woods were adjacent to the stream channel. Downstream, a narrow strip of trees was adjacent to the channel with pastures beyond. On the downstream side of the bridge, there was a swimming hole as evidenced by a wooden platform and ladder extending into the river.

Upstream View

Downstream View

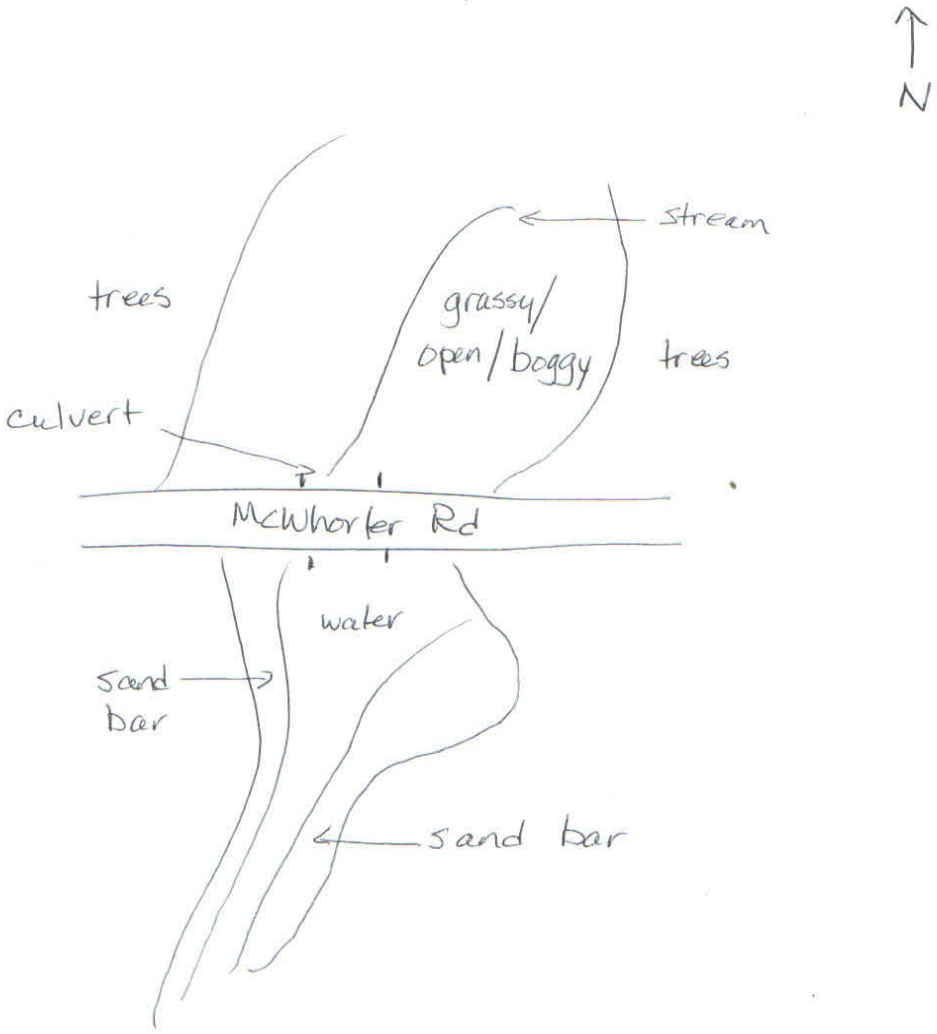
Sandy Cross Road and Little River

Concrete bridge crossing on paved road. Upstream stream channel is ~ 20 - 25'' wide with no discernable flow. There were unconnected pools of stagnant water. Water was cloudy and greenish/brown in color. No odor was present. Stream banks are gently sloping and covered with leaves but no apparent vegetation. Upstream, there is a wide floodplain on the east side of the stream channel. Downstream, the channel is narrowed with eroded banks ~3' in height. Vegetation was more dense on the downstream segment.

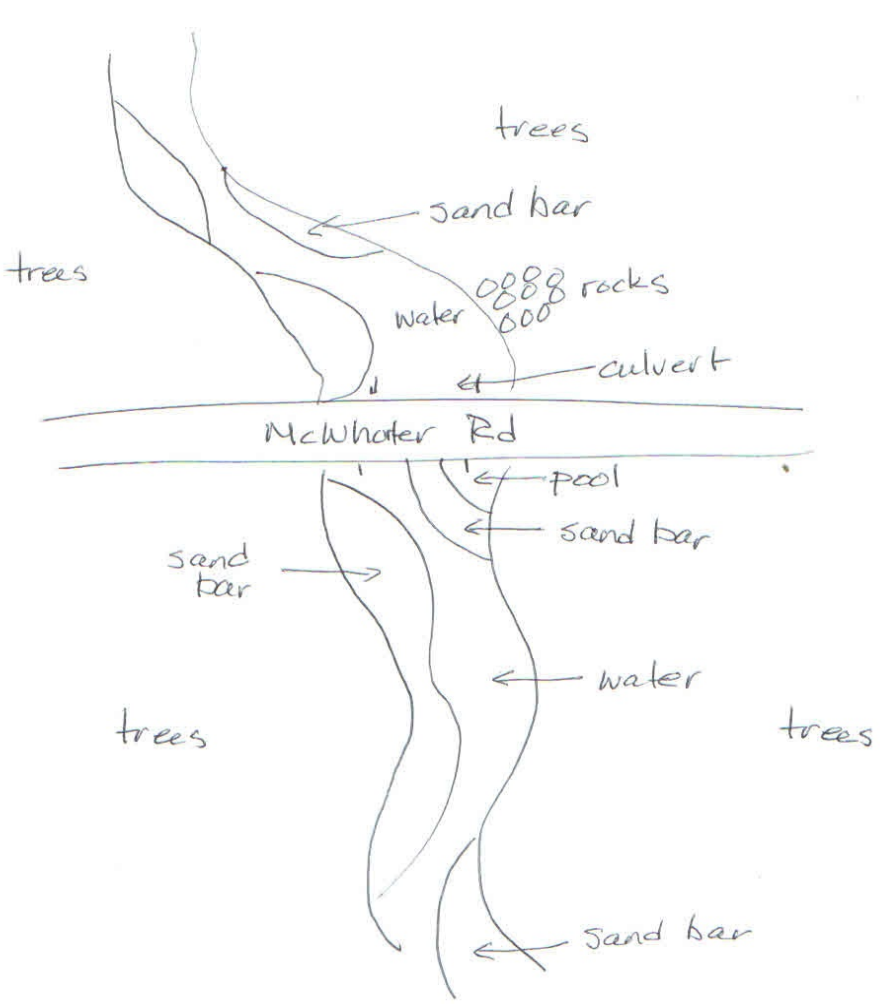
Upstream View

Downstream View

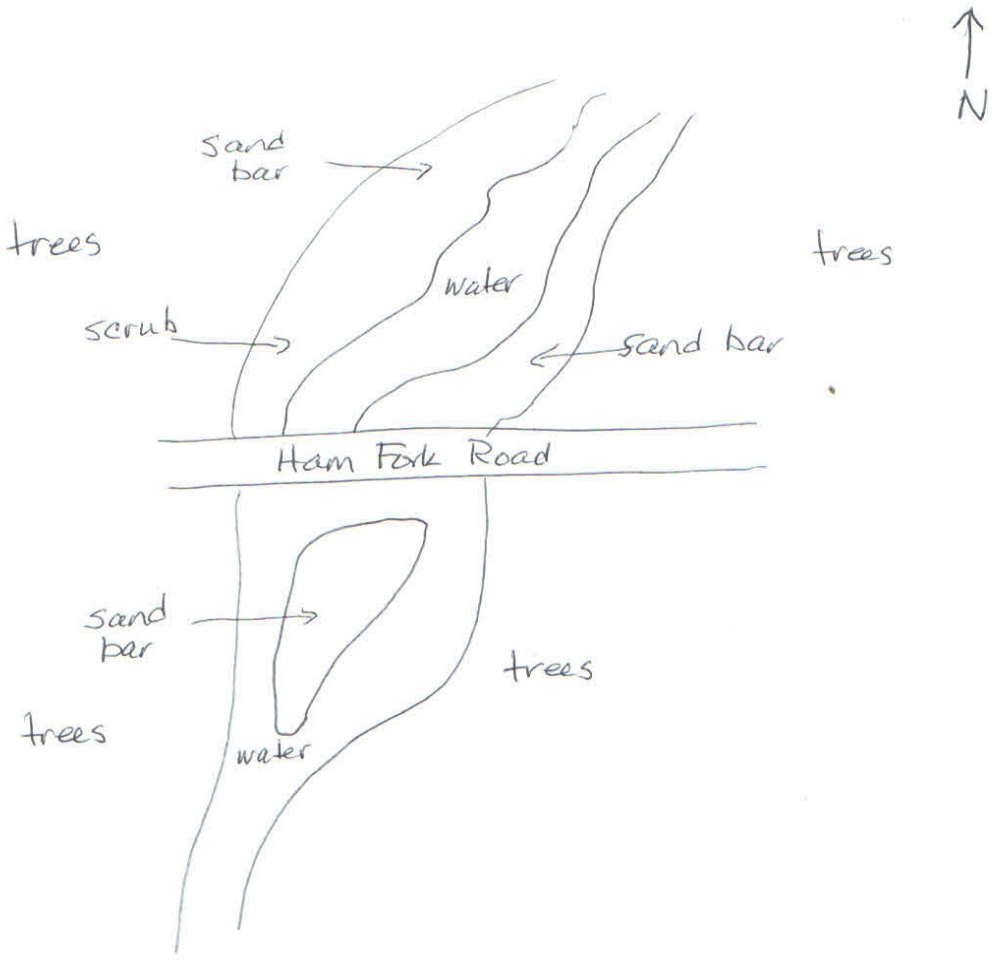
McWhorter Rd & tributary to N. Fork



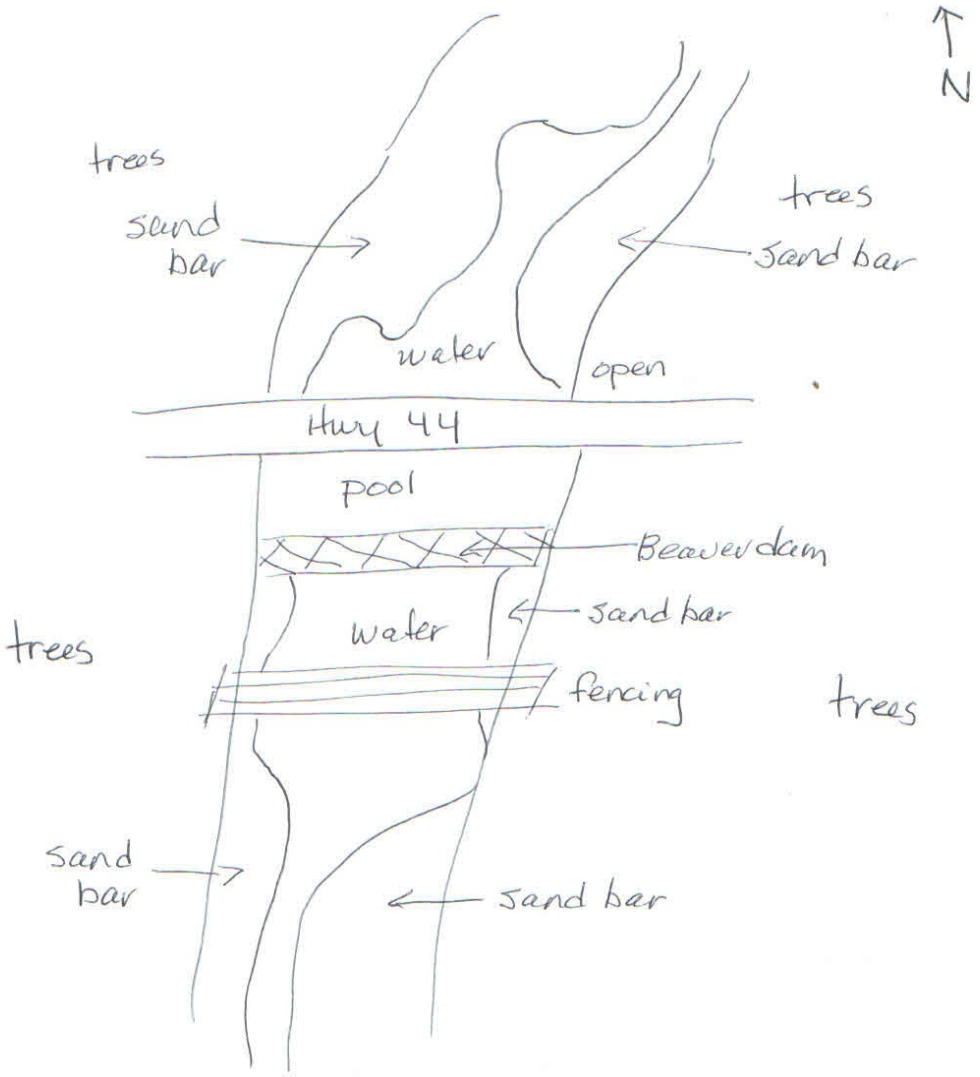
Mc Whorter Rd & N. Fork

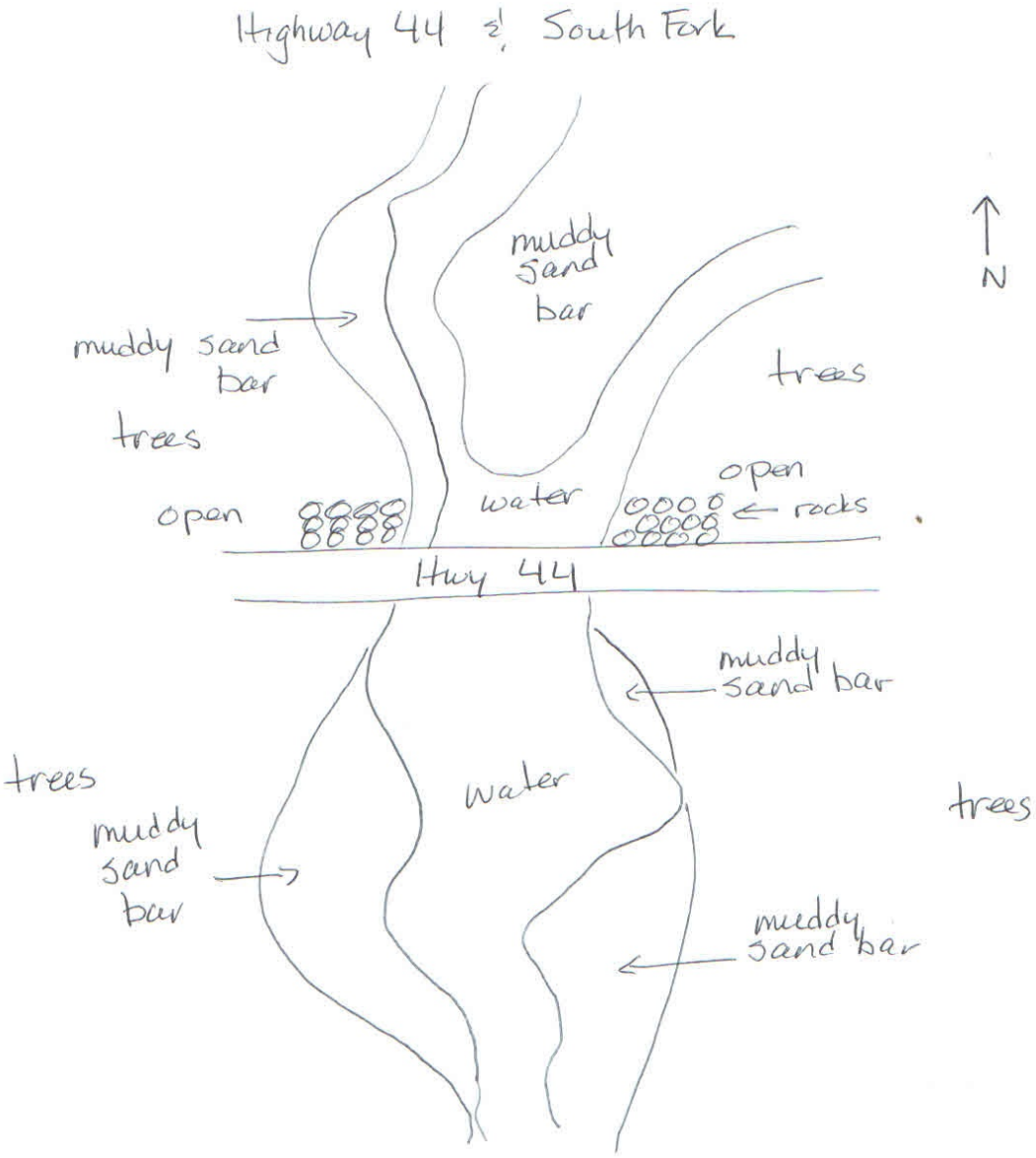


Ham Fork Rd & N. Fork

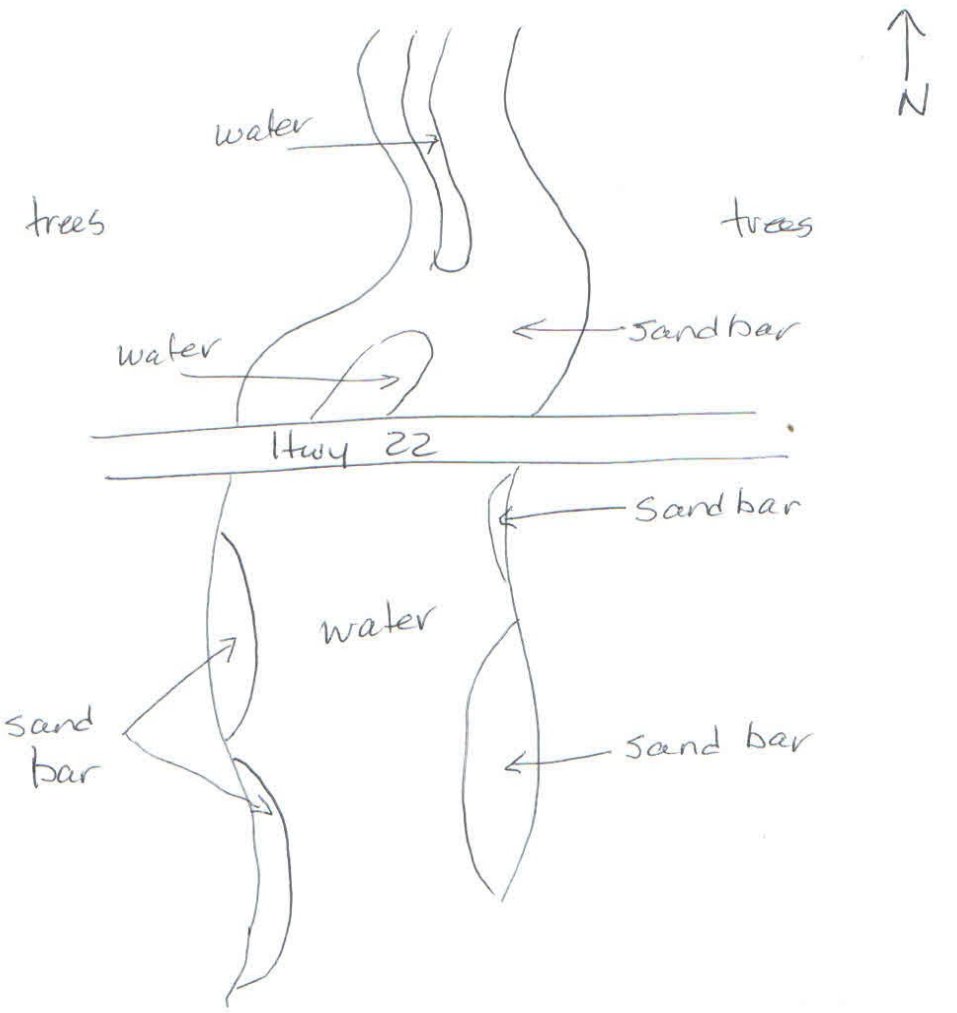


Highway 44 & South Fork

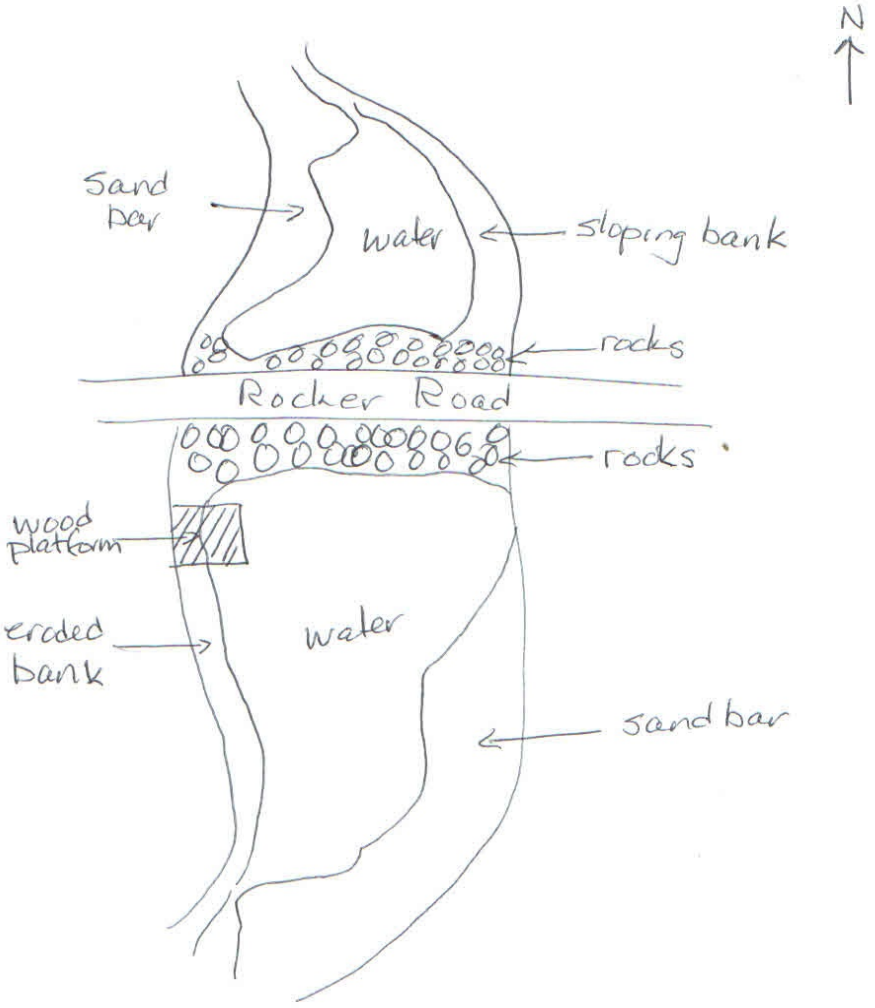


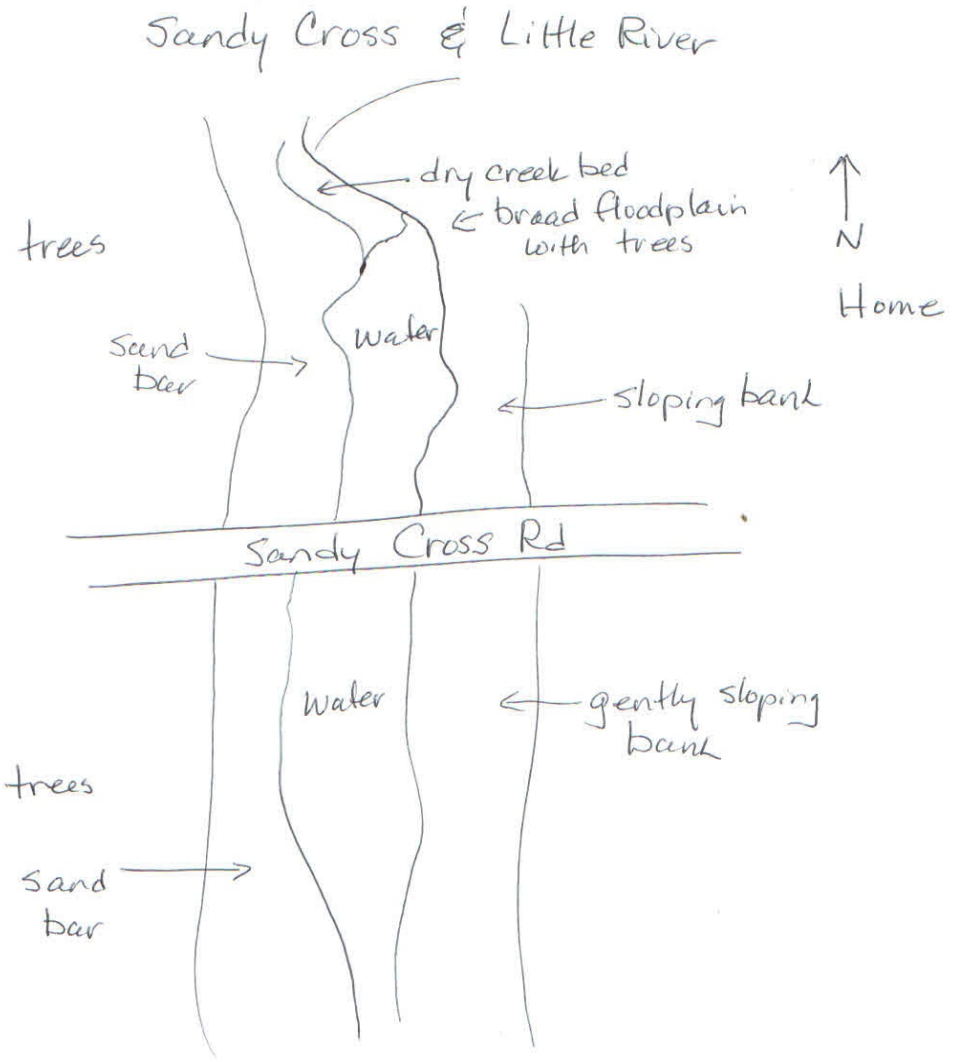

Highway 44 & South Fork
muddy sand bar
muddy sand bar
trees
trees
open
water
open
rocks
N
Hwy 44
muddy sand bar
trees
water
trees
muddy sand bar
muddy sand bar

Highway 22 & North Fork



Rocker Road & Little River




Sandy Cross & Little River
dry creek bed
broad floodplain with trees
N
Home
trees
Sand bar
water
sloping bank
Sandy Cross Rd
water
gently sloping bank
trees
Sand bar