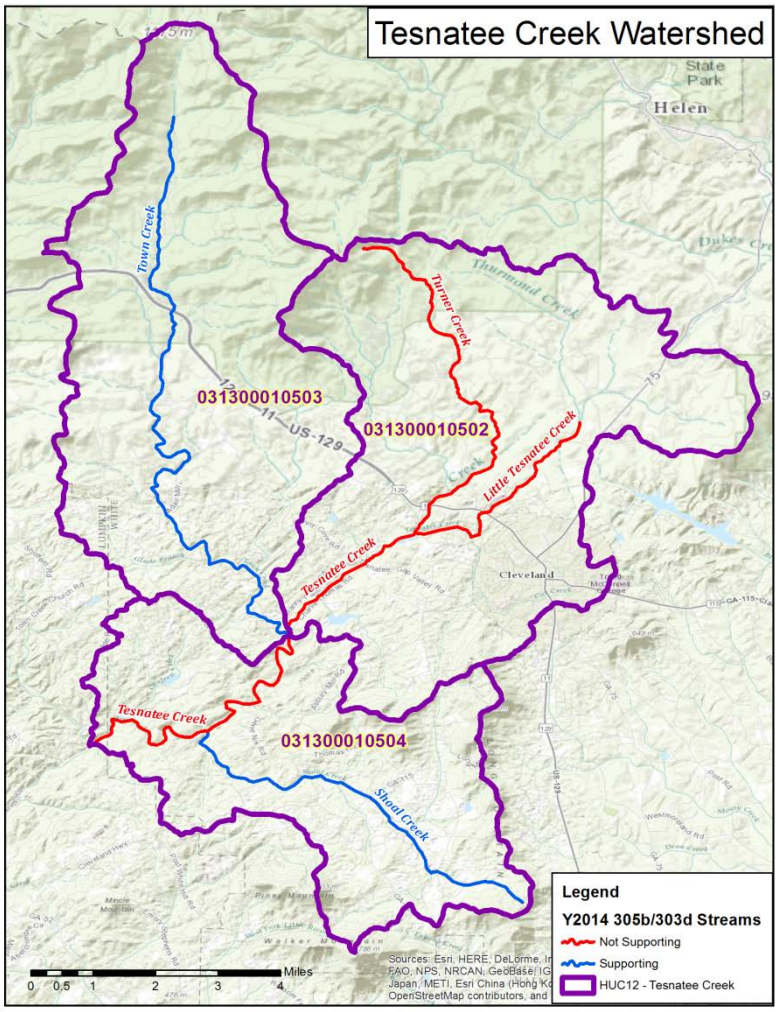
2016 WATERSHED MANAGEMENT PLAN
TESNATEE WATERSHED



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2016 WATERSHED MANAGEMENT PLAN
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TESNATEE WATERSHED

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INTRODUCTION

PURPOSE

This document is the Watershed Management Plan (WMP) for the identified segment of the Tesnatee Creek. The objective of a WMP is to identify and prioritize significant sources of pollution causing impairment in a watershed, determine effective management practices that will reduce pollutant loads from those sources, and seek funds and other resources to install the pollution controls and restore water quality in the impaired water body.

The Tesnatee Creek has a beneficial water use classification of recreation and drinking and is currently listed as an impaired water body. The targeted segment has been identified as contaminated/partially contaminated by the Georgia Department of Natural Resources (DNR) and in need of remediation. The degree of impairment is classified as not supporting use and the TMDL for the Tesnatee Creek is set at a target level that will allow the water body to achieve water quality standards necessary for the beneficial use classification of fishing.

In this particular instance, the contamination stems from non-point sources and has been added to the list of streams for Total Maximum Daily Load (TMDL) planning and water quality restoration. An original TMDL assessment and Implementation Plan has already been developed and some progress made with regards to remediation measures by local stakeholders in restoring stream banks and promoting septic tank maintenance standards. This WMP will provide a summary of progress and of recent monitoring efforts, then produce an updated Implementation Plan for ultimately achieving water quality. The results of this WMP will be used to coordinate local and State assisted remediation measures for the next 5-10 years.

WATERSHED PLANNING IN GEORGIA

Georgia is home to nearly 10 million people and one of the most naturally diverse states in the country, featuring mountains and valleys to the north, thousands of acres of farmlands in the south and the marshlands along the coast. The Georgia Department of Natural Resources (DNR) is the State agency charged with management and protection these natural resources, and within the DNR structure the Environmental Protection Division (EPD) is responsible for protecting Georgia's air, land, and water resources through the authority of state and federal environmental statutes. These laws regulate public and private facilities in the areas of air quality, water quality, hazardous waste, water supply, solid waste, surface mining, underground storage tanks, and others. EPD also issues and enforces all state permits in these areas and has full delegation for federal environmental permits except Section 404 (wetland) permits.

As part of their approach to improved water resource protection, EPD employs a watershed-based approach to assessing and managing conditions that impact water quality. A watershed approach provides a comprehensive and effective means for examining the factors that affect all surface waters, including both point and nonpoint sources of pollution. To this end, the well-being of Georgia’s streams, rivers, ponds and lakes are addressed through improvement plans and studies that consider the full context of drainage basins. This helps to account for historical activities, ongoing land uses, and future growth that do/may impact Georgia’s water quality, as well as providing a means for coordinating across stakeholders how to monitor, improve and sustain healthy water.

As a Watershed Management Plan (WMP), this document will follow EPD guidelines and standards in addressing the water quality for the Tesnatee Creek watersheds. It has been developed in response to previous TMDL assessments that established a violation concern but did not fully establish a source. By going through a watershed-based approach, this WMP provides an identification of likely causes as well as recommended remediation measures for restoring and sustaining water quality within the Tesnatee Creek watershed.

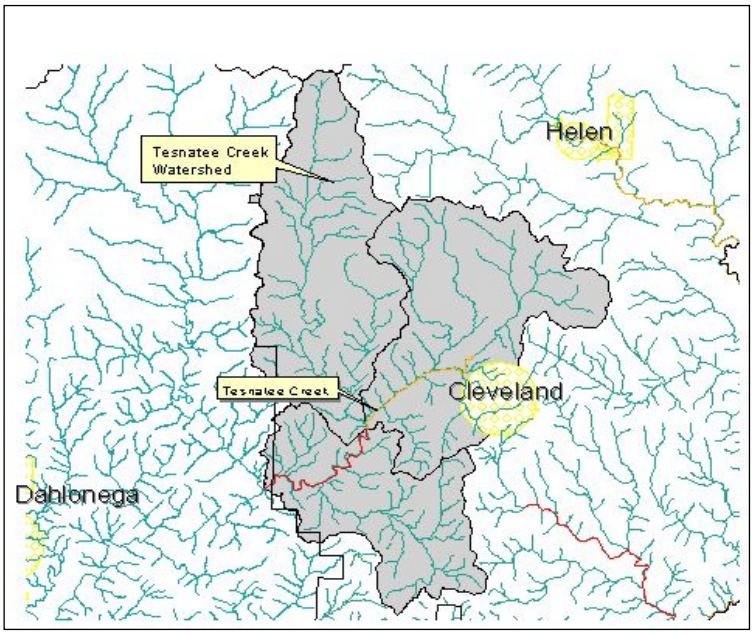
As part of the watershed planning directed by EPD, documents such as this are to include the *Nine Key Elements* (see below) as recommended by the U.S. Environmental Protection Agency (EPA). The nine elements are recommended to ensure the propriety of the assessment, a minimum of stakeholder involvement and to ensure a program of action for attaining watershed restoration objectives.

EPA's Nine Key Elements for Watershed Plans

1. *An identification of the sources or groups of similar sources contributing to nonpoint source (NPS) pollution to be controlled to implement load allocations or achieve water quality standards.*
2. *An estimate of the load reductions needed to de-list impaired stream segments;*
3. *A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards;*
4. *An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan;*
5. *An information/education component that will be used to enhance public understanding of and participation in implementing the plan;*
6. *A schedule for implementing the management measures that is reasonably expeditious;*
7. *A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;*
8. *A set of criteria that can be used to determine whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised; and;*
9. *A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item (8) above.*

PROJECT SCOPE

The Tesnatee Creek Watershed is located in White County, Georgia, with a smaller downstream portion in Lumpkin County, within the upper Chattahoochee River Basin. The drainage area of the Tesnatee Creek Watershed includes three HUC12 watersheds (031300010502, 031300010503, and 031300010504) and is approximately 71 square miles. Significant tributaries include Turner and Little Tesnatee Creek which flow into the upper headwaters of the major tributary Tesnatee Creek. Downstream Towns Creek flows into lower Tesnatee Creek from the north and Shoal Creek from the south. Tesnatee Creek ends at the confluence with Chestatee River. The City of Cleveland is the only city in the watershed.



According to the State of Georgia's *DRAFT* 2014 305(b)/303(d) List of Waters, Tesnatee Creek watershed contains four streams which are listed as not supporting recreation and drinking water designated uses for Fecal Coliform and Biota Impacted (Fish Community) and two streams as supporting designated uses.

Stream Miles: 160
Lake Acreage: 319
Wetland Acreage: 449

THE GMRC

This report was developed by the Georgia Mountains Regional Commission (GMRC). The GMRC is one of 12 regional government offices within Georgia working to foster economic development and to provide community planning and information services. The GMRC provides services and technical assistance directly to its 13 counties and 38 municipalities as well as developing regional initiatives and supporting the programs of various State Departments. Originally founded as the Georgia Mountains Area and Planning Development Center in 1962, the GMRC has evolved in the common services provided but continually works to assist its member governments in efforts that preserve local character, encourage sustainable resource management and progressive economies, and contribute to improving the overall well-being of the region and its communities.

Currently the GMRC employs 32 staff in the realms of planning, economic development, workforce development, information technology, human resources and general administration. The Council for the GMRC consists of two representatives from each county, one from the County Commission and one mayoral representative from all the cities within that county, as well as 5 appointees from the State legislature.

As the contractor for this project, the GMRC was responsible for carrying out the tasks and duties necessary to complete this document, including but not limited to the following:

- Outreach to local stakeholders;
- Survey the watershed to identify possible causes/sources of pollution, as well as opportunities for remediation;
- Produce the final WMP.

WATERSHED PROFILE

WATERSHED LOCATION AND GENERAL DESCRIPTION

The watershed for the part of the Tesnatee Creek being reviewed in this report is located predominantly in White County, GA. A portion of the watershed lies within Lumpkin County to the west, and another small portion lies within the City of Cleveland to the east. The stretch of the main artery of the Tesnatee in this watershed runs roughly from the north to the south, draining away from Cleveland, before banking west where it will eventually receive the waters from Towns Creek and ultimately emptying into the Chestatee River.

The creek and its tributaries are mostly small in size and modest in water flow, within only the main branch of Tesnatee and Towns Creeks rating large enough for fishing, and neither of them are navigable for boats or tubes in any substantial stretch. In some places in the past they have been accessed by private landowners to supply water for agricultural purposes, while many landowners have cleared openings to the creeks for scenic views or to provide access for leisure.

The particular drainage basin features various land uses and development types. Most of the watershed is considered rural, made up of forest and agricultural lands. It is also a predominantly hilly terrain and many small valleys with very steep slopes. Because of the river's location, elevation and topography, the Tesnatee is a comparably cool creek with a high volume of breaks and turbulence. This aids in how the stream will process silt and contaminants as well as aiding its scenic value. Even the smaller sections and tributaries within the headwaters tend to wind around hills and through smaller valleys and ravines reminiscent of larger, wilder mountain waters.

However, retaining downstream water quality also entails proper management upstream, within the target watershed for this WMP. Both Counties and the EPD recognize that maintaining the health of the entire river and its ecosystem is best served by applying best practices throughout the entire watershed, especially in the headwaters as the smaller, more susceptible streams come together to form the river.

This also lends the Tesnatee to easier contamination in some situations, however, as the sloping terrain and woody forests foster strong runoff conditions during even mild rainfalls. This means waste and other elements resting on topsoil are readily washed into the surface waters within the Appalachian Mountains and its foothills.

NATURAL FEATURES AND CONDITIONS

(Much of this material has been taken from, or referencing, existing or past editions of the White County Comprehensive Plan)

Weather and Climate

The climate of White County is strongly influenced by mountainous terrain. Summers are mild and winters are quite cold. Generous precipitation occurs throughout the year with heavier amounts in winter and early spring.

The complex terrain and contrasting elevations of White County creates highly variable weather conditions. High elevation mountain areas are commonly 5 to 10 degree colder during the day than

valley bottoms. In the evening, cold air flows off of the high slopes into the valleys. In these bottom lands, early morning temperatures can be 10 to 15 degrees colder than surrounding areas. Precipitation varies as well. High elevations receive more rainfall and snow than lowlands, as air is forced to rise and cool as it pushed over mountains. Elevation changes alone can increase annual precipitation by 10 inches or more, when compared to nearby lowlands. Microclimates at high elevations are common, and lead to greater biodiversity than surrounding counties that have only low elevations.

The Southeast Regional Climate Center's Clarkesville and Helen stations have weather and climate records from 1961 to 2000. Maximum summer temperatures during this time averaged in the middle to high 80's. July is the warmest month, with the average highs of 86.5 degrees. Lows during the summer are comfortable, and average between the high 50's and low 60's.

Average high temperatures during the winter months are in the low to middle 50's. January is the coldest month with an average high temperature of 50.9, and an average low temperature of 29.4. Average low temperatures throughout the winter months range from the high 20's to the high 30's.
Precipitation in White County follows a winter maximum regime with a second peak of precipitation during summer months. In the Town of Cleveland, December through March are the wettest months, during which time the city receives between 5.71 and 6.94 inches of precipitation per month. July and August also see considerable rainfall. During these months, Cleveland receives a monthly average of 5.64 and 5.37 inches of rain. Snowfall can occur during winter months, especially at higher elevations. Cleveland averages 2.6 inches a year while Helen's average snowfall is 3.4 inches. The fall and early summer are the driest periods. During this time, monthly precipitation averages between 4.24 and 5.19 inches of rain.

Physiography

White County lies within two physiographic provinces: the Blue Ridge District and the Piedmont District. The north and northwest sections of the County are within the Blue Ridge Mountains District, which consists of rugged mountains and ridges ranging in elevation from 3,000-4,700 feet. The southern boundary of the Blue Ridge Province abuts the Piedmont Province at approximately the 1,700 ft. elevation where a sharp contrast in regional slope occurs.

The portion of White County that falls within the Piedmont Province can be subdivided into three different districts. A small middle-western portion of the County lies within the Dahlonega Upland District, which is a rough and hilly section standing 1,500 to 1,700 feet above sea level. Streams in this district flow south out of the Blue Ridge Mountains District and have cut deep, narrow valleys 500 to 600 feet below the surrounding surface. Running in a southwest to northeast direction in the southwest and central portions of White County, at a width of approximately five miles, is the Hightower-Ridges District. This district contains a series of low, linear, parallel ridges separated by narrow valleys. The Hightower Ridges range in elevation from 1,000 feet in the southwest to1,500 feet in the northeast. The remainder of White County (southern and eastern portions) lies within the Central Uplands District, which encompasses a series of low, linear ridges 1,300 to 1,500 feet above sea level separated by broad, open valleys. Streams flowing through this section occupy valleys 150 to 200 feet below the ridge crests. *(Source: Georgia Department of Natural Resources, Geologic and Water Resources Division. Physiographic Map of Georgia. 1976.)*

Land Cover

The mountain region of North Georgia contains a multiplicity of climatic and soil conditions that stimulate the growth of many trees and plants. The slopes, soils, and annual rainfall are principal natural factors controlling the vegetation of the area, giving shape to the local ecosystem and conditions impacting runoff.

The Tesnatee Creek watershed is a heavily wooded area that features rolling-to-steep hills populated with varieties of pine, hickory, elm and other trees. Oak forests often predominate on the eastern faces of the mountains, which do not typically receive as much moisture, while pines and oaks may mix on some slopes. The northern facing slopes, which will be cool and moist, will be made up of mostly broadleaf deciduous forests. At higher elevations, the understory is less varied. Shrubs of mountain laurel and rhododendron form nearly impenetrable thickets that are densest where conditions are wettest. The large amount of forested land in this region provides wildlife with shelter from adverse weather and also gives protection from predators by providing screening or escape cover.

Within a forest community, how the plants grow in different layers is also an important type of arrangement called vertical layering. This is important because some wildlife species may use the ground layer vegetation (herbaceous) for food, but also need the tallest layer (tree canopy) for shelter. The middle layer between the tree canopy and herbaceous layer is comprised of shrubs (shrub layer). Every mature forest community has different vertical layering. Some may have a variety of layers comprised of grasses, broadleaf weeds (forbs), shrubs, small trees, and large trees; whereas, others may only have one distinct layer of tall trees. The latter would provide fewer habitats for wildlife compared to the forest stand with a variety of layers. The boundary where 2 or more different plant communities or successional stages (such as where a forest meets a pasture or cropland) meet is called edge.

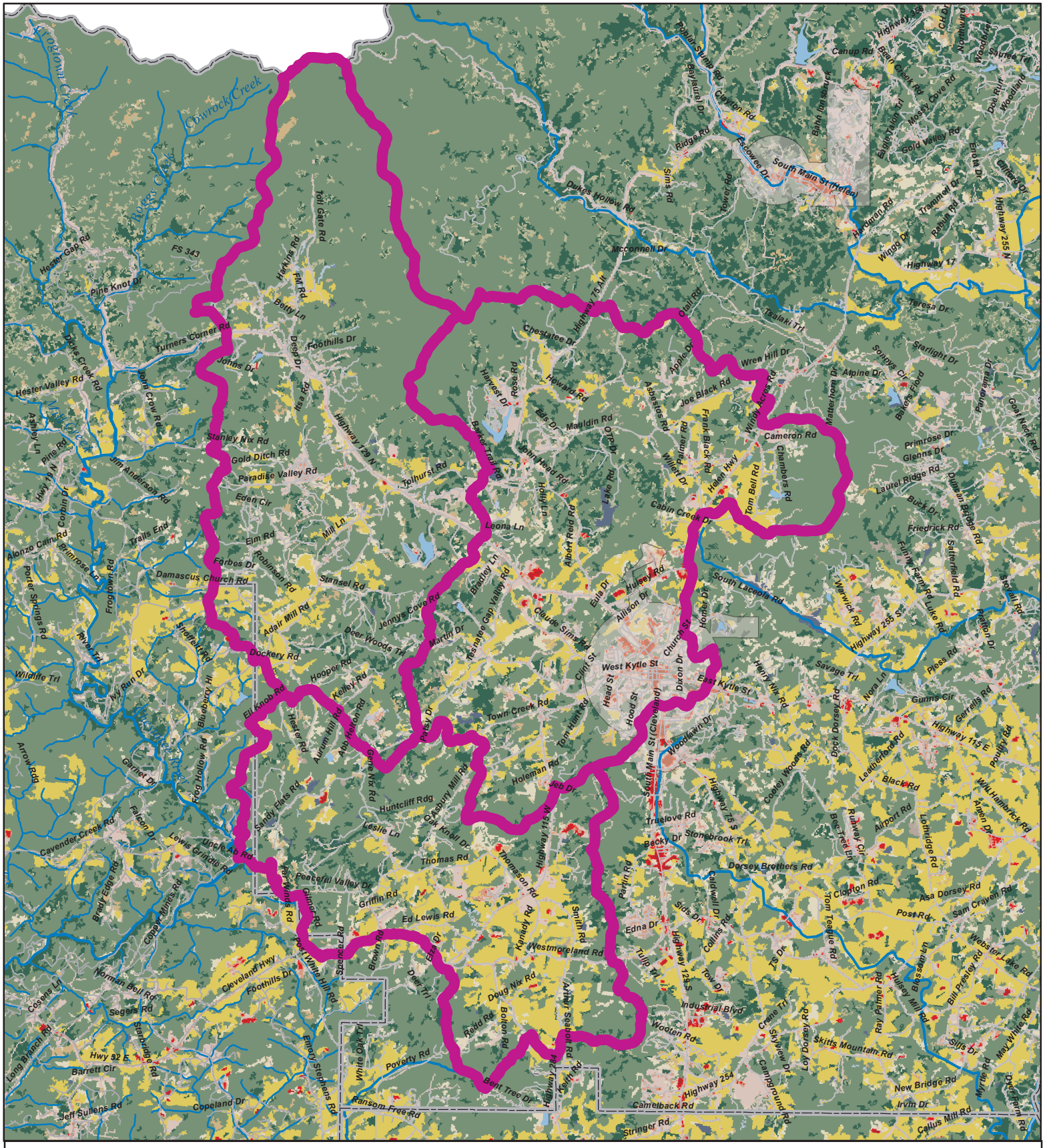
There are also many areas that are open fields and pastureland as well. Small treeless openings that provide breaks in tree canopy and provide leafy trees, shrubs, grasses, and flowering plants which attract deer, rabbits, and mice. Berries and other fruits will draw birds and bears to the area, while dozens of wildlife species are known to feed on nuts such as acorns, which would be prevalent on the eastern faces of the mountains. The different species of herbivores will undoubtedly attract predators such as coyotes, wolves, cougars and bears, which prey on other animals.

Wildlife is attracted to the many water resources in the area and will settle in areas near streams and rivers for drinking, bathing, and reproduction. Without a sufficient water source, wildlife must either leave the area or die. Wild animals will not inhabit areas too far from water, even if food and cover are abundant.

General Forest Types by Elevation.

Forest Type	Locale	Elevation
Oak Ridge	Along crests of Blue Ridge	3600-4000'
Open Oak Pine	Exposed north or south facing slopes	2100-3800'
Mixed Deciduous	Moist Valley Floors	1800-2000'
Oak-Hickory-Pine	Dry ridge slopes of Piedmont	1800-2000'

Source: Institute of Community and Area Development, University of Georgia, The Atlas of Georgia. 1986.



Testnatee Creek Watershed (HUC12)
National Land Cover - 2011

National Landcover Dataset - 2011

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock, Sand, Clay)
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Woody Wetlands

N W E S

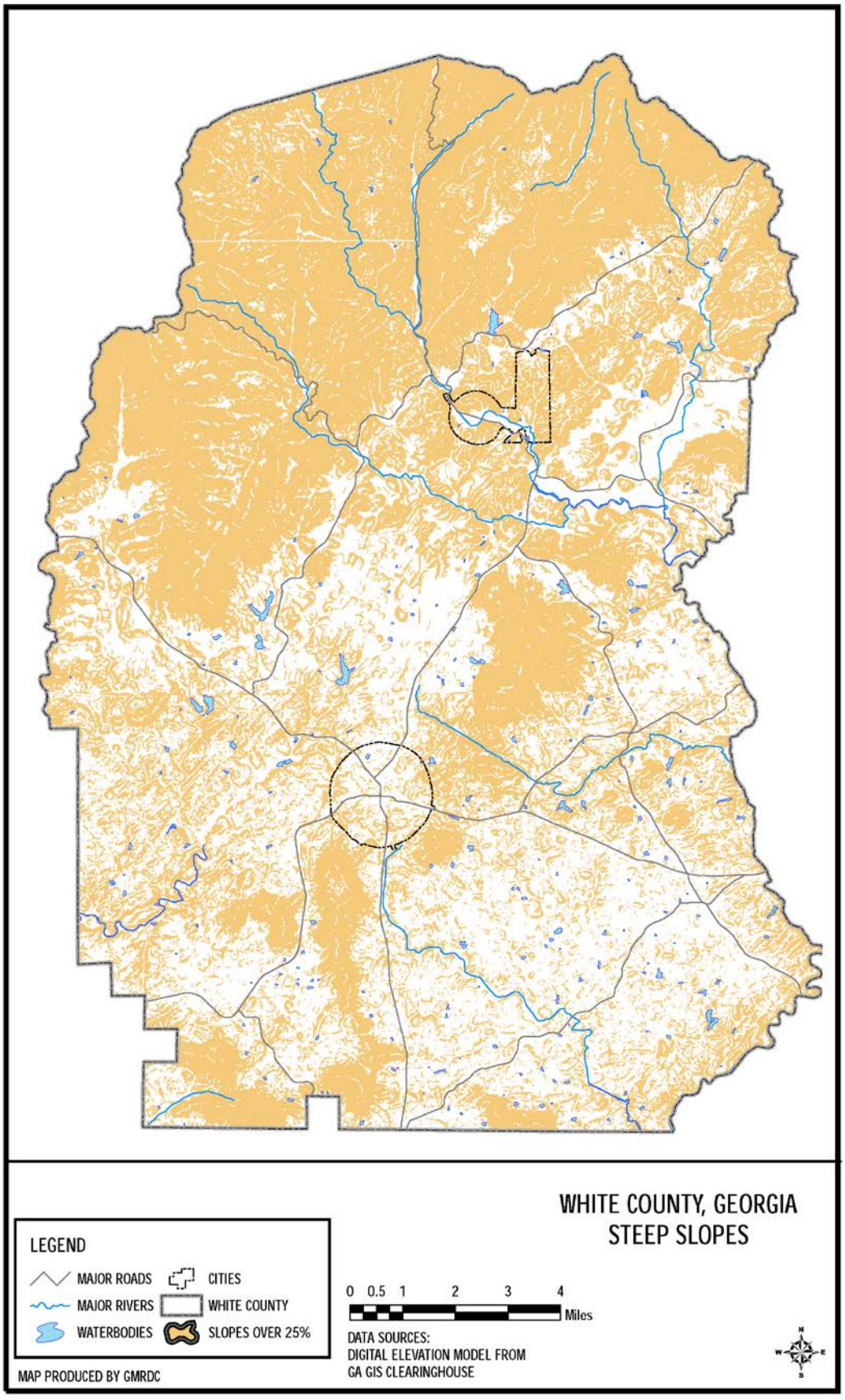
Georgia Mountains Regional Commission

0 0.45 0.9 1.8 2.7 Miles

Steep Slopes

Due to its location in the Blue Ridge and Piedmont Physiographic provinces, White County has a number of mountains which pose limitations on development. A total of 34.87 percent (54,225 acres) of the County area qualifies as steep slopes. The highest elevations in White County are located along the northern county boundary with Lumpkin, Union, Towns, and Habersham Counties. This county line also forms the Tennessee Valley Divide, which separates the Chattahoochee River Basin from the Tennessee River Basin. The Tennessee Valley Divide contains some of the highest elevations in North Georgia, with 15 mountains in White County surpassing 3,000 feet.

The complex terrain of White County results in a significant area that is impacted by steep slopes. As noted earlier, the greatest occurrence of steep slopes is found in the northern portion of White County. The U.S. Forest Service's Chattahoochee National Forest and a number of Wildlife Management Areas already protect much of this area. Despite large areas of already protected land, steep slopes are located throughout the area and need special consideration. Development on steep slopes can be problematic because of issues relating to environmental quality and public health and safety. Steep slope are generally composed of thin soils that are easily eroded. If development occurs on steep slopes, eroded sediment enters streams and impacts surface water quality and aquatic habitat. Steep slopes commonly contain distinctive natural settings because of high elevations, unique aspect to sun angles, and other others that lend themselves to particular habitats of threatened or endangered species. Along with these environmental reasons, excessively steep slopes are also not suited for development. Development has the potential to induce landslides, and the operational capability of septic drainfields is reduced, and may create health and safety concerns for local residents. To some extent, a septic system can overcome issues associated to steep slopes, but the system must be designed with slope considerations in mind. The building permitting process is a useful measure in maintaining citizen's general welfare during development periods, and it should address septic placement on steep slopes. Further, development on steep slopes creates accessibility problems for emergency vehicles and places increased demands on infrastructure. For example, considerably larger pumps are mandatory to overcome gravitational forces in order to supply water to sites located on steep slopes.


WHITE COUNTY, GEORGIA
STEEP SLOPES
LEGEND
MAJOR ROADS
CITIES
MAJOR RIVERS
WHITE COUNTY
WATERBODIES
SLOPES OVER 25%
0 0.5 1 2 3 4
Miles
DATA SOURCES:
DIGITAL ELEVATION MODEL FROM
GA GIS CLEARINGHOUSE
MAP PRODUCED BY GMRDC

Soil Types

An analysis of the types of soils in White County and their suitability for certain land uses is an important component of the Comprehensive Plan. White County has a broad range of soils, which are listed by symbol and name in Table 2-2, along with the limitations of each soil type on crop cultivation, dwelling foundations, septic tank utilization, and commercial structures.

Of the 55 soil types in White County there are 17 soil types which have been identified (*) as suitable for intensive crop cultivation. The soils most suitable for crop cultivation are found on lesser slopes (2-10%). Most of the soils in White County have limitations for intensive crop cultivation because of steep slopes, severe erosion hazards, flooding, low natural fertility, low organic matter content, shallow depth of rooting zone, rock outcrops, and/or surface stones. Although only 17 soil types are found suitable for intensive crop cultivation, other soil types can be and are cultivated for crops. Furthermore, many of the soils not identified as suitable for intensive crop cultivation are suitable for other agricultural uses such as pasture and woodlands. The vast majority of land areas in White County have soils which pose severe limitations on dwelling foundations and septic tank utilization. The Masada soil association (MoB, MoB2, MoC2, MoD2) is the most suitable soil for these uses. Approximately 28,190 acres, or 18% of the total County land area, have only slight to moderate limitations on dwelling foundations and septic tank utilization. Even less of the County land area has soils suited for commercial and light industrial uses without extensive adjustments; approximately 26,365 acres, or 17% of the total County land area, contain soils with only moderate limitations on commercial structures.

White County lies within the Upper Chattahoochee River Soil and Water Conservation District along with Dawson, Forsyth, Hall, Habersham and Lumpkin Counties. Soil and water conservation districts were formed in Georgia by 1957 with the purpose of providing local direction to federal conservation efforts. In addition to basic duties such as coordinating programs and developing annual and long range plans, the districts sponsor demonstration projects and conservation workshops. *(Source: Georgia Soil and Water Conservation Committee, Georgia Resource Conservation Program and Action Plan, 1982.)*

Limitations of Soils in Development, 2006

Lumpkin County	Acres	Percentage of Total County Acreage
Total Hydric Soils	8,385	5.39 %
Total Prime Agricultural Soils[1]	28,655	18.43 %
Total Soils with 25% slope or more	54,225	34.87 %
Total Soils Suitable for Septic Tanks[2]	28,190	18.13 %
Total Soils Suitable for Commercial Structures[2]	26,365	16.95 %

Notes: 1. Excludes the Cartecay Complex and Toccoa soil types, which is considered a hydric soil and, therefore; not included as a prime agricultural soil.
2. With only slight or moderate limitations. Can be used with special management.

Source: U.S. Department of Agriculture, Soil Conservation Service. Soil Survey of Dawson, Lumpkin and White Counties, Georgia. 1972.

Soil Types in White County as Identified in the USDA Soil Conservation Service Soil Survey

Symbol	Soil Name	(% Slope)	Foundation Suitability		Septic Suit-ability	% of County Acreage
			Housing	Commercial		
AcG	As he stony loam	(60-90)	Se	Se	Se	
AEE	Ashe/Edneyville stony loam	(10-25)	Se	Se	Se	
AEF	Ashe/Edneyville stony loam	(25-60)	Se	Se	Se	
AmC2*	Appling sandy loam	(6-10)	Sl	M	M	
AWB**	Augusta fine sandy loamy	(2-6)	Se	Se	Se	
AwC	Augusta fine sandy loam	(6-10)	Se	Se	Se	
Bfs	Buncombe loamy sand		Se	Se	Se	
BvF	Burton loam	(15-50)	Se	Se	Se	
Cac**	Cartecay complex		Se	Se	Se	
CCF	Chandler loam	(25-60)	Se	Se	Se	
Con*	Conagree/Starr soils		Se	Se	Se	
EPD	Edneyville/Porters loams	(10-15)	M	Se	M	
EPE	Edneyville/Porters loams	(15-25)	Se	Se	Se	
EPF	Edneyville/Porters loams	(25-60)	Se	Se	Se	
EPG	Edneyville/Porters loams	(60-80)	Se	Se	Se	
FaB*	Fannin fine sandy loam	(2-6)	Sl	M	M	
FaC*	Fan n in fine sandy loam	(6-10)	Sl	M	M	
FaE	Fannin fine sandy loam	(10-25)	MtoSe	Se	Se	
FbC2*	Fannin sandy clay loam	(6-10)	Sl	M	M	
FbE2	Fannin sandy clay loam	(10-25)	Se	Se	Se	
FcF	Fannin soils	(25-60)	Se	Se	Se	
Gut	Gullied land				Not Rated	
HIB*	Hayesville sandy loam	(2-6)	Sl	M	M	
HIC*	Hayesville sandy loam	(6-10)	Sl	M	M	
HIE	Hayesville sandy loam	(10-25)	MtoSe	Se	Se	
HJC3*	Hayesville sandy clay loam	(6-10)	Sl	M	M	
HJE3	Hayesville sandy clay loam	(10-25)	Se	Se	Se	
HKC3	Hayesville/Rabun clay loam	(6-10)	Sl	M	M	
HLC*	Hayesville/Rabun loams	(6-10)	Sl	M	M	
HLD	Hayesville/Rabun loams	(10-15)	M	Se	Se	
HLF	Hayesville/Rabun loams	(25-60)	Se	Se	Se	
HSC*	Hiwassee loam	(2-10)	Sl	M	SItoM	
HSD*	Hiwassee loam	(10-15)	M	M	M	
HSF	Hiwassee loam	(15-40)	Se	Se	Se	
MCE	Musella cobbly loam	(6-25)	Se	Se	Se	
MCG	Musella cobbly loam	(25-70)	Se	Se	Se	
MoB*	Masada fine sandy loam	(2-6)	Sl	M	Sl	
MoB2*	Masada fine sandy loam	(2-6)	Sl	M	Sl	
MoC2*	Masada fine sandy loam	(6-10)	Sl	M	Sl	
MoD2*	Masada fine sandy loam	(10-15)	M	Se	M	

Symbol	Soil Name	(% Slope)	Foundation Suitability		Septic Suit-ability	% of County Acreage
			Housing	Commercial		
MuE2	Musella gravelly clay loam	(10-25)	MtoSe	Se	Se	
RaE	Rabun loam	(15-25)	M	Se	Se	
RbD3	Rabun clay loam	(10-15)	M	Se	M	
RbE3	Rabun clay loam	(15-25)	Se	Se	Se	
Sta*	Starr fine sandy loam		Se	Se	Se	
TbE	Tallapoosa cobbly fine sandy loam	(6-25)	Se	Se	Se	
TcE	Tallapoosa fine sandy loam	(10-25)	MtoSe	Se	Se	
TdG	Tallapoosa soils	(25-70)	Se	Se	Se	
TIC*	Tusquitee loam	(6-10)	Sl	M	Sl	
TID	Tusquitee loam	(10-25)	MtoSe	Se	MtoSe	
TIF	Tusquitee loam	(25-60)	Se	Se	Se	
TmE	Tusquitee stony loam	(10-25)	Se	Se	Se	
TmF	Tusquitee stony loam	(25-60)	Se	Se	Se	
Toe* (**)	Toccoa soils	(0-2)	Se	Se	Se	
Wed**	Wehadkee soils	(0-2)	Se	Se	Se	
WgC*	Wickham fine sandy loam	(6-10)	Sl	M	Sl	
WgD	Wickham fine sandy loam	(10-25)	MtoSe	Se	MtoSe	
WgF	Wickham fine sandy loam	(25-50)	Se	Se	Se	
WnD3	Wickham sandy clay loam	(10-15)	M	Se	M	

Notes: * Suitable for farming (cultivated crops).
** Hydric soils, according to Soil Conservation Service.
Se Severe limitations, extensive adjustments are needed before suitable for purpose.
M Moderate limitations, some adjustment needed for use.
Sl Slight limitations, little or no adjustments needed for use.

Soil Suitability for Dwelling Foundations, Septic Tank Absorption Fields and Commercial Structures

White County has limited opportunity for most structure types due to the steep terrain, but even more restrictions apply in areas with unsuitable soil and substrata. As a result the county's basins and bottom lands tend to be in full use where possible. The Tesnatee Creek watershed exhibits some comparably mild topography and some agricultural activity as a result, but there are not many places ideal for large scale, heavy construction due to soil and other factors. Most of the commercial and industrial activity has thus been directed toward hill tops in and around Cleveland.

Septic Tanks and On-Site Sewage Structures

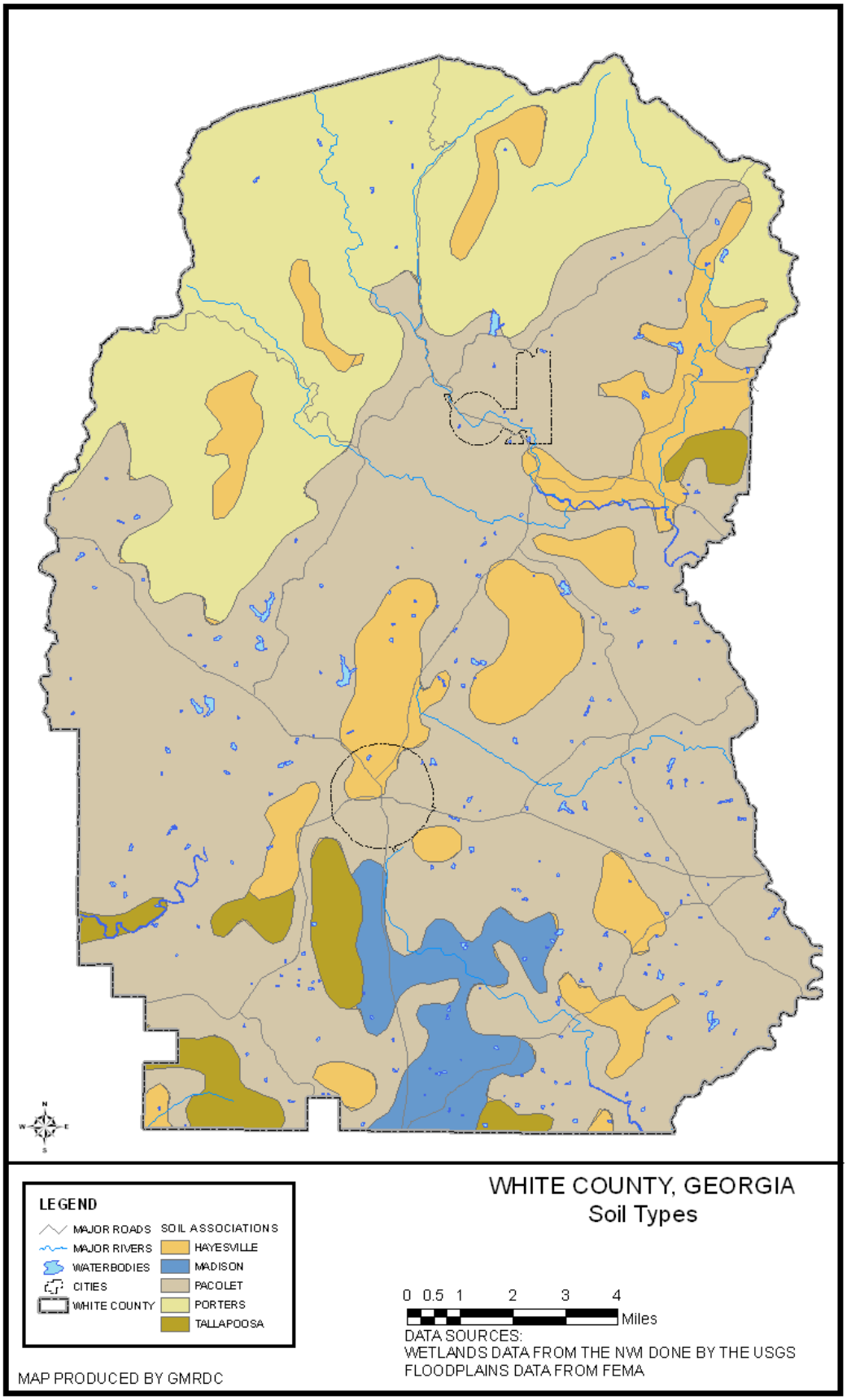
Of primary concern to the area is the environmental sensitivity to on-site septic systems, particularly older models or those that have not been properly maintained. Less than 20% of White County is categorized as suitable for handling septic waste filtration, yet even where the soils are conducive to this use the general topography and/or proximity to surface water may curtail that option. *Soil Erosion*

White County has adopted ordinances which reflect the required provisions of the Georgia Erosion and Sedimentation Act of 1974 dealing with construction and development site soil erosion and sedimentation. In order for any local government to become or remain a certified local issuing authority for an erosion and sedimentation control permit (also known as a grading permit), the local government must first adopt an ordinance, which demonstrates compliance with the provisions in O.C.G.A. 12-7-1.

Prime Agricultural and Forested Lands

"Prime farmland" in Georgia is land which is best suited for producing food, feed, forage, fiber, and oilseed crops, and also available for these uses. It has the soil quality, growing season, and moisture supply necessary to produce sustained good yields of crops economically if treated and managed, including water management according to modern farm methods.

From the list of soils found in Lumpkin County, 17 soils types have been identified as prime agricultural soils. There are scattered fragments of prime agricultural soils throughout the county but, due to the prevailing topography of the area limited concentrations of such soils in lands conducive to farming. There are no major commercial farming operations for livestock or row crops, and with the growing popularity of the mountains for forest-based recreation and scenery, the area has not been reserved or designated as prime agricultural territory.


LEGEND
MAJOR ROADS
MAJOR RIVERS
WATERBODIES
CITIES
WHITE COUNTY
SOIL ASSOCIATIONS
HAYESVILLE
MADISON
PACOLET
PORTERS
TALLAPOOSA
WHITE COUNTY, GEORGIA
Soil Types
0 0.5 1 2 3 4
Miles
DATA SOURCES:
WETLANDS DATA FROM THE NWI DONE BY THE USGS
FLOODPLAINS DATA FROM FEMA
MAP PRODUCED BY GMRDC

Mineral Resources

White County has a variety of mineral resources. Two areas within the County contain granite and related rock outcrops: One area in the mid-northwest section; and one area in the extreme northeast portion of the County. An area of gold deposits, approximately four miles wide by fifteen miles long, bisects the central portion of White County running southwest to northeast in the same general pattern as the Hightower Ridge. This area is known as the "Dahlonega Belt". Paralleling the span of gold deposits to the south is a broken concentration of granite and related rocks. There is also a concentration of mica (colored or transparent mineral silicates that separate into thin leaves and used dry in roofing materials, joint cement, well drilling compounds and paint) located east of State Route 75 and north of State Route 254.

Other mineral resources found in lesser quantities in White County are: corundum (a very hard mineral that consists of aluminum oxide and which is used as an abrasive); feldspar (crystalline minerals consisting of aluminum silicates which is ground and used in the manufacture of glass, pottery, enamels and abrasives); iron and manganese; sulfide deposits (iron, copper, etc.); talc (a soft mineral that is a basic magnesium silicate and which is used as a filler in rubber); asbestos (a mineral supposed to be inextinguishable when set on fire, used for chemical filters and plastics); sillimanite (a mineral consisting of aluminum silicate which has uses in the production of high temperature refractories); quartzite (a compact granular rock composed of quartz and derived from sandstone); and soapstone (a soft stone having a soapy feel and composed of talc, chlorite and magnetite). *(Sources: Georgia Department of Mines, Mining and Geology, The Common Rocks and Minerals of Georgia. Information Circular No. 5,1934, Revised 1964. Georgia Department of Natural Resources, Georgia Geologic Survey, Mineral Resources Map. 1969.)*

A deposit study of mineral deposits in White County was completed in 1964. This study concluded, among other things, that the "volume and grade of gravels in the Nacoochee Valley, Sautee Creek, Bean Creek and Dukes Creek warrant a dredging operation," and that "other economic materials which might be worked are asbestos, mica and soapstone."

Although there are a variety of mineral resources located in White County, mining and quarrying operations are limited to fill material, gold and sand-construction commodities.

Plant and Animal Habitats

Georgia's Protected Species Program began in 1973 with the enactment of two state laws: the Endangered Wildlife Act and the Wildflower Preservation Act. These laws provide protection for certain species of plants and animals. Under the Natural Heritage Inventory Program, the Georgia Department of Natural Resources is continuously in the process of completing an inventory of rare plants, animals and natural habitats in Georgia warranting state and federal protection.

According to a report by the Georgia Department of Natural Resources, the natural environment of White County is conducive to three (3) species of protected wildlife and eight species of concern.

Threatened Species:

- Bluestripe Shiner (Cyprinella callitaenia)- This threatened fish is found only in the Chattahoochee Watershed and prefers flowing areas in large creeks and medium sized rivers over rocky substrates.

- Highscale Shiner (Notropis hypsilepis)- This threatened shiner prefers habitats of streams flowing over sand or bedrock substrates.
- Northern Pine Snake (Pituophis melanoleucus melanoleucus)- This threatened snake grows to between 48 and 68 inches and is identified by its black and dull white to yellowish or light grey color. It is found in dry pine or pine-hardwood forests.

Species of Concern:

- Coal Skink (Eumeces anthracinus)- This lizard grows from 5 to 7 in. in length and can be found in mesic forests near streams, springs or bogs.
- Blue Ridge Two-lined Salamander (Eurycea wilderae)- This small salamander is distinctive because of its two stripes that run the length of its body, but break apart into spots that cover its tail. The Blue Ridge Two-lined Salamander is found in high elevation springs and seeps that are adjacent to hardwood forests.
- Four-toed Salamander (Hemidactylium scutatum)- This salamander, as the name implies, has four toes instead of the common five toes on the hind feet. The four toed salamander is found in swamps and boggy streams and ponds, located near hardwood forests.
- Greater Jumprock (Scartomyzon lachneri)- The Greater Jumprock is a sucker that can be found in small to large streams in swift current over rocky substrate.
- Masked Shrew (Sorex cinereus)- This shrew has a dark gray coat, with lighter gray underbelly. The Masked Shrew can be found in high elevation mesic forests, field edges, swamps, or mountain bogs.
- Pygmy Shrew (Sorex hoyi)- The Pygmy Shrew's habitat includes mountain bogs and grassy openings in high elevation forests. It is an insectivore that grows up to two inches in length.
- Red Squirel (Tamiasciurus hudsonicus)-
- The Diana Fritillary (Speyeria Diana)- is a colorful butterfly whose habitat includes openings and fields in wet, rich, forested valleys and mountainsides.

Fish are also an important part of wildlife in the mountains. The cold-water streams support rainbow, brown and brook trout, of which only the brook trout species is native to the State of Georgia. The Department of Natural Resources maintains listings of primary and secondary trout streams. Primary trout streams have environmental conditions that are most favorable for trout, and the trout are able to both survive and reproduce in these waters. In secondary trout streams, trout are able to survive without assistance but are unable to reproduce naturally, and thus require stocking to maintain their populations. Trout are commonly used as indicator species because of their sensitivity to environmental changes such as sedimentation, insect populations, and water temperature. The State of Georgia protects trout streams through the Erosion and Sedimentation Act, which provides a 50-foot stream buffer on all trout streams with an average annual discharge of greater than 25 gallons per minute. A 25 foot buffer is applied to all streams with an annual discharge of less than 25 gallons per minute. In White County, primary trout streams include: the Cathey Creek watershed upstream from the Arrowhead Campground Lake, the Chattahoochee River watershed upstream from Georgia Hwy.255 Bridge, and the Town Creek watershed upstream from the mouth of Jenny Creek. Secondary trout streams include: the Chattahoochee River watershed upstream from the Georgia Hwy.115 to the

Georgia Hwy.255 Bridge, the Little Chestatee River watershed upstream from the mouth of Turner Creek, and the Turner Creek watershed (except those sections listed as primary trout streams).

The mountain region of North Georgia contains a multiplicity of climatic and soil conditions that stimulate the growth of many trees and plants. The slopes, soils, and annual average rainfall are principal natural factors controlling the vegetation of the area. These varied natural conditions have led to habitat for numerous plant species with federal or state protection which include:

- Biltmore Sedge (Carex biltmoreana)- This perennial grass like herb is found at high elevations on seepy cliff crevices in partial shade to full sun at high elevations. Notable features include its stout, britte, scaly stolons and its narrowly tapered, bluish green drooping leaves.
- Manhart's Sedge (Carex manhartii)- This perennial grass like herb can be fouind in loose clumps with leafy shoots. Commonly found at elevations ranging from 2,000 to 4,000 ft, this plant prefers the acidic soils of cove hardwoods.
- Pink Ladyslipper (Cypripedium acaule)- The Pink Ladyslipper is a perennial herb that is known for its showy flower and pair of basal leaves, and is found acidic soils of pinelands, rhododendron thickets, and mountain bogs.
- Large-flowered Yellow Ladyslipper (Cypripedium parviflorum var. pubescens)- This small perennial has small white leafy stems and elliptic leaves with 1 to 2 yellow flowers. This Yellow Ladyslipper prefers upland oak-hickory-pine forests and mixed hardwood forests.
- Florida Torreya (Torreya taxifolia)- This small evergreen tree can be found beneath magnolia forests and mixed hardwood forests on middle to steep slopes with permanent seepage.

Species of Concern:

Sweet-fern (Comptonia peregrina)
Butternut (Juglans cinerea)
Minniebush (Menziesia pilosa)
Naked-fruit Rush (Juncus gymnocarpus)
Climbing Fern (Lygodium palmatum)
Wild Coffee (Triosteum aurantiacum)
A Moss (Hypnum cupressiformen var. filiforme)
Broadleaf Bunchflower (Melanthium latifolium)
American Ginseng (Panax quinquefolius)
Dwarf Ginseng (Panax trifolius)
Staghorn Sumac (Rhus typhina)
Woodland Bulrush (Scirpus expansus)

Habitats of Concern:

The Georgia DNR has also identified the Shrub Bald and Heath Bald as threatened natural communities. These areas are located on the highest of peaks in Georgia including Tray Mountain, Brasstown Bald, Standing Indian, and Blood Mountains. These balds are composed of a wide variety of plants including Catawba rhododendron, mountain ash, and dwarf willow. A GAP analysis performed by the US Geological Survey Biological Resources Division identified only 281 acres of Heath Bald in Georgia *(Source: Georgia Department of Natural Resources, Game and Fish Division. Georgia's Protected Species.)*

Efforts are being made to protect the rare, endangered and protected species of plants in Georgia. Public and private groups such as the University of Georgia and the Georgia Plant Conservation Alliance are studying and attempting to preserve rare plants and attempting to return them to their original landscapes. Even with these efforts though, rare species continue to be lost for many reasons, including

the drying of wetlands and heavy growth of rhododendrons, mountain laurel and other shrubby plants that shut out light and inhibit reproduction (*Source: Georgia Conservation Alliance*).

Wetlands and Floodplains

Wetlands are those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. The ecological parameters for designating wetlands include hydric soils, hydrophytic vegetation and hydrological conditions that involve a temporary or permanent source of water to cause soil saturation. Fresh water wetlands and aquatic habitats are classified into the following categories:

- *Open water* - Areas of open water, primarily reservoirs, ponds, lakes, rivers, and estuaries.
- *Non-Forested Emergent Wetlands* - freshwater marshes dominated by a variety of grasses, sedges, rushes, and broad leaved aquatics associated with streams, ponded areas, and tidally-influenced non-saline waters.
- *Scrub/Shrub Wetlands* - non-forested areas dominated by woody shrubs, seedlings, and saplings averaging less than 20 feet in height, these wetlands may intergrade with forested wetlands, non-forested emergent wetlands, and open water.
- *Forested Wetlands* - natural or planted forested areas having a dominant tree crown closure or hardwoods, pines, gums, cypress, or any combination of these types. These areas are usually in stream or river floodplains, isolated depressions, and drainways, and contain standing or flowing water for a portion of the year.
- *Altered Wetlands* - areas with hydric soils that have been denuded of natural vegetation and put to other uses, such as pastures, row crops, etc., but that retain certain wetland functions and values.

Major Wetland Values.

Socio-Economic Values	Environmental Quality Values
• Flood Control	• Water Quality Maintenance
• Wave Damage Protection	• Pollution Filter
• Erosion Control	• Sediment Removal
• Groundwater Recharge & Water Supply	• Oxygen Production
• Timber & Other Natural Resources	• Nutrient Recycling
• Energy Source (peak)	• Chemical & Nutrient Absorption
• Livestock Grazing	• Aquatic Productivity
• Fishing & Shellfishing	• Microclimate Regulator
• Hunting & Trapping	• World Climate (ozone layer)
• Recreation	• Fish & Shellfish Habitat
• Aesthetics	• Waterfowl & Other Bird Habitat
• Education & Scientific Research	• Other Wildlife Habitats

Source: American Planning Association, Planning Advisory Service. 1988. Protection of Non-Tidal Wetlands. (Report Number 412/413).

Vegetation Common to Non-Tidal Wetlands.

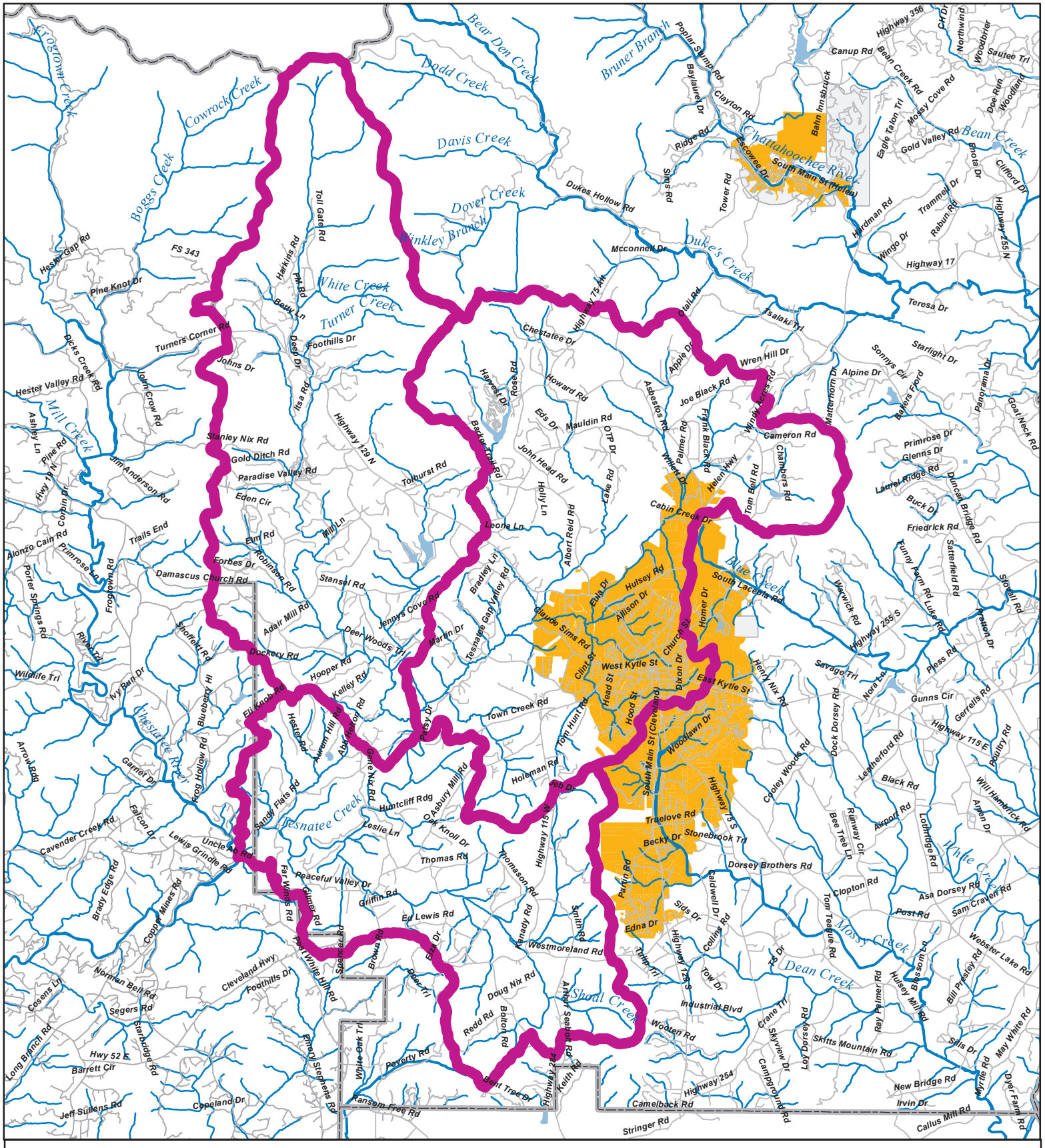
Type of Wetland	Vegetation
Emergent Wetlands: Freshwater	cattails, wild rice, sedges, rushes, bulrushes, spikerushes, burreeds, rice cutgrass, maidencane, reed, arrowheads, pickerelweed, smartweeds, bluejoint, whitetop, reed cannary grass,manna grass, asters, goldenrod, marsh fern
Pocosins	Pond pine, sweet bay, inkberry, fetterbush, titi, red bay, was myrtle
Others	Buttenbush, alders, willows, dogwoods, red maple sapplings, cottonwood sapplings

Source: American Planning Association, Planning Advisory Service. 1988. Protection of Non-Tidal Wetlands. (Report Number 412/413).

There exist three sources for determining the location of wetlands, one of which is the identification of "hydric" soils. Hydric soils are a key indicator of potential wetlands. White County contains 5 hydric soils, which are found throughout the county.

If the wetlands identified in the future land use plan are retained as open space and are protected in accordance with the Environmental Planning Criteria, then no adverse effects are anticipated on the public health, safety and welfare, or the property of others; no known unique or significant flora or fauna, including threatened, rare or endangered species will be impacted; no adverse effects will occur on the flow or quality of water or cause substantial additional soil erosion; no adverse impacts on adjacent natural areas are likely to occur.

According to Federal Emergency Management Agency (FEMA) records, White County entered the National Flood Insurance Program (NFIP) in 2000. Flood plains located in White County are illustrated on the following map and on the Future Land Use Map as parks, recreation and conservation. Currently the local Floodplain Protection Ordinance applies to all FEMA-mapped flood plains and structures located in flood plains. In the near future, flood plains in White County will be remapped and updated under a program called Map Modernization.



Testnatee Creek Watershed
White County Sewer Service Areas

Legend

- Lakes and Ponds
- Streams & Rivers
- Sewer Areas Served

N
W E
S

Georgia Mountains Regional Commission

0 0.4 0.8 1.6 2.4 Miles

ANTHROPOGENIC FEATURES

Governmental Boundaries

The watershed is almost exclusively within western White County. A small portion (~ 4%) lies within northeastern Lumpkin County, next to the equally-impaired Chestatee River watershed. A smaller portion (3%) lies within the City limits of Cleveland, within the Tesnatee Creek watershed proper. The area within Cleveland does NOT include the downtown area or the most intensely developed portions of the city with high volumes of impervious surfaces.

Land Use and Development

As discussed in the land cover and physiography sections, this watershed is predominantly undeveloped and covered with varieties of forests and wooded areas. The vast extent of development within this part of the region is sparsely populated, rural agrarian homesteads and some supporting uses. Farms are prevalent but the terrain and slopes make commercial scale agriculture a difficult proposition. Similarly, fields available for livestock are neither large nor available in volume.

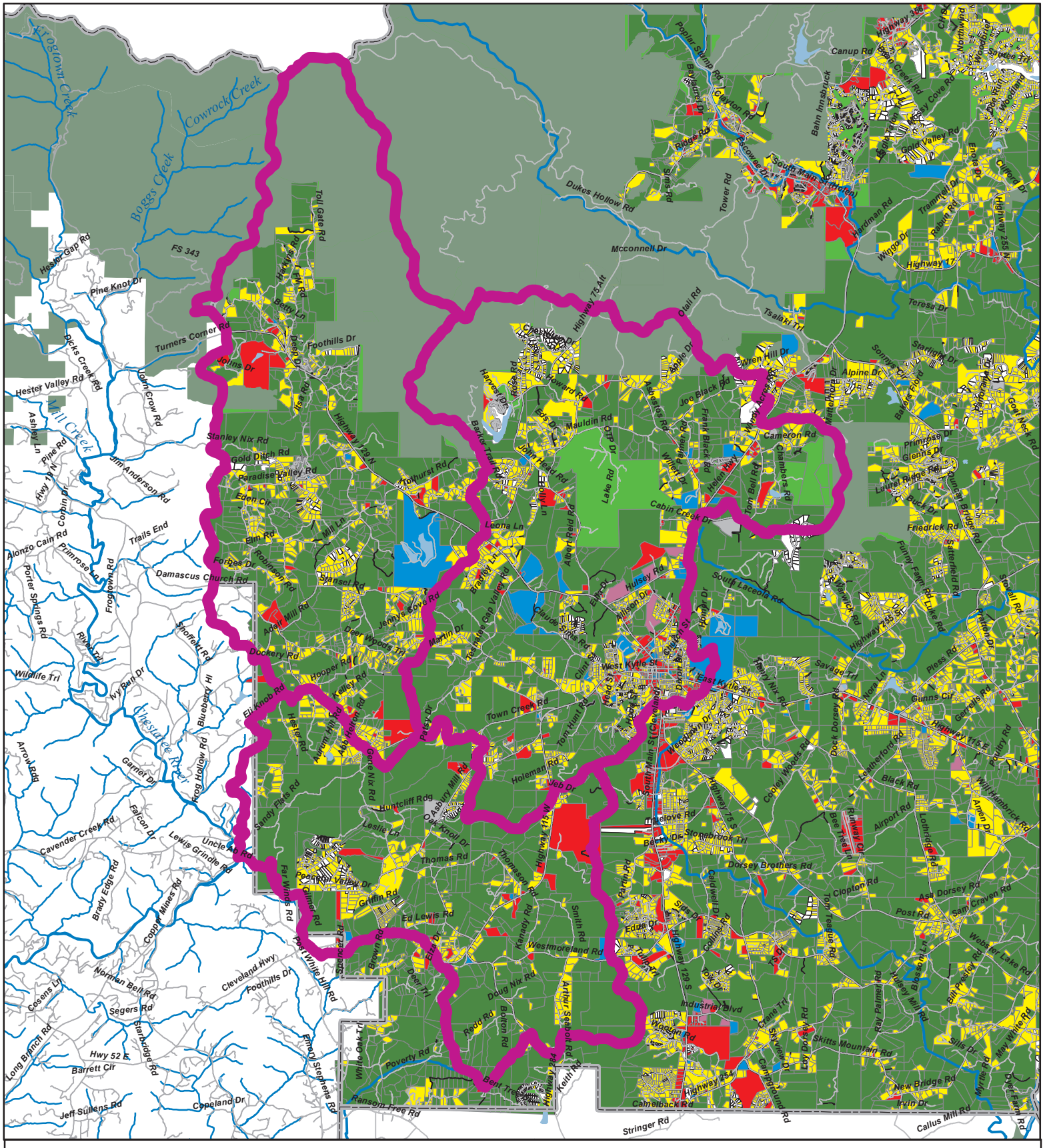
A review of aerial imagery suggests there are possibly as many as 10 poultry houses within the watershed. However several appear in disrepair and may not be in operation, nor was there any evidence found of concentrated dump sites for litter. Only one site may be large enough to imply an ongoing large commercial operation.

The most common structures, based on property records, are simple homes and supporting farm buildings, such as sheds and barns. There are several churches and a small variety of commercial structures, but few (no?) places with expansive parking lots or industrial-scale structures. There are three areas with a concentration of commercial facilities (cross-roads communities) and some additionally denser residential areas in/near Cleveland.

Tesnatee Watershed Land Use		
	Town Creek to Chestatee	Cleveland
Forest	87.4%	87.1%
Pasture, Hay	8.8%	7.3%
Row Crops	1.5%	1.2%
Transitional	0.8%	1.1%
High Intensity Commercial, Industrial, Transportation	0.5%	1.3%
High Intensity Residential	0.4%	0.9%
Open Water	0.3%	0.6%
Other Grasses*	0.2%	0.4%
Quarries, Strip Mines, Gravel Pits	0.1%	0.0%
Low Intensity Residential	0.0%	0.0%
Bare Rock, Sand, Clay	0.0%	0.0%
Woody Wetlands	0.0%	0.0%
Emergent Herbaceous Wetlands	0.0%	0.0%
Total Acres	***45,722***	***17,888***

Based on the preliminary review of land use and development, suggested possible causes of increased levels of fecal coliform into the water include: human waste from sewage leaks or septic tank leaks, development activities, logging activities, domestic animals, urban wildlife, livestock, or rural wildlife.

**=Urban, recreational; e.g. parks, lawns*



Testnatee Creek Watershed (HUC 12)
Generalized Existing Land Use

Legend

- Lakes and Ponds
- Streams & Rivers
- Conservation Lands

Generalized Existing Land Use

- Residential
- Commercial
- Industrial
- Public/Institutional
- Transportation/Communication/Utilities
- Parks/Recreation/Conservation
- Agricultural/Forestry
- Vacant/Open Space

N W E S

0 0.4 0.8 1.6 2.4 Miles

Georgia Mountains Regional Commission

Utilities and Infrastructure

The Tesnatee Creek watershed does not have access to any public sewer and limited access to public water. All of the properties within the watershed rely on a septic system of some kind.

Environmental Interests and Other Organizations

The US Forest Service (UFSF) manages the Chattahoochee National Forest within Georgia, which includes the Chestatee Wildlife Management Area and the Desoto Falls National Forest areas within Lumpkin County. Combined these represent the bulk of the preserved woodland in the northeastern part of the county, and are addressed within the USFS' *2004 Land and Resource Management Plan for the Chattahoochee and Oconee National Forests*. This document guides the federal efforts to protect the local ecology and environmental resources as well as providing visitor access to area camp sites, hiking trails and scenic areas. This document is currently undergoing an update and is routinely shared with local governments as well as being made available to citizens on the USFS web site.

As part of their involvement with the management of the Chestatee, the Georgia EPD routinely monitors stream data for the Tesnatee at 3 points along the creek. This does not always include bacterial monitoring but is used to gauge the relative flow, temperatures and clarity of the river, and to provide early indications of needs for additional testing.

Tesnatee Watershed - Chattahoochee River Basin

GA EPD STATION NO	STATION NAME	LAT./LONG.
02333460	Tesnatee Creek at County Road 200 near Cleveland, GA	34.583332 -83.8225
	Tesnatee Creek at Gene Nix Road near Cleveland, GA	34.568485 -83.83582
	Tesnatee Creek - 0.7 Mile U/S Chestatee River nr Cleveland,	34.564167 -83.8625

Lying within the Chattahoochee River Basin, the Tesnatee is also part of the stream netowrk monitored by the ***Chattahoochee Riverkeeper***. As stated on their web site, the "*Chattahoochee Riverkeeper's mission is to advocate and secure the protection and stewardship of the Chattahoochee River, its tributaries and watershed, in order to restore and preserve their ecological health for the people and wildlife that depend on the river system. Established in 1994, Chattahoochee Riverkeeper is an environmental advocacy organization with more than 7,000 members dedicated solely to protecting and restoring the Chattahoochee River Basin — drinking water source for nearly four million Georgians. Chattahoochee Riverkeeper was the 11th licensed program in the international Waterkeeper Alliance, now close to 200 organizations strong*."

As the foremost advocacy organization in the Chatthoochee basin, the Riverkeeper has supported monitoring exercises, educational forums and water quality grants for various streams within the basin. According to interviews with Riverkeeper staff they have not done any recent on-the-ground projects within the upper Tesnatee watershed within the past several years but would be available to assist in the future.

A recent advisory group with similar interest is the ***Lake Lanier Stakeholder Group***, an advisory committee recently convened in 2013 to provide a forum for local governments and water and sewer service permit holders to review, discuss and advise EPD regarding forthcoming issues about Lake Lanier and all the waters upstream. This effort war particularly driven in response to pending TMDL assessments regarding nutrient loads, specifically phosphorous, and how that might impact discharge permits both now and in the future. This group included representatives from Lumpkin and White County as well as various industry and citizen representatives.

This group met several times over a two year period to learn about EPD's assessments and advised EPD staff about modeling scenarios for pending studies. They also evaluated options for approaching forthcoming TMDLs for the watershed and how communities and permit holders can address remediation measures for restoring water quality as a result.

An additional committee providing a forum for assessing the upper Tesnatee watershed is the ***Coosa-North Georgia Watershed Council*** and the ***North Georgia Water Resources Partnership***. Both organizations represent an 18 county area stretching from the Alabama border to Lumpkin and White Counties. The former represents the EPD-appointed body that developed and will maintain the Coosa-North Georgia Watershed Plan, the latter, which consists of many of the same organizations and people, is the established independent organization that oversees the implementation of various water quality projects. The upper Tesnatee is only a small part of their service areas but they do support educational and improvement programs as well as providing another forum for discussing issues and possible mitigation measures.

The ***Chestatee-Chattahoochee Resource Conservation and Development District*** (CCRCD)is another resource service the area. This advisory council and their related staff work to promote environmental stewardship in the region, including educational activites and administration of implementation grants. The CCRCD will be developing a Watershed Management Plan for the adjacent Towns/Tesnatee Creek watershed and is available to provide assistance within the upper Tesnatee watershed.

WATER QUALITY IMPAIRMENTS AND TMDLS

Georgia employs two tiers of water quality standards for environmental planning purposes: A general criteria applicable to all waters, and more detailed, specific criteria for each of six designated uses.

The general criteria (shown below) are qualitative and reflect the goals form Georgia's streams, rivers, ponds and lakes. These are established to ensure consistency across resource initiatives and to keep a comprehensive perspective in everything EPD does for maintain water quality.

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

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

Beyond this, waters within Georgia are given one of six designated, which can vary in strictness of individual standards. This allows for more contextually sensitive policies and guidelines with regards to

managing each type of resources, respecting the differences across types of water bodies. These six designations are:

Drinking Water Supply
Fishing
Wild River
Recreation
Coastal Fishing
Scenic River

Tesnatee Creek is designated for fishing.

Once designations are made, the State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into one of three categories depending on water quality assessment results: supporting designated use, not supporting designated use, or assessment pending. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that addresses the assessment process, and are published in Water Quality in Georgia (GA EPD, 2010 – 2011).

A subset of the water bodies that do not meet designated uses, those in Category 5 on the 305(b) list are assigned to Georgia's 303(d) list, named after that section of the CWA. Water bodies included in the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality criteria. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality based controls to be developed to reduce pollution and restore and maintain water quality.

A TMDL is a calculation of the maximum amount of a pollutant, from both point and non-point sources, that a waterbody can receive and still meet water quality standards. The Clean Water Act, section 303, establishes the water quality standards and the TMDL programs. TMDLs are simply the implementation of rules included in Section 303(d) of the Clean Water Act of 1972. The resulting inventory of impaired streams and water bodies provides a basis for decisions related to restoring water quality. Although some TMDLs are aimed at managing all sources of pollution which affect beneficial uses of water, the focus of the implementation plan discussed here relates primarily to nonpoint water sources including contamination from diffuse sources such as agricultural and urban runoff.

TMDL History

In 2002 (with a revision in 2003) the Georgia Mountains Regional Commission developed a Tier 2 TMDL Implementation Plan for Tesnatee Creek using Section 106 funds provided by the Georgia Environmental Protection Division (GAEPD). This original plan focused only on the two impaired segments of Tesnatee Creek for a total of 10 miles.

The original TMDL Implementation Plan addressed the general characteristics of the watershed and the potential sources of pollution, which were determined to be non-point sources such as wildlife, animal production, and failing septic systems. It identified stakeholders and described public involvement as well as educational and outreach activities that were conducted to teach them what could be done to improve the conditions of the watershed. In addition, the plan described regulatory and voluntary

practices/control actions (Best Management Practices, or BMPs) needed to reduce pollutants by 36% to achieve its designated use. Furthermore, it laid out a preliminary milestone schedules to show development of the BMPs and a basic monitoring plan to determine BMP effectiveness. However this original TMDL Implementation Plan does not meet the current USEPA's Nine Elements of Watershed Planning.

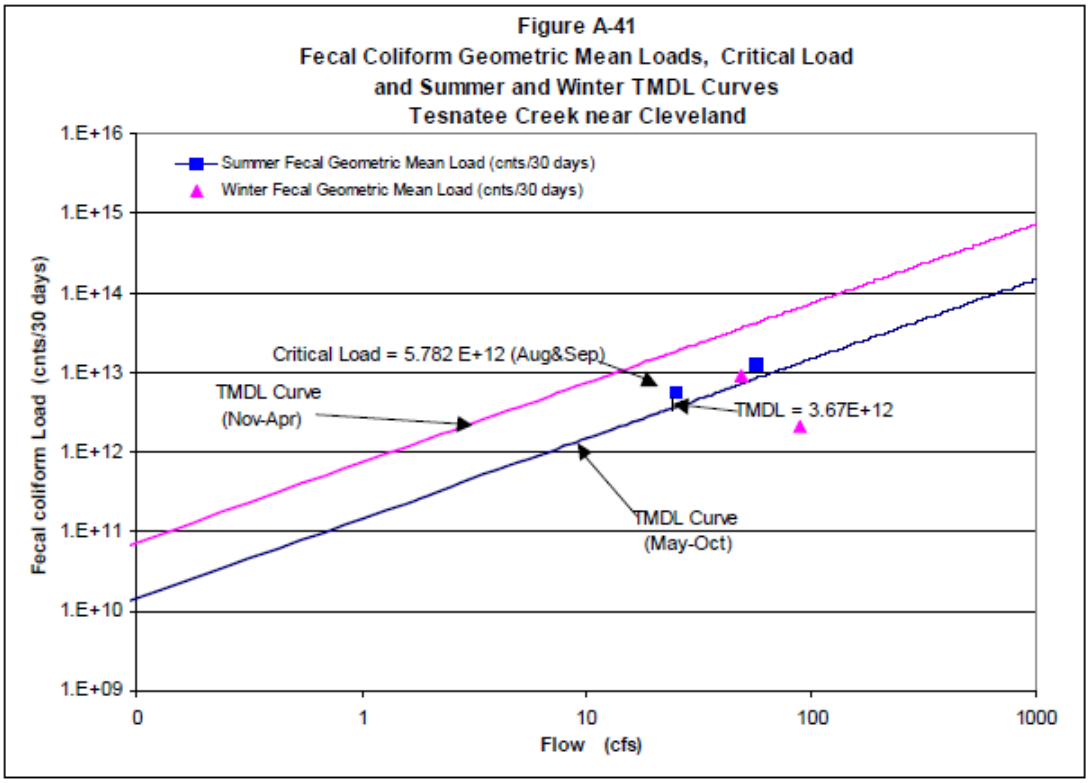
Since the last revision of the original TMDL Implementation Plan, other streams in the watershed, that are tributaries to the Tesnatee Creek, have been added to the 303(d) list of impaired waters including Tesnatee Creek Also two supporting streams have been added to the 305(b) List of waters, Town Creek and Shoal Creek.

Also since the last revision, the land uses have changed in some aspects in the watershed in that mining is now taking place on a section of the Town Creek. The agricultural component remains the same with more farms and homes but there are no major changes such as subdivisions or commercial establishments.

Finally in 2014, as part of the Georgia's Statewide Nonpoint Source Management Plan development, the GAEPD revised and identified 176 Priority Watersheds at a HUC12 level. Projects in these watersheds guide GAEPD's 319(h) competitive grant funds, other GAEPD efforts including potential compliance assurance efforts, and GAEPD's partners' nonpoint source control activities. Two of the HUC12s that make up the Tesnatee Creek Watershed are considered Priority Watersheds (031300010502 and 031300010504). Thus updating the Tesnatee Creek watershed plan and installing implementation activities in the area are a priority of GAEPD.

Data for Figure A41, including: observed fecal coliform, instantaneous flow fecal coliform load, fecal coliform geometric mean, mean flow, fecal coliform geometric mean load.

Date	Observed Fecal Coliform (counts/100 ml)	Estimated Instantaneous Flow On Sample Day (cfs)	Estimated Fecal Coliform Loading on Sample Day (cnts/30 days)	Geometric Mean (cnts/100 ml)	Mean Flow (cfs)	Fecal Coliform Loading (cnts/30 days)
20-Jan-00	20	56	8.22E+11			
2-Feb-00	20	111	1.63E+12			
8-Feb-00	50	77	2.82E+12			
16-Feb-00	50	111	4.07E+12	32	88.75	2.06E+12
16-May-00	170	66	8.23E+12			
23-May-00	1100	72	5.81E+13			
8-Jun-00	80	49	2.88E+12			
13-Jun-00	490	42	1.51E+13	293	57.25	1.23E+13
15-Aug-00	360	21	5.55E+12			
23-Aug-00	170	26	3.24E+12			
30-Aug-00	490	26	9.35E+12			
12-Sep-00	330	27	6.54E+12	315	25	5.78E+12
6-Nov-00	330	31	7.50E+12			
13-Nov-00	490	49	1.76E+13			
28-Nov-00	110	62	5.00E+12			
29-Nov-00	230	54	9.11E+12	253	49	9.09E+12



WATERSHED ASSESSMENT

VISUAL FIELD SURVEY

Assessment of the watershed was done throughout the 1.5 years of the project, involving GMRC staff touring the watershed, identifying and noting land use and development trends and surveying the river and stream banks for general integrity. Where possible, GMRC staff also walked the river and stream banks for closer examination of the water clarity and quality. Throughout the process, sites and land uses suspected of contributing to the impairment of the river were noted.

The watershed is in the burgeoning foothills of Appalachia, with an abundance of scenic vistas and narrow valleys winding among the many steep slopes. The topography has ensured this area is predominantly rural, with a variety of residential styles playing off the large farmstead, small country house and rustic wooded cabin theme. Most of the houses are on larger lots and built into the hillsides either to take advantage of the vistas or to seek out privacy. There are no conventional subdivisions within this particular watershed and the only distinct changes in development character is the occasional church or independent commercial use, such as an auto repair shop or fruit stand.

There is some agricultural activity, including a couple of livestock operations where terrain allowed. A good number of houses exhibited small yards set aside as pastures for horses or goats, and there were a couple chicken houses seen, as well. This particular part of the state, nestled near the Chattahoochee National Forest, is also thick with wildlife, and there were several wooded properties marked to indicate the use as a hunting preserve.

Overall the river appeared in good condition. The slopes and desires for privacy in the area have apparently helped keep points of routine intrusion to a minimum, as the majority of the river itself looked undisturbed. Despite this being the start of the river, it is fed by many strong creeks that the main artery is considerably wide and strong, with many points of rapids and shoals and an abundance of tree cover. Litter here is at a minimum, and while there were some instances of homes built in close proximity to the river banks the general threat of encroachment seemed very low.

Some of the smaller tributaries run through the valleys with much less vegetative cover and at least in one instance was directly accessible by the livestock kept on one property. In many instances these streams form the boundary between properties and are covered by only the minimal amount of grass and shrubs. A couple of houses have made seating areas near the creeks, but did not appear to damage the banks save for trimming vegetation so as to view the water.

<u>Preliminary ranking of possible sources:</u>
Livestock & Leaking septic systems
Wildlife
Urban Dev/ Runoff

ADVISORY COUNCIL AND PUBLIC INVOLVEMENT

Any successful environmental protection and mitigation program requires a level of public outreach, education and involvement. This ensures the community is receiving the most information possible to correctly assess the situations and make wise decisions. This also ensures the widest number and variety of stakeholders and potential contaminant contributors are being presented with the information necessary to implement any improvement measures.

While both Counties currently provide a modicum of leadership and support to stakeholders in this area, there is no singular existing body designed to discuss and champion local environmental concerns within White or Lumpkin County. This means an advisory council to help guide efforts concerning the Tesnatee Creek watershed must be developed. The following names of people and organizations have been mentioned for participation in this capacity, and the exact make-up and format for the advisory council will be confirmed within the second year of the WMP development.

Specific measures regarding the Tesnatee Creek will include regular communication and meetings with the Partnership Advisory Council (PAC) and other stakeholders. Due to the abbreviated timeline for this project (only 3 months for building the document), stakeholder involvement was initially be handled through direct communication such as emails and phone calls, with general input handled upon initial contact with most parties and organizations. The committee will continue to be involved throughout the process, however, and the WMP may be amended based on their input going forward.

NAME/ORG	ADDRESS	CITY	ZIP	PHONE	E-MAIL
Adam Hazell; GMRC	PO Box 1720	Gainesville	30503	770.538.2617	ahazell@gmrc.ga.gov
Barbara Stitt-Allen; EPD	4220 International Parkway, Suite 101	Atlanta	30354	404-675-1745	barbara_stittallen@dnr.state.ga.us
Ga. Water Coalition	817 W. Peachtree St.; Suite 200	Atlanta	30305	866-889-2837	sudvardy@gaconservancy.org; sbarmeyer@gwf.org
Frank Riley, CCRCD	Scoggins Drive	Demorest	30535	706-894-1591	Frank.ccrcd@gmail.com
Georgia Forest Watch	15 Tower Road	Ellijay	30540	706-635-8733	info@gafw.org
Harry Barton; White Co. Planning Dir.	59A South Main Street	Cleveland	30528	706-865-6768	hbarton@whitecounty.net
Larry Reiter; Lumpkin Co. Planning Dir.	25 Short Street	Dahlonega	30597	706-864-6894	lreiter@lumpkincounty.gov
Jason Ulseth; Upper Chatt. Riverkeeper	615F Oak Street, Suite 1000	Gainesville	30501	770-531-1064	julseth@riverkeeper.org
Stanley London, White County Farm Bureau	PO Box 849	Cleveland	30528	770-865-3177	c/o pramey@gfb.org
Bobby Gunter, Lumpkin Co. Farm Bureau	PO Box 538	Dahlonega	30597	706-864-2597	c/o jiburnett@gfb.org
Sean Sullivan; White Co. Env. Health	1241 Helen Highway, Unit 210	Cleveland	30528	706-348-7698	
Sheryl Dockery, NRCS		Cleveland	30528	706-865-2912	

It has been recommended the Counties also find a way to support a regular environmental advisory committee. Tesnatee Creek is a major water source for Lake Lanier and the region, but there is no standing body to regularly champion and monitor the health of the watershed within either county. A standing body that meets as they are able, with stakeholders from each government, the local Farm Bureau and others could assist in not only regularly communicating the needs and issues of the river but also help coordinate management measures among all involved.

MITIGATON PROGRAM

WATER QUALITY GOALS

The overarching goal for Tesnatee Creek is the same as that of the State's general standards for water quality. That is, to render the creek and all of its streams free of contaminants, healthy for its ecology and fully compliant with the measurable standards for water bodies with the State's designation. Optimally, this would also entail restoration of any deteriorating stream banks and the mitigation of any critical sources of erosion and sedimentation from developed areas, so as to better sustain the quality of the watershed going forward.

Broken into individual elements, the practical goals for the Tesnatee watershed, as pertaining to this WMP, are as follows:

Restoration of Measured Water Quality

As discussed above Tesnatee Creek remains listed among the State's impaired waters and requires an approximate 37% reduction in pollution levels in order to restore water quality to designated standards. This represents the summation of everything discussed throughout this WMP and the original TMDL for Tesnatee Creek, so any and all actions done to improve conditions within the watershed must ultimately yield future water testing results that establish Tesnatee Creek has once again come into compliance with the appropriate State standards.

This means that even if a variety of measures are implemented and the clinical testing still reveals impaired water quality levels, then the priority goal of this WMP process and document have not been achieved. However, if testing reveals the creek has come into compliance even if not all of the recommendations have been implemented then remaining measures should still be pursued but the goal of restored water quality would have been met.

Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
	Counts/ 30 days)	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Tesnatee Creek Cleveland						
5.78E+12	6.83E+10		3.23E+12	3.67E+11	3.67E+12	37%
Tesnatee Creek Town - Creek to Chestatee River						
5.78E+12			3.30E+12	3.67E+11	3.67E+12	37%

Establishment of Watershed Maintenance Measures

As the water quality for Tesnatee Creek is restored and the overall health of the watershed is improved, a key supplemental component of this WMP is to create and employ an ongoing program that will help sustain the environmental integrity of the Tesnatee and its supporting tributaries. Many of the elements required for this are in place or readily available, so it is hoped that with minimal effort and coordination all of the stakeholders involved can help monitor conditions, educate others and do their part to keep the Tesnatee watershed healthy.

Achievement of this goal will require, at a minimum, the following elements:

- Acknowledgment of the impairment listing and remediation plans within the Lumpkin and White County Comprehensive Plans;
- Establishment of/Maintaining local policies and programs regarding code enforcement, with special attention paid to watersheds with impaired streams;
- Development of a long-term water sampling and testing program to routinely monitor the bacteria levels within the Tesnatee;
- Regular communication among stakeholders concerning updated information about the watershed, possibly via an annual status report;
- Establishment of an overall watershed education strategy for area stakeholders.

IMPAIRMENT SOURCE ASSESSMENT

This element includes an accounting of the significant point and nonpoint sources in the watershed, in addition to the natural background levels that make up the pollutant loads causing problems in the watershed. The analytical methods did include mapping, modeling, monitoring, and field assessments to make the link between the sources of pollution and the extent to which they cause the water to exceed relevant water quality standards.

Point Sources

Point sources are singular, clear places where an outside element is being introduced to a water body, one which may or may not be carrying contaminants and thus polluting the stream or lake. These are typically things like industrial pipes, spillways, storm sewer drains or other controlled means for directing flows toward a surface water or holding pond. Most of these require special permitting and management to ensure protection against contamination, but occasionally point sources can escape detection through oversight or mal intent.

NPDES Facilities Discharging Fecal Coliform in the Chattahoochee River Basin

Facility Name	NPDES Permit No.	Receiving Stream	Actual 2000 Discharge NPDES Permit Limits		Actual 2000 Discharge NPDES Permit Limits		Number. of Violations 7/98 - 6/01
			Avg. Flow (MGD)	Geo Mean (No./ 100 mL)	Avg. Monthly Flow (MGD)	Geo Mean (No./ 100 mL)	
Cleveland WPCP	GA0036820	Tesnatee Creek Tributary	0.28	32.5	0.75	200	0

As previously mentioned there are no known point-sources within the Tesnatee watershed that require registration and permitting. There are some small culverts and storm drains that direct immediate

runoff into stream channels but none that are part of larger municipal systems. There are some sewer lines within the watershed but no major violations or concerns emanating from that system to date. As of this completion through this WMP process there have not been any other point sources identified within the watershed.

Non-Point Sources

Non-point sources refers to how various areas within a watershed may contain polluting elements that are then introduced into a water body through storm water runoff, flooding or other means. As sources they may be inconsistent and obviously difficult to identify, but through investigation and a process of elimination it is possible to identify geographic sources of contamination and then analyze the local conditions that are conducive to producing pollutants.

Wildlife

Lumpkin and White Counties lie within a heavily wooded and rugged part of the state, complete with National Forests, wildlife management areas and parks that allow all manner of wildlife to thrive. The area is a known destination for hunters and hikers who comes to see the scenic beauty and encounter wild animals in their native habitat, including bears, beavers and more.

Of special attention to this WMP is the prevalence of larger mammals, from large rodents to deer, coyotes and even bears. Mammals produce the type of warm waste that is particularly harmful when introduced to surface waters, so concentrations of these animals within close proximity to the streams and rivers is of crucial concern to water quality interests.

The most abundant manner of wildlife in the region warranting concern is the deer. Wild deer have become abundant in much of Georgia as human development displaces their natural predators. According to the State DNR, within the *Georgia Deer Management Plan 2005-2014*, Lumpkin and White Counties are within the northernmost Deer Management Unit, a section of the state with defined traits and compatibility for deer populations. The plan estimates that the population within this region is approximately "*27 deer per square mile of forested acreage*." At the time projections indicated the potential for that figure to increase, even considering additional human development, due to the presence of deer-friendly habitats.

Pending updated figures from DNR it is possible the region now harbors a population of near 35 deer per forested mile, the approximately maximum for stability projected by the State. This is due in part to the limited change in measures to control the population locally and the increased tenor of comments received from the public as received by DNR and other natural resource offices. If suspected then it's probable that deer are among the prominent causes of contamination of the Tesnatee as their herds gather near watering spots and seek shelter and food within the many woods and fields.

In addition to deer discussion among Advisory Committee members and other stakeholders suggests there is a potential impact from feral hogs within the watershed. As with deer, the population of these animals has thrived as their natural predators are driven out by human activities. Particularly in areas with some row crop production to supplement natural food sources, feral hogs have grown in presence within the Georgia Mountains region. Because these animals can grow to substantial size (175+ pounds for adults), produce sizable litters over multiple years, will gather near watering sources and typically

travel as a small herd, feral hogs are capable of producing copious amounts of waste that would severely impair area streams.

Other animals within the watershed are sparse in numbers or small enough that they're considered as a collective of other mammals in the region. This would include larger predators such as black bears, coyotes, bobcats and (possibly) eastern timber wolves. It would also include large rodents such as beavers, opossum and groundhogs. None of these alone measures significantly enough within the watershed to be considered a major contributor to bacteria contamination levels, however taken as a whole in this predominantly wooded area they are regarded a factor.

Lastly, there is a notable presence of foul within the area that can likewise add to the pollution levels. Wild turkeys are found throughout the region and the abundance of various ponds in the region has drawn numbers of geese and ducks.

Agriculture - Livestock

Agricultural livestock refers to the animals retained on farmsteads for the production of young and/or milk, including cattle, pigs, horses, goats and poultry. Some livestock farms are large commercial operations (even requiring special permitting), while others are small and oriented around production only for the owners. At any scale, the animals produce wastes that can severely impair waters, and often this waste is left in fields or stalls where storm water runoff can wash the waste into open streams, ponds and lakes. It's also not uncommon to see livestock wading within perennial streams for drinking and to cool off, while in the process directly dropping their feces within the water. Because of these factors, management of livestock is considered a critical component to water quality health.

As noted before, the Tesnatee Creek watershed is predominantly rural but agricultural activity is only seen in modest amounts. This is due largely to the sloping topography that minimizes the opportunity for large fields and pastures. What activity is present, though, is that much more conducive to aggravated issues due to the runoff conditions created by the steeper slopes. This increases the streams sensitivity to runoff pollution, and makes livestock management all the more critical.

Estimated Agricultural Livestock - 2009

	Beef	Dairy					Poultry		
County	**Cattle**	**Cattle**	**Swine**	**Sheep**	**Horse**	**Goats**	**Layers**	**Broilers**	
White	5,200	300				140	400,000	26,752,000	150,000
Lumpkin	2,549	-	-	82	20	158	140,000	12,672,000	36,000

Natural Resources Conservation Service - 2011

State records estimate agricultural livestock in Lumpkin and White Counties consists overwhelmingly of poultry, with some cattle and even less of other animal operations. Apart from the barely registered counts of sheep, horse and goats, Lumpkin County exhibited the lower counts among all animal categories, suggesting the upper Tesnatee watershed is less likely to feature heavy livestock activity.

Records indicate three large confined animal feeding operations (CAFOs) within the watershed, with the listing shown below. Field surveys did not identify other sizable farms that may qualify as commercial livestock operations. There were open fields on several properties but few animals seen. There was also a limited count of poultry houses (10 within the watershed), with only one property featuring more than 2 poultry houses.

Registered CAFOs in the Chattahoochee River Basin

Name	County	Type	Total Animals
Bobby R. Gunter Dairy Farm	Lumpkin	Dairy	200
McClure Hog Farm	Lumpkin	Swine	2000
R&R Farm #4	White	Swine	2200

Source: Permitting and Compliance Program, Environmental Protection Division, GA EPD, 2002

Of the farms and livestock observed a few properties had only topography and natural brush to prevent animals from open access to streams. Of note were the variety of small ponds on many of these properties, used to retain water for animals to drink and in which to wade. It is assumed any of these ponds within active farms would harbor high bacterial counts do to animal wastes and limited water refreshment or agitation. It's not unlikely that some of these ponds may experience flooding and the runoff could make its way into nearby streams and rivers.

Agriculture – Row Crops

Agricultural row crops refer to the planted and harvested vegetation associated with large scale farming. These are a factor in considering bacterial infiltration into waterways as many soil fertilization practices employ significant amounts of manure and animal wastes to improve the nutrient make-up for growing various plants. Depending on the overall soil management plan and the method for applying such fertilizers, storm water runoff can transmit the topsoil and freshly spread manure into adjoining creeks and streams.

Land cover and field survey information indicate minimal acres of row crops within the watershed. Some3-5 fields identified that may harbor routine use for crops, but throughout various observations there was limited indication of large scale land disturbance or soil turnover. While the topography limits the volume of large crop fields, it also provides an element that raises the potency of any runoff as it reaches the surface water, meaning fields may be that much more likely to contribute to runoff if located along a slope just above a stream or creek.

Septic Systems

Septic systems are a type of on-site wastewater treatment facility, involving an underground receiving tank and an outflow line laid into a leach or drainfield. Wastewater enters the tank, allowing solids to settle and scum to float. The settled solids are digested in an anaerobic bacterial environment while the excess liquid then drains into the leach field. Due the potential of waste by products to enter the soil in the drainfields, percolation tests are required to establish the porosity of the local soil conditions.

The rural nature of the Tesnatee watershed demands a dependence on on-site septic systems, which is a critical issue given the relatively limited amount of soil conditions ideally suited for septic applications.. The same issues with steep slopes exacerbating runoff concerns from animal wastes also raises the stakes for leaking septic systems. Especially for those properties where the tank or drainfield may be in close proximity or directly upslope from a surface water body, the potential for contamination from faulting systems is considerably high within such watersheds as the Tesnatee. The soil make-up of each property is also a factor, with many parts of Lumpkin and White Counties exhibiting soil types unsuitable for some types of septic systems.

Septic Systems

County	Existing Systems (2006)[1]	Existing Systems (2011)	Systems Installed (2007 to 2011)	Systems Repaired (2007 to 2011)
Lumpkin	11,462	12,314	852	71
White	10,717	11,276	559	217

There are some sewer lines within the Tesnatee watershed within the City of Cleveland, while every structure in the unincorporated counties is dependent on septic systems for processing waste. Given the age of most properties it is estimated the majority of systems in the area are from 1995 or older, and likely in need of maintenance or possible replacement. The low rate of system repairs for Lumpkin between '07 and '11 suggests the potential for leaking or faulty systems is fairly high.

Urban/Suburban Runoff

General stormwater runoff from developed areas is considered its own category of potential non-point source pollution. This refers to runoff from storm sewers and impervious surfaces such as parking lots, roads and larger structures, and while these waters are not typically contaminated with animal waste they can contribute to stream impairment through erosion and sedimentation that activates legacy wastes in soils, as well as provided additional solids that disrupt water clarity and nutrient balances.

The Tesnatee watershed is not heavily developed and there are limited opportunities for urban runoff. There are several concentrations of homes and structures that could produce aggravated runoff, as well as several arterial roadways running directly alongside and over streams or creeks, including several unpaved roads and driveways. While these conditions may not harbor large impacts on the Tesnatee watershed, they should be monitored for any potential improvements through best management practices.

Ranking and Prioritizing of Sources of Impairment

As part of the planning process EPD asks that the potential sources be assessed based on the perceived extent and magnitude of their contribution, with additional reflection based upon public input. The matrix below has been developed as a means for indicating these relative assessments, using the following definitions:

Extent	Refers to the scope and range to which this source is present throughout the watershed
Magnitude	Refers to the perceived potency or volume of contribution resulting from this source
Permit	Indicates whether there is a State or local permit required for this activity
Estimated Contribution	Indicates the comparable degree for which this source is responsible for current pollution levels
Stakeholder Priority	Indicates which sources are of most importance to stakeholders involved in the process

After consideration of the various potential sources of impairment through field surveys, research and discussion among stakeholders and the general public, it's considered that of the regular possible non-point sources that runoff from wildlife and failing septic systems are the most prominent sources of pollution for the Tesnatee, with agricultural sources considered after that.

Source	Extent	Magnitude	Permit (Y/N)	Estimated Contribution	Stakeholder Priority (Rank 1-5)	Comments
Agriculture						
Diffuse runoff of animal waste associated with erosion	Med	Med	N	Med		Moderate probable cause but limited options for mitigation
Runoff from concentrated animal operations	Low	Med	Y	Med		No large scale operations in watershed means more smaller projects in order to yield benefits
Spreading of animal waste or municipal sludge on fields	Low	Med	N	Low		Few crop farms in watershed but high rate of return in BMP application
Failing septic systems	High	High	Y	Med		Difficult to manage but a critical source to be addressed
Runoff from urban development	Low	Low	N	Low		

EXISTING AND RECOMMENDED MANAGEMENT MEASURES

This element describes the management measures that need to be implemented to achieve the load reductions estimated above, as well as to achieve any additional pollution prevention goals called out in the watershed plan (e.g., habitat conservation and protection). Pollutant loads will vary even within land use types, so the plan should also identify the critical areas in which those measures will be needed to implement the plan.

Local Codes and State Laws

Both Lumpkin and White Counties maintain many policies and programs which illustrate their respective commitment to environmental stewardship in general. Many of these measures apply to the Tesnatee Creek watershed, though the specific activity may not have occurred during this planning time frame. However, as these actions benefit all of the County and its properties they are being presented to demonstrate the type of watershed management already in place with each government and Tesnatee Creek.

Both jurisdictions employ an *Erosion Control and Sedimentation Ordinance* to help control pollution along surface streams. Both local governments adopted the State of Georgia model ordinance that

established stream protection measures for certain construction sites. Both County governments also rely on their respective Health Departments, through rules and regulations established the Georgia Department of Human Resources, to administer the review and placement of septic systems for residential, commercial and industrial land uses.

Both White County and Lumpkin County have also adopted five *environmental protection ordinances* required for State-designated vital areas. Combined these minimum standards ensure that environmentally sensitive areas are protected from the impacts of poor, inappropriate or overly intensive development. Most regulate development scale, type and location within proximity of these vital areas, ultimately retaining the integrity of stormwater runoff draining into each condition.

- The *water supply watershed ordinance* will limit types and density of development that would impair the water supply or watershed. This ordinance will allow for the establishment of protective buffers around streams where septic tanks are not allowed to be placed. This ordinance will also limit impervious surface adjacent to streams.

- The *river corridor protection* ordinance protects land within 100 feet horizontally on both sides of a river at the point when it becomes 400 cfs, which applies to the Tesnatee downstream from this watershed. New construction is prohibited in the river corridor except for single family houses on two-acre or larger lots. Septic tanks and septic tank drainfields are prohibited in the river corridor, as are hazardous waste and solid waste landfills. These provisions help to keep pollution flowing into the river at a minimum. Potential for fecal coliform bacteria caused by leaking septic tanks is decreased by this ordinance.

- The *wetlands protection ordinance* protects land alterations within or near wetlands that will significantly affect or reduce their primary functions for water quality control, floodplain and erosion control, groundwater recharge, aesthetic nature, and wildlife habitat. The floodplain control measures also serve to indirectly control fecal coliform bacteria levels because of the direct correlation between fecal coliform bacteria levels and flow rates. Less unnatural flooding and water diversion means lower flow rates, and therefore, lower fecal coliform levels.

- The *mountain protection ordinance* protects land above 2,200 feet elevation by limiting lot sizes and density of land uses. Also included in this ordinance is that no more than fifty percent of a lot can be cleared or timbered.

- The *ground water recharge ordinance* regulates lot sizes and density of land uses in areas designated as a significant recharge area. This ordinance also prohibits a number of uses that handle hazardous materials and requires liners for agricultural lagoons.

Dedicated Environmental Management Resources

There are several organizations designated throughout the State to assist communities with local management of natural resources, often provided layers of education, mitigation programs and other means to ensure landowners are applying sound stewardship practices. Combined these agencies provide a variety of resources that can assist with implementing the WMP and maintaining the overall quality of the watershed. In addition

Agency	Program		Impairment Addressed
Georgia EPD	Georgia Water Quality Control Act (OCGA 12-5-20)	Regulates discharge of pollutants into waters of the state to protect public health, safety, and welfare, and to preserve stream habitats for animals and aquatic life.	All
	Georgia Erosion and Sedimentation Act	Requires permits and standards regarding undisturbed buffers on state waters.	All
	NPDES regulations for CAFOs over 1,000 animal units	Permitting program created to protect and improve water quality by regulating CAFOs.	Agriculture
Georgia Department of Agriculture	Georgia Regulations for CAFOs 301 to 1,000 animal units	Outlines requirements for Feeding Operation and Land Application System (LAS) permits.	Agriculture
Natural Resource Conservation Service	Environmental Quality Incentives Program (EQIP)	A cost-share program to assist landowners seeking to implement BMPs.	Agriculture
	Conservation Reserve Program	Costs shared with FSA for conversion of sensitive farmland acreage to vegetative buffers along waterways.	Agriculture
	Conservation Technical Assistance Program	Assists landowners with creating management plans for their lands, including but not limited to Farm and Forest Conservation Plans and Comprehensive Nutrient Management Plans (CNMPs).	Agriculture
Chest-Chat Resource Conservation & Dev. Council	BMP education and grant assistance	Support arm of the NRCS providing educational forums and assisting landowners and communities with grant applications and administration	All
Lumpkin Co./ White Co. Environmental Health Offices	Regulations for On-site Wastewater Management	Permitting and inspection of new and repaired systems.	Urban/ Suburban Runoff
Lumpkin Co./ White Co. Extension Offices	UGA Cooperative Extension Program	Assists agricultural operations with soil and water conservation.	Agriculture

Voluntary environmental stewardship efforts within the counties include active *Adopt-A-Stream* programs. The White County program is assisted by two community groups, Preserve White County and the Sautee Nacoochee Community Association (SNCA). The SNCA has organized an environmental concerns committee that focuses on public education through a series of community forums. The Lumpkin County program is aided by Keep Lumpkin Beautiful. The Chattahoochee Riverkeeper is another resource available to assist with volunteer related efforts including educational programs, organization of events, and monitoring as time and resources permit.

Two members of the University System of Georgia are also available to provide assistance where possible. The *University of North Georgia*, based in Dahlonega, has used students and class work to perform various water sampling projects and stream bank assessments in Lumpkin and White Counties. The *North Georgia Technical College*, based in Clarkesville, has also supported watershed programs including staff and student involvement in the Soque River Watershed Partnership in neighboring Habersham County.

Recommendations for Additional Management Measures

On the basis of the existing source loads estimated above, this element discusses various management measures that will help to reduce the pollutant loads and estimate the load reductions expected as a result of these management measures to be implemented, recognizing the difficulty in precisely predicting the performance of management measures over time. The estimate should account for reductions in pollutant loads from point and nonpoint sources identified in the TMDL as necessary to attain the applicable water quality standards.

The recommended load reductions with this WMP are representative of the projected share each potential source contributes to the overall impairment. It has also been selected based on the probable impact of remediation measures.

- *Detailed Inventory of Septic Systems*
  This particular watershed is completely reliant upon on-site septic systems to treat wastewater, and many of these systems are aging and/or within close proximity to a surface water. To the best extent possible, both jurisdictions should work to develop an accurate, up-to-date parcel map that can be codified based on the presence, age, and proximity to the stream of each septic tank and drainfield. As new testing can be used to identify hot spots within the river and tributaries, this information could aid in identifying any correlating concentrations of septic systems that may be candidates for failures or leaks. Where possible, information about system repairs should also be accounted for, providing the most accurate portrait possible of the viability of on-site systems within the watershed.

- *Survey Application of Agricultural BMPs*
  While this watershed is not the most populated with regards to livestock, there are enough farms in the area to warrant consideration. More importantly, the terrain and general accessibility seen for some streams suggests this remains a possible source of contamination. A coordinated effort involving the Counties, local Farm Bureaus and other stakeholders could serve to increase promotion and awareness of watershed stewardship, while simultaneously confirming the volume of livestock present within the watershed and the level of vulnerability.

The three separate actions entailed would begin with a detailed accounting of livestock operations within the watershed, complete with visual field surveys of conditions and written surveys for property owners to determine the extent of BMP applications. The second action would be the distribution of promotional material about agricultural BMPs in general and information about specifically about the Tesnatee Creek. Lastly, a follow up effort for remediation should be developed for any incidents of livestock operations with severe conditions that are strongly suspected of causing water pollution.

- *Targeted river bank surveys and clean-ups*
  In addition to routine observation and surveys of the watershed, a concentrated effort to walk as much of the river as possible at least once per year would help confirm the integrity of the stream banks and identify possible points of animal intrusion. This could coincide with efforts to maintain the cleanliness of the watershed, and would increase public awareness of the need to sustain healthier watersheds. These could be coordinated with Adopt-A-Stream to both benefit the communities and also provide an additional opportunity for volunteer training and participation.

- *Review and update of education programs and materials*
  Both White County and Lumpkin County currently employ several methods to engage area residents, employers and developers on the rules and efforts behind maintaining local water quality. A specialized approach for Tesnatee Creek could aid in this effort by providing targeted information to critical stakeholders, building a stronger sense of vested interest among property owners and business owners and hopefully increasing awareness and support for BMPs and mitigation measures. This could include promotional material illustrating the health of Tesnatee Creek watershed and special guidance about WMP related activities and issues.

- *BMP promotional campaign – Agricultural ponds*
  Many properties within the watershed feature ponds of various sizes, something readily possible given the sloping terrain and directed rain channels. Of these ponds several are surely provided as a watering source for livestock, making them highly likely to contain high bacteria levels. To ensure these ponds are being properly managed against overflow draining directly into perennial streams, a promotional campaign should be established to ensure landowners area aware of available BMPs. This could be the focus of a 319 grant that would endow funding support for landowners pursuing major improvements or shifting to high ground drinking facilities.

- *BMP promotional campaign – Septic system maintenance/repair*
  Many residents are unaware of the recommended standards regarding when and how to perform maintenance and repair for aging septic systems. Given the prevalence of these systems within the watershed and the relatively low figures regarding repair rates, a promotional campaign should be pursued that would educate owners of recommended practices and encourage the routine maintenance of their tanks. This could be the focus of a 319 grant program that would endow funding support for landowners pursuing tank repairs and maintenance treatments.

- *BMP promotional campaign – Topsoil management for row crops*
  Due to the nature of the TMDL data suggesting the Tesnatee was listed due possibly to singular events, there should be consideration to the impact of seasonal applications of manure and

fertilizers on area farms. While this will likely also be covered within the above mention educational campaign and survey of BMPs, an additional round of targeted promotional material and support regarding management of crop soil is advised.

- *Updated wildlife survey*
  While there are suspicions of large numbers of wildlife within the watershed it is difficult to properly assess the situation without a detailed approach by knowledgeable persons. An effort should be pursued that would coordinate USFS staff, local code enforcement officials and other wildlife experts to perform a more detailed survey of wildlife within the watershed that tracks conditions over a full year. This may require outside experts searching through area woodlands as well as a possible comprehensive survey of landowners to gauge their perceptions. An updated assessment of estimated counts and prominent habitats would allow for the WMP to properly refine the extent and magnitude of impairment from area wildlife.

- *Watershed monitoring and survey*
  An updated round of watershed monitoring could be pursued that includes more frequent sampling and/or many more sampling points. Additionally, more and regular field surveys of the watershed and its many streams would assist in refining the information used to assess the sources of impairment. An effort should be made to work with either area collegiate institution about utilizing their environmental studies programs to assist with such an effort.

BMP	Pollutant Source	Estimated Effectiveness	Estimated Load Reduction (%)	Cost Estimate	Public Support	Install Priority
Survey Application of Agricultural BMPs	Diffuse runoff of animal waste	High	10%	$5,000	Med	High
Education Materials	Diffuse runoff of animal waste; Failing septic systems	Med	10%	$5,000	High	High
Inventory of Septic Systems	Failing septic systems	Med	15%	$5,000	High	High
Targeted surveys and clean-up events	Diffuse runoff of animal waste	Low	10%	$10,000	Low	Low
Agricultural Pond BMPs	Diffuse runoff of animal waste	Med	10%	$25,000	Med	High
Septic Maintenance/ Repair	Failing septic systems	Med	20%	$10,000	Med	High
Crop Soil BMP campaign	Diffuse runoff of animal waste	Med	15%	$10,000	High	Med
Updated Wildlife Survey	Diffuse runoff of animal waste	Low	5%	$10,000	Med	Med
Watershed Monitoring and Survey	Diffuse runoff of animal waste; Failing septic systems	Low	5%	$10,000	Med	Med

POTENTIAL FUNDING SOURCES

Some of the above measures can be implemented easily and cheaply through special application and coordination of existing programs and work at each County government. Reviews of permits and updating of GIS information are regular facets of County operations at select departments, and provided the time frame is permissible the County's would only need to make special notice of efforts related to the Tesnatee to ensure the collected/developed information is shared with stakeholders. Specifically, if the efforts related to GIS mapping of information and the reviews of septic tank records are compiled through routine workloads, those materials could be developed at marginal cost.

Where some projects may entail the need for critical investment, some outside funding sources should be called upon to assist local efforts. The following list identifies potential funding sources that the Counties or other stakeholders could pursue to assist with financing special projects and efforts, paying for materials, manpower or specialized lab testing. As the stakeholders begin to address specific tasks, each potential outside funding source should be considered for support. Further, the GMRC and local stakeholders should routinely consult EPA and other organization to learn about other opportunities or funding resources not listed here.

Georgia Environmental Facilities Authority - GEFA's program focus areas are water, wastewater, solid waste, recycling, land conservation, energy efficiency and fuel storage tanks for local governments, other state agencies and non-profit organizations.

Clean Water State Revolving Fund - Programs cover the cost of engineering, planning, and design, construction, and contingencies.

Southeastern Regional Water Quality Assistance Network - Can provide funding to assist communities in water quality and related projects.

NRCS: Environmental Quality Incentives Program (EQIP) - Page maintained by NRCS that contains information on this program that provides monetary and technical assistance.

NRCS: Wildlife Habitat Incentives Program (WHIP) - Page maintained by NRCS that contains information on this program that provided monetary and technical assistance for habitat conservation for fish and wildlife.

US EPA Section 319 Grant Program - Under Section 319, states, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

Community Action for Renewed Environment (CARE) Grants - Projects to help communities reduce toxics in their environment and to solve environmental problems.

5-Star Restoration Program - Must have five or more project partners. Provides environmental education through streambank and wetland restorations.

PROPOSED EDUCATION AND OUTREACH

Promulgation of the WMP

The GMRC, with support from Lumpkin and White Counties, will post/share the WMP and distribute material (emails and flyers) indicating the document's purpose and availability. The goal will be to ensure all major stakeholder groups have been contacted about this notice and to have copies directly provided to the same.

Update of local Comprehensive Plans

The Lumpkin County and White County Comprehensive Plans are both due for updates within the next 2 years. The GMRC will work with the planning staff at each and ensure that the document reflects the impaired status of the Tesnatee and move to incorporate the mitigation measures recommended in this WMP into the respective objectives and work programs. This will ensure the Counties are fully aware of watershed's conditions as they develop new future development strategies, and keep the issue of watershed management within the related public discussions.

Establishment of a local Environmental Advisory Council

A spin off from the committee used in this process, Lumpkin County should establish a Council to meet once a year and to remain in routine contact with County and GMRC staff to review the progress with implementation of the Tesnatee WMP, improve coordination among various stakeholder groups and organizations, and advise the County and others on actions needed to address watershed management. This Council could serve in this capacity for other environmental issues throughout Lumpkin County to help coordinate interests and activities.

Review and update of education materials

The various agencies discussed throughout the document have many resources available for sharing with landowners to improve awareness of environmental stewardship, including in the form of educational resources, promotional brochures, web resources and more. With the possible sources prioritized and an overall mitigation strategy established, the GMRC and Advisory Committee should review these materials as relate to the issues identified herein and establish recommendations for preferred materials to be used, possible improvements needed of these resources, and suggest a coordinated approach to distribution. This should be done over the course of 2017.

IMPLEMENTATION SCHEDULE

The following table presents the recommended implementation schedule for to-be-completed actions or newly proposed remediation measures. This assumes the Counties and other stakeholders are continuing with existing and ongoing measures already discussed in this WMP.

Action	Responsible	Possible Funding	Estimated Cost	Year
Promulgation of the WMP	GMRC	NA	NA	2017
Update map of septic systems by parcels, by year	GMRC	EPD – Water District planning funds	$1,000	2018
Survey of agricultural operations and BMPs within the watershed	NRCS, Ext. Service	NA	NA	2018
Targeted stream bank surveys and clean-ups	County, UNG, GMRC	319 grant program	$10,000	2018
Update local comp plans	GMRC	DCA	$1,000	2018-19
Watershed Monitoring and Survey	County, UNG, GMRC	319 grant program	$10,000	2019
319 Grant application	GMRC, CCRC&D	NA	NA	2019
Agricultural pond BMPs	CCRC&D, GMRC, NRCS	319 grant program	$25,000	2019
Septic maintenance/ repair campaign	CCRC&D, GMRC, NRCS	319 grant program	$10,000	2019
Crop soil BMP campaign	CCRC&D, GMRC, NRCS	319 grant program	$10,000	2019
Updated Wildlife Survey	TBD	319 grant program	$10,000	2020
Advisory Committee mtg.; Report of Progress	GMRC	NA	NA	2020
Targeted water sampling for delisting	County, UNG, GMRC	319 grant program	$20,000	2021

PROGRAM MONITORING, CRITERIA AND MILESTONES

Watershed management plans must include a monitoring component to determine whether progress is being made toward attaining or maintaining the applicable water quality standards. There must be water quality benchmarks to track progress, and the monitoring program should ideally be integrated with the established schedule and interim milestone criteria.

The following have been identified as the general criteria by which progress with the mitigation program shall be measured: *(List presented in no particular order)*

- *Number of Septic Systems Repaired/ Replaced* - Any number of septic systems repaired/ replaced within the watershed is considered positive, with a 5-year goal to see a 25% service rate of those tanks older than/not maintained since 1995.

- *Number of BMPs installed* - This project is dependent on individual participation and likely outside funding assistance, however, any and all projects that do install stormwater runoff-related BMPs within the watershed, particularly among agricultural properties, would be considered a positive. Pending survey results of existing BMPs employed, the ambition will be to see 5 improvement projects within 5 years.

- *Material distributed* - Once appropriate education material has been identified the objective will be to have a coordinated distribution push of the WMP, education material, and promotion of the EQIP program as a bundle. This measurable will be evaluated based upon the number of stakeholder groups contacted and the number of events reached for promotion.

- *Field observation results* – In 2019, an additional comprehensive field survey will be conducted to review any possible changes within the watershed. Those observations will be compared with notes from this planning process to determine if amendments are needed to the WMP or for any visible progress in watershed conditions.

- *Water quality testing* - As the penultimate goal remains restoration of water quality, sampling and testing will be done after implementation of the mitigation program to determine the updated status of the Tesnatee watershed.

Part of this planning process also includes the development of interim, measurable milestones to gauge progress in implementing the mitigation program for the watershed. Each of these will represent the completion of a significant phase in the mitigation program, meaning one of the program elements can be considered “tied off” and remaining efforts may focus on other tasks.

- ✓ Complete promulgation of WMP/ Distribution of educational materials
- ✓ Complete and share updated septic system map and database
- ✓ Establishment of White County Environmental Advisory Council
- ✓ Successful for 319 grant funding
- ✓ Progress Report delivered to Counties and EPD annually

The methodology used in monitoring progress against these criteria and milestones will be a combination tasks performed by the GMRC, with support from the Counties and the Advisory Committee members, followed by the eventual water sampling and testing to be done between 3 and 5 years out from completion of the WMP.

In addition to performing several action items directly, the GMRC staff will follow up, at least annually, with the various parties responsible for implementing the recommended mitigation measures. The results of these communications will be provided to the Advisory Committee for consideration and comment. If new action is needed that will be added to the WMP mitigation program, and the summary of each annual review will be shared with the Counties and EPD.

Additionally, the GMRC and the County will seek reconvene the Advisory Committee by fall of 2018 to consider an application for 319 grant funding (and other outside assistance). At this time the initial round of milestones should have been completed and the Advisory Committee can review the results of the septic system inventory and BMP survey, and explore in more detail the proposed work scope for the grant as well as new sampling methodology.

Lastly, the GMRC will work with the Advisory Committee in developing a Sample Quality Assurance Plan (SQAP) and general monitoring strategy both for updated bacterial conditions and with plans for possible delisting. This will be pursued at the recommendation of the Advisory Committee, when they feel enough progress has been made to warrant new samples.

APPENDICES

A. USEPA Guidelines for Watershed Planning

B. Field Notes and Pictures

APPENDIX A - USEPA Guidelines for Watershed Planning

GA EPD recommends that the Watershed Management Plan include the following elements to comply with USEPA Guidelines (9 Key Elements):

1) An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level (with estimates of the extent to which they are present in the watershed;

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

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

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

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

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

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

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

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

APPENDIX B – Field Notes and Pictures

Additional comments and survey observations have been included within the main text of the document.

This field survey was done to assist in the continued monitoring of the Tesnatee Creek watershed. Tesnatee Creek had been designated a polluted water according to Georgia Environmental Protection Division (EPD), placing it onto the 303(d) list that required subsequent improvement plans. A Total Maximum Daily Load (TMDL) assessment and subsequent Implementation Plan was developed for Tesnatee Creek to identify possible sources of fecal coliform contamination, and White County and other stakeholders have since worked to mitigate contamination and attempt to restore water quality.

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The watershed is generally large lot residential in character. Pockets of suburban development, ranging from residential subdivisions to small commercial activity. There is also a fair amount of agricultural use, mainly as small pastures and some row crops, though not much indicative of commercial scale operations. At the eastern-most edge of the watershed is a portion of the City of Cleveland, including some more dense commercial activity along Main Street. Within Cleveland most development incorporates public utilities, including sewer. Throughout most of the rest of the watershed it is expected the properties rely on septic systems.

Preliminary assessments of the survey would prescribe the most common potential sources of fecal coliform intrusion would come from (in no particular order) leaking septic tanks, wildlife and/or agricultural soil applications. There were plenty of fields capable of sustaining farm animals but only a few such animals were seen during this survey.

Photo Location #1
North Main Street, near Montagna Drive

Facing upstream

Facing downstream

The first noticeably deep valley coming westward out of Cleveland. The land use begins to take on more suburban scales of density with significant amounts of undeveloped lands and some open fields.

This stream winds its way through the valley with substantial tree cover along the stream banks and various levels of open slopes beside. There does not appear to be any direct access to the stream based on the slope and the topography and density of growth alongside the stream banks. There are no houses or pastures within the immediate area, though there is are several light industrial facilities upstream from here, most approx. 200 yards from the stream banks.

Photo Location #2
North Main Street, near Claude Simms Road

This section of the watershed is sparsely developed but the actual stream corridor is relatively shallow and open, with a large volume of open field on either side. Most of the land use upstream is large lot residential, with some small scale agricultural activity (corn, hay) evident. It does not appear the banks have been disturbed despite the open access.

Facing upstream

Downstream the corridor passes alongside a municipal water facility and through some additional shallow valley. A few houses dot the landscape and the stream banks are more densely covered with trees and low growth. There is a small exposed shoreline that appears it may receive passive use by local kids, otherwise the stream appears bucolic and undisturbed.	 Facing downstream

Photo Location #3
SR 75, north of Ray Pardue Rd.

This part of the watershed is among the most rural and sparsely developed. It is a heavily wooded area with rolling terrain and a lot of larger properties throughout.

The stream itself is routinely shrouded in thick vegetation and barely visible, with no points of obvious intrusion. There is not much in the way of farm activity present, save for a few small animal pens for horses or goats. There are some houses close to the stream within this area, with septic systems also likely close to the stream banks, though the slopes may be shallow and well covered.

Facing upstream

Immediately downstream the watershed features even more woodland before winding behind some isolated rural residential developments. There are patches of exposed earth and possible sedimentation issues further downstream, but otherwise it's static woodland. The creek is very slow moving in this area, but appears relatively clean and undisturbed.	 Facing downstream

Photo Location #4
Paradise Valley Rd., near Running Deer Rd.

This section of the watershed is sparsely developed and very rural in character. The notable exception is found at this crossing adjacent to the Paradise Valley Campground. The valley is rather shallow and heavily wooded, including a substantial canopy at the campground. There are several points where local residents access the stream, which features very shallow ground cover along the banks and a few sandy shoals. Some benches and one pavilion adorn the shorelines, and a number of the campers and permanent shelters are within 100 feet of the stream.

Facing upstream

Downstream the creek passes from the crowded campground to more open valley and some native woodland. The stream itself begins to wind and feature more rocky shores and shoals, before merging with more smaller tributaries deeper into the valley. What other housing exists within this portion of the watershed is further removed from the stream banks, and no other points of immediate access were identified.	 Facing downstream

Photo Location #5
Adair Mill Road

This part of the Tesnatee watershed passes through a wide valley with a higher degree of crops and agricultural activity, including some pastureland and chicken houses. A variety of smaller tributaries reach out into the fields, and clusters of undisturbed, but smaller, forests are scattered throughout.

The stream banks are almost consistently open here, with very limited tree canopy or ground cover, save for grass and smaller shrubs. There is open access to the water throughout, though no farm animals were seen this morning. The integrity of the banks seemed okay and there were no structures immediately adjacent to any of the streams except rare farm sheds and one chicken house.

Facing upstream

Facing downstream

Photo Location #6
Town Creek Rd

This point is still within the central, agricultural valley of the watershed, with tributaries dividing farm lots, pastures and small woodlands throughout. It features a deeper and thicker canopy directly over the stream, and some fencing on both sides to suggest some animal activity.

Most development is located away from the streams, though there is evidence of occasional points of stream access. The stream banks appeared ragged and eroded at some points downstream from this crossing.

Facing upstream

Facing downstream

Photo Location #7
Town Creek Rd., near Charlie Thomas Rd.

This is a heavily wooded portion of the watershed, at the southern tip of this particular valley. The topography becomes more dramatic, limiting agricultural opportunities and feeding more ponds and rocky shoals within the streams.

Development here is limited and mostly residential. The main stream is deeply set and heavily shrouded in tree cover. There is no evidence of animal activity in this area, nor any access to the stream by residents. What housing is in the area is scattered and typically 200+ yards from the main stream. Any runoff issues would be due to the severity of slope, but often mitigated by the thicker vegetation.

Facing upstream

Facing downstream

Photo Location #8
Tesnatee Gap Valley Rd.

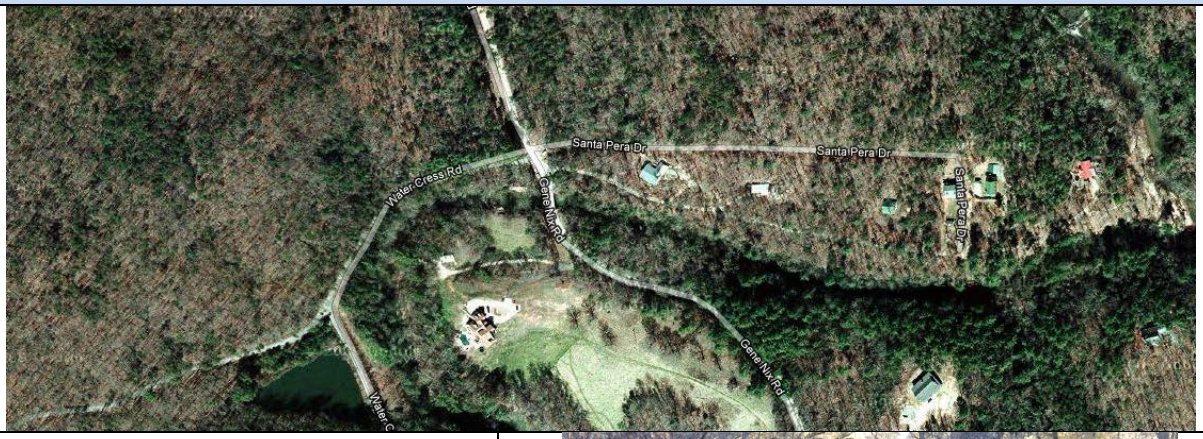
This is another section of the shallow valley, in a part of the watershed featuring more agricultural activity. Forested areas appear in pockets and there is an abundance of open fields and some pastureland. Despite the agricultural use, the stream banks are mostly well covered and undisturbed.

The stream is moving slowly and looks particularly clean. There are some worn and eroded fields to one side upstream, but the slope may not be conducive to much intrusion.

Facing upstream

Facing downstream

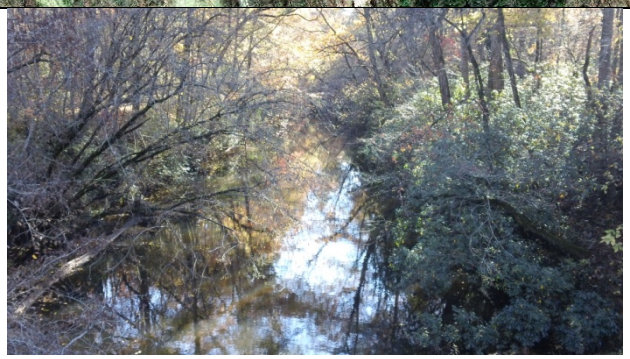
Photo Location #9
Gene Nix Rd.



Gene Nix is a dirt road bisecting the southern-most part of the watershed. It is a remote area predominantly used for large lot residential scattered throughout a large forest. The topography is dramatic as many of the houses feature views overlooking the valley.

There is no sign of any pasture or cropland, though wildlife is prominent. Deer were seen during the survey and at least one vehicle was depositing 2 hunters into the area.

At this particular location the stream featured signs of popular access, with a small beach containing artifacts of regular use: A make-shift fire pit, some litter and a rope from one tree branch as if a swing for would-be swimmers.



Facing upstream

Facing downstream