Lower Oconee River Watershed Management Plan

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Watershed Management Plan

September 2018

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Prepared by Pine Country Resource Conservation and Development Council, Inc.

Pine Country
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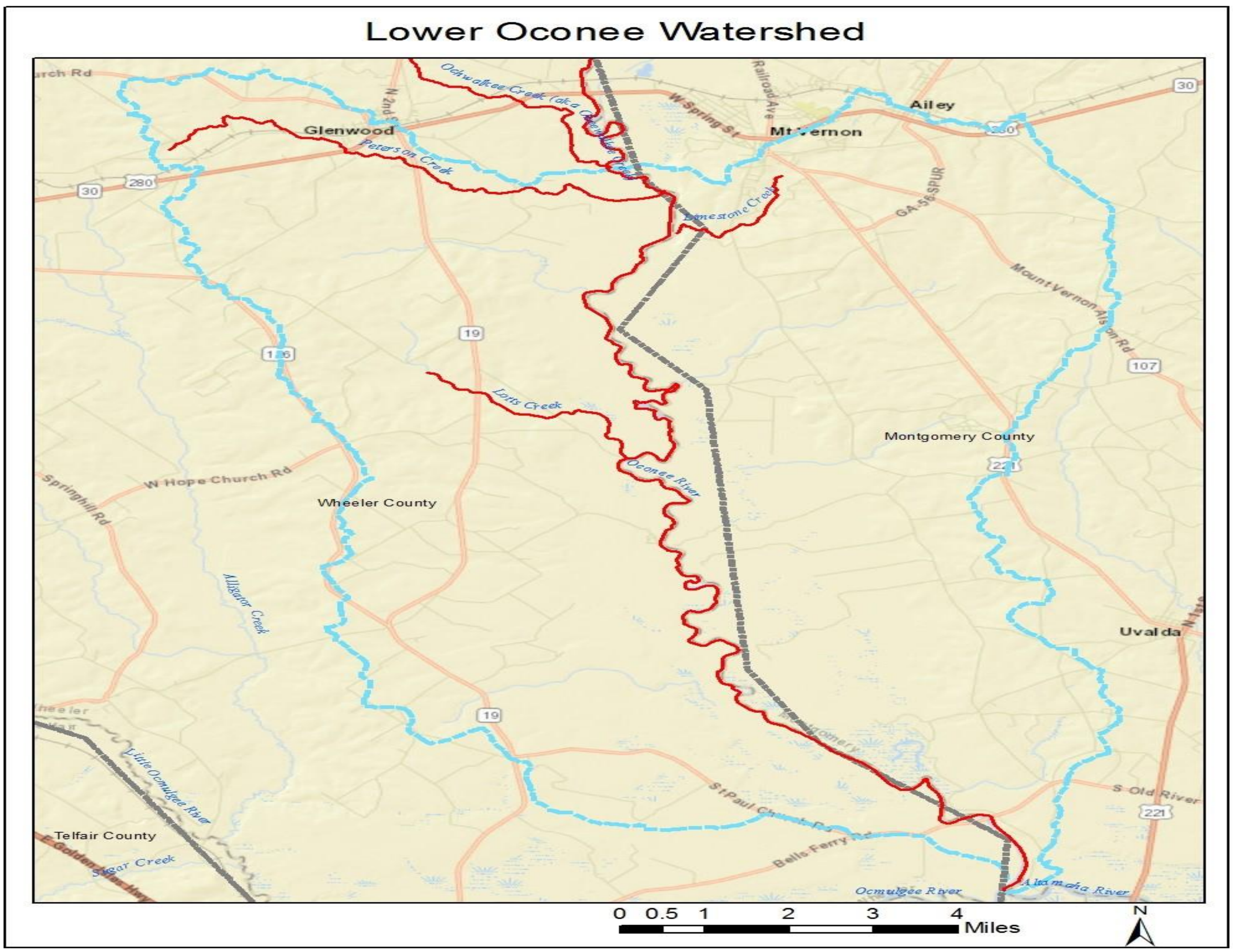
TABLE OF CONTENTS

I. Introduction

The Watershed Management Plan for the Lower Oconee River watershed provides an outline for holistic watershed management and water quality improvement. This plan was developed through a process that engages stakeholders within the watershed to identify and recognize issues associated with water quality impairment, assess and evaluate previous efforts toward water quality improvement, and develop a plan for future efforts that includes leveraging resources, educating the public, and implementing priority Best Management Practices (BMPs). While this document is not regulatory, the ultimate goals of this plan identified by the Advisory Committee is for stakeholders and landowners within the watershed to be aware and knowledgeable of watershed issues and understand the importance of managing the landscape to minimize negative water quality impacts so as to return all impaired stream segments to meeting state water quality standards.



II. Stream Selection

The Hydraulic Unit Code (HUC)–10 0307010214 Lower Oconee River watershed is approximately 79,054 acres of primarily agricultural and forested lands and lies in parts of Laurens, Wheeler, and Montgomery Counties.

A Total Daily Maximum Load (TMDL) for biota impacted – fish community (Bio F) due to sediment was completed in 2007 for Limestone Creek, Lotts Creek, and Peterson Creek. The *Total Maximum Daily Load Evaluation for Thirty-Two Stream Segments in the Oconee River Basin for Sediment* recommends at 13.2% and 8% sediment load reduction for Limestone Creek and Peterson Creek, respectively. Lotts Creek's current annual sediment load is stated to be within the allowable annual total load and has no recommendation for a reduction.

In addition a fecal coliform bacteria TMDL was completed in 2012 for the Peterson Creek segment, and in 2017 for the Limestone Creek segment. The *Total Maximum Daily Load Evaluation for Four Stream Segments in the Oconee River Basin for Fecal Coliform* published January 2012 recommends a 71% load reduction in fecal coliform for Peterson Creek. The *Total Maximum Daily Load Evaluation for Two Stream Segments in the Oconee River Basin for Fecal Coliform* published April 2017 recommends a 31% load reduction in fecal coliform for Limestone Creek.

The only TMDL Implementation Plan developed for the fecal coliform bacteria impairment in the Peterson Creek is currently the Section 7.0 Initial TMDL Implementation Plan in the 2012 TMDL. An initial TMDL Implementation Plan has also been developed for the fecal coliform bacteria impairment in Limestone Creek in Section 7.0 of the 2017 TMDL.

The GAEPD's 2016 Integrated 305(b)/303(d) List of Waters identified two stream segments in the watershed as not meeting water quality standards for Bio F due to sediment and fecal coliform, and a third segment not meeting water quality standards for Bio F due to sediment only. The List of Waters also identifies one stream segment meeting water quality standards.

III. Formation of Advisory Committee

The development of the plan relied upon the participation of an Advisory Committee that represented the HUC-10 watershed and consisted of elected officials, property owners, state and federal agency representatives, and regional water council representatives. Technical specialists with the Natural Resources Conservation Service (NRCS), Georgia Forestry Commission (GFC), and UGA Cooperative Extension were included on the Advisory Committee to assist in the planning efforts and provide area specific information. The initial meeting was held on July 26, 2017, to organize the group and explain the activities to be undertaken throughout the watershed planning process.

Existing watershed data, potential sources of new data, and the critical need for local input were discussed at the initial meeting. Also, maps of the watershed were reviewed, which depicted the water quality monitoring sites, overall land use in the watershed, and the segments of the stream that were impaired according to current data. Public meetings were subsequently held to inform and engage the public in the plan development process, gather additional information, and allow input into the process and plan.

IV. Source Assessment

The major impairments in the Lower Oconee River watershed as described by previous reports and sampling has been determined to be sediment and fecal coliform. Fish habitat has been impaired by the amounts of sediment present in the stream according to data in the *Total Maximum Daily Load Evaluation for Thirty-Two Stream Segments in the Oconee River Basin for Sediment* published January 2007. Also, additional TMDL evaluations have identified stream segments not meeting water quality standards for their designated use due to fecal coliform bacteria.

The report recognizes that legacy sediments remain in the stream and continue to negatively affect fish habitat. Regarding fecal coliform contamination, urban runoff, non-point sources, and municipal facilities were identified as potential sources.

Stakeholders were advised to assist in identifying any current sources of sediment loading or fecal coliform loading that may exist in the watershed area. Additionally, Pine Country RC&D staff has undertaken a visual watershed assessment to determine any current or potential loading sites.

Water quality monitoring according to an approved Sampling and Quality Assurance Plan (SQAP) was anticipated to provide data that would assist in identifying the impacts of sediment loading.

V. Assessment and Characterization of Current Condition

Overview

The Hydraulic Unit Code (HUC)–10 0307010214 Lower Oconee River watershed is approximately 79,054 acres of primarily agricultural and forested lands and lies in parts of

Wheeler and Montgomery Counties. Within the HUC–10 watershed, Limestone Creek, Lotts, Creek and Peterson Creek were included in GAEPD's 2016 Integrated 305(b)/303(d) List of Waters and identified as not meeting water quality standards for Bio F due to sediment. Also, Limestone Creek and Peterson Creek were identified as impaired for fecal coliform.

Physical and Natural Features

Hydrology

The Lower Oconee River watershed is comprised of 197 miles of streams, 914 acres of lakes, and 24,875 acres of wetlands. Major streams in the watershed include Crooked Creek, Larry Creek, Limestone Creek, Lotts Creek, Mobley Mill Creek, and Peterson Creek, all tributaries of the Oconee River. All major streams have numerous tributaries throughout their respective reaches, and small ponds are scattered throughout the watershed. The majority of these small ponds are located at either the headwaters of, or adjacent to, the minor tributaries.

Soils

The U.S. Department of Agriculture – Natural Resources Conservation Service has published soil surveys for each county in the Lower Oconee River watershed. All of the watershed is located in the Southern Coastal Plains Major Land Resource Area (MLRA). Dominant soils of the Southern Coastal Plains MLRA have mostly Ultisols, Entisols, and Inceptisols. They are generally very deep, somewhat excessively drained to poorly drained, and loamy. Specifically within this watershed, the dominant soil types are the Troup, Pelham, Fuquay, Dothan, and Cowarts Group along with the Tifton, Dothan, and Alapaha Group - (See Map 3).

Climate

The Lower Oconee River watershed is characterized by mild winters and hot summers. Average annual precipitation is 46.4 inches per year. Precipitation occurs chiefly as rainfall, and about 66 percent falls in the period of March through October. Thunderstorms occur approximately 55 days each year, mostly during the period of May through August. The average winter temperature is 48.2°F with an average minimum temperature 36.8°F. Summer average temperature is 79.7°F with an average maximum temperature of 90.9°F. The growing season for the region can range from 250 to 275 days depending on temperature extremes.

Waterbody and Watershed Conditions

Visual Survey

A visual survey is used to observe problems, if present, within streams and characterize the environment in which the river flows. The survey is also useful in identifying potential sources of water quality impairments and assessing the overall condition of the streams. The visual survey was conducted by one individual on staff with the Pine Country RC&D following Georgia Adopt-A-Stream methodologies and guidelines.

Throughout the six month sampling period, the visual survey and water quality monitoring was conducted at following location:

Stream/River	Decimal Degrees Coordinates		Location
Limestone Creek	-82.601872	32.151900	Old River Road
Peterson Creek	-82.666049	32.169525	GA HWY 19/S. 2nd St.
Lotts Creek	-82.636015	32.096856	Clarks Bluff Road
Oconee River (Site 11)	-82.622455	32.083996	Clarks Bluff Road
Oconee River (Site 12)	-82.556033	31.979568	Bells Ferry Road

Low rainfall coupled with long dry periods resulted in either no flow or small stagnant pools in the upper areas of the watershed during the first four months of the sampling period. During this same time period, the lower portion of the watershed was experiencing a stream flow that was below normal levels and exhibited slow movement. Throughout the entire sampling period, all locations where a flow was present exhibited clear water with the exception of sampling locations on the Oconee River where the river appeared turbid until samples were viewed in the sampling container, which revealed little to no turbidity present.

The visual survey along with the review of current aerial photography revealed that streams within the watershed appear to have adequate vegetated buffers due to the adjacent land use predominately being forestland with only portions currently undergoing harvesting operations. Agricultural lands in close proximity to streams within the watershed appear to have adequate vegetative buffers as well, with an adequate buffer being classified as a natural or vegetative buffer exceeding 25 feet measured perpendicular from the point of wrested vegetation.

Areas that drew attention during visual assessments as potential points of sediment loading included eroded areas directly adjacent to box culvert headwalls and bridge features on paved roadways in need of stabilization as well as the volume of unpaved public and private roads and associated drainage features that directly intersected streams within the watershed. Potential contributors of fecal coliform contamination including beaver dam ponds located upstream of certain box culverts with ducks present, animal carcasses, mainly white-tailed deer, being disposed of within or directly adjacent to the stream, agricultural livestock and/or associated runoff, and potentially, septic systems associated with single family residences located within close proximity of streams where municipal sewer systems were not available.

Water Quality Standards

The Lower Oconee River watershed has stream segments identified as not meeting water quality standards for their designated use due to stream sedimentation and two segments have been identified for fecal coliform impairment.

The Biota Impacted designation indicates that studies have shown a degradation of the biological populations in the stream, in this case, in the fish community within the stream segments. The general water quality criteria not being met as stated in *Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(5)(c) currently states:

> All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

However, the narrative criteria in *Georgia's Rules and Regulations for Water Quality Control* are in the process of being reviewed and updated at the time of this writing.

Regarding fecal coliform, the State has determined that for a water to support its use of fishing, the maximum number of *E. coli* colony forming units (cfu) is not to exceed 200 cfu per 100 milliliters for the period of May through October, or 1,000 cfu per 100 milliliters for the period of November through April. Values in excess would be in violation of the current bacteria water quality standard set for Georgia.

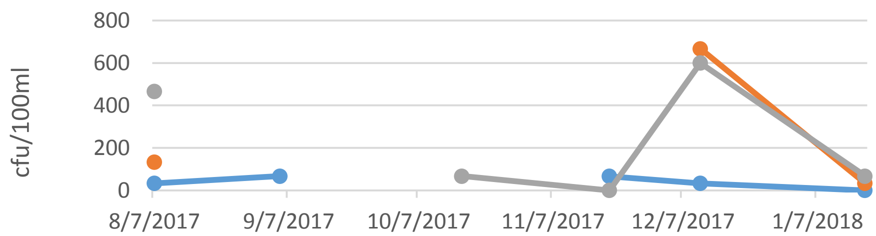
Water Quality Data

Water quality monitoring was performed by one individual on staff with the Pine Country RC&D possessing the appropriate Georgia Adopt-A-Stream certifications and following a watershed specific SQAP. The SQAP was developed to strategically sample throughout the watershed to better identify potential sources of pollution and areas having higher impacts on water quality. (See Map 8 for Sampling Locations)

During sampling events, general observations including water flow levels, turbidity, color, and odors were documented. Ambient temperature and water temperature were recorded along with Nephelometric Turbidity Units (NTU) levels, pH, dissolved oxygen (DO), and conductivity. Additional samples were taken to be tested for settleable solids and *E. Coli* in a lab setting. Sampling sites with no water present or no flow were not sampled resulting in no data being shown for those sampling dates in the following charts. Additionally, the Oconee River is listed as a healthy water and was sampled for comparative purposes.

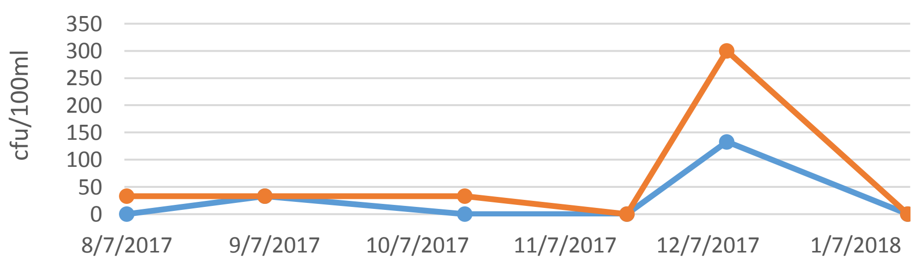
Overall, water quality monitoring data reflected no current problems with sediment loading. At no time during the six month sampling period was settleable solids present above a trace amount (≥ 0.5ml/1000ml) in any sample taken, and the highest NTU levels were recorded in the Oconee River which is identified as a health water. The fecal coliform levels recorded for Limestone Creek and Peterson Creek did not exceed the current State standard at any time during the six month sampling period; however, Lotts Creek, which is currently not listed as impaired for fecal coliform, did exceed the current State standard during the month of August.

Lower Oconee *E. coli.*

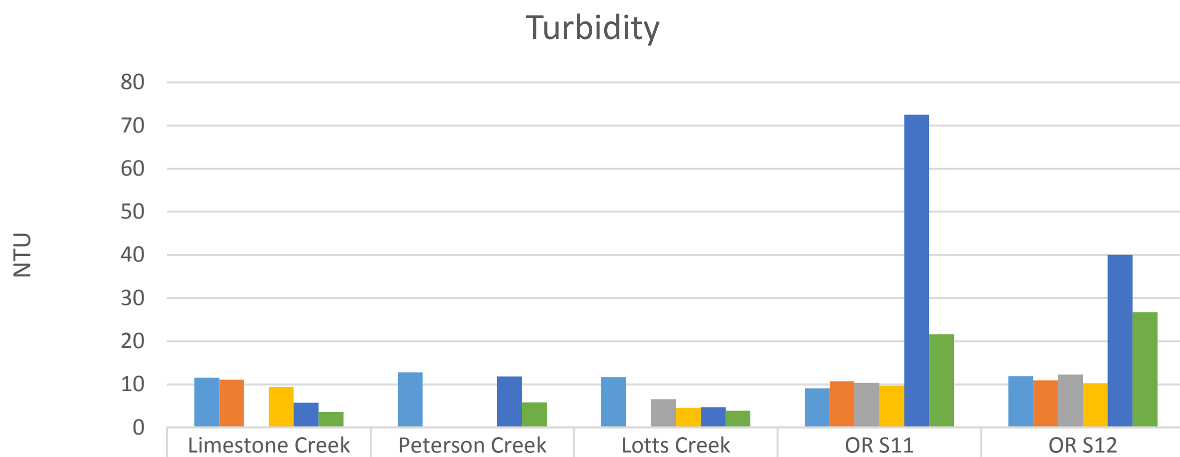


	8/7/2017	9/5/2017	10/17/2017	11/20/2017	12/11/2017	1/18/2018
Limestone Creek	33	67		66	33	0
Peterson Creek	133				667	33
Lotts Creek	466		67	0	600	67

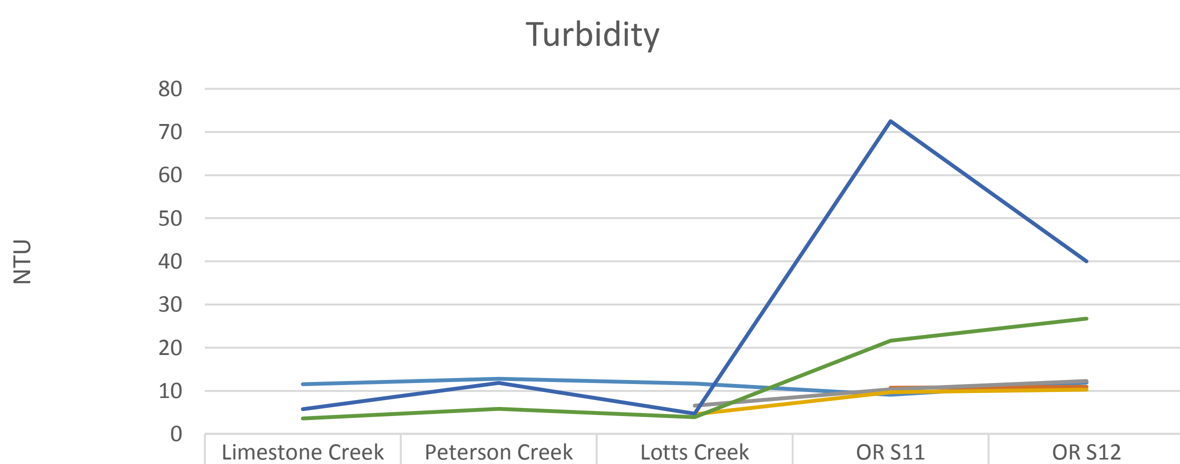
Oconee River *E. Coli*



	8/7/2017	9/5/2017	10/17/2017	11/20/2017	12/11/2017	1/18/2018
Site 11	0	33	0	0	133	0
Site 12	33	33	33	0	300	0



	Limestone Creek	Peterson Creek	Lotts Creek	OR S11	OR S12
8/7/2017	11.55	12.8	11.7	9.11	11.9
9/5/2017	11.1			10.69	10.95
10/17/2017			6.57	10.34	12.3
11/20/2017	9.4		4.57	9.68	10.3
12/11/2017	5.73	11.85	4.73	72.5	40
1/18/2018	3.61	5.81	3.89	21.65	26.75



	Limestone Creek	Peterson Creek	Lotts Creek	OR S11	OR S12
8/7/2017	11.55	12.8	11.7	9.11	11.9
9/5/2017	11.1			10.69	10.95
10/17/2017			6.57	10.34	12.3
11/20/2017	9.4		4.57	9.68	10.3
12/11/2017	5.73	11.85	4.73	72.5	40
1/18/2018	3.61	5.81	3.89	21.65	26.75

Lower Oconee River Sampling Report

SITE INFORMATION	
Site ID:	LC #7
Stream Name:	Limestone Creek
Location Description:	Limestone Creek at Old River Road
Coordinates:	32.151900 -82.601872
Monitor(s):	Rahn Milligan

SITE INFORMATION	Event Date:	8/8/2017		9/6/2017		10/17/2017		11/20/2017		12/12/2017		1/19/2018	
	Time Sample Collected:	8:35 a.m.		11:35 a.m.				10:22 a.m.		1:20 p.m.		9:30 a.m.	
VISUAL OBSERVATIONS	Weather:	Overcast		Overcast		No Sample taken No Water Present or stagnant pool		Partly Cloudy		Clear/Sunny		Clear/Sunny	
	24 Hr Rainfall:	0.0"		0.0"				0.0"		0.0"		0.0"	
	Flow Level:	Normal		Low				Low		Normal		Normal	
	Water Clarity:	Clear/Transparent		Clear/Transparent				Clear/Transparent		Clear/Transparent		Clear/Transparnet	
	Water Color:	Tannic		Tannic				Tannic		No Color		No Color	
	WaterSurface:	Clear		Clear				Oily Sheen (breaks)		Clear		Clear - Ice	
	Water Odor:	Natural/None		Natural/None				Natural/None		Natural/None		Natural/None	
CHEMICAL	Air Temp:	25.0°C		24.4°C				11.1°C		17.9°C		5.0°C	
	Water Temp:	24.7°C		24.7°C				10.2°C		9.3°C		2.7°C	
	pH (±0.25):	7.0	7.0	6.5	6.5			6.0	6.0	6.5	6.5	6.0	6.0
	Dissolved Oxygen (±0.6): mg/L	1.10	0.90	1.40	1.40			3.10	3.10	7.20	7.00	9.80	9.80
	Conductivity: µS/cm	160		200				240		120		150	
	Turbidity: NTU	11.60	11.50	11.10	11.10			9.16	9.64	5.71	5.75	3.61	3.60
	Settleable Solids: mL/L	ø		ø				ø		ø		ø	

BACTERIAL	*E. coli:*						
	Plate	Colonies	Colonies	Colonies	Colonies	Colonies	Colonies
	Blank-	ø	ø		ø	ø	ø
	1-	1	ø		1	ø	ø
	2-	ø	1		ø	ø	ø
	3-	ø	1		1	1	ø
	Total # Colonies	1	2		2	1	ø
	cfu/100mL:	33	66		66	33	ø

Lower Oconee River Sampling Report

		8/8/2017		9/5/2017		10/17/2017		11/20/2017		12/12/2017		1/18/2018	
SITE INFORMATION	Site ID:	PC #9											
SITE INFORMATION	Stream Name:	Peterson Creek											
SITE INFORMATION	Location Description:	Peterson Creek at GA HWY 19/S. 2nd Street											
SITE INFORMATION	Coordinates:	32.169525	-82.666049										
SITE INFORMATION	Monitor(s):	Rahn Milligan											
SITE INFORMATION	Event Date:	8/8/2017		9/5/2017		10/17/2017		11/20/2017		12/12/2017		1/18/2018	
SITE INFORMATION	Time Sample Collected:	9:55 a.m.								10:20 a.m.		10:05 a.m.	
VISUAL OBSERVATIONS	Weather:	Partly Cloudy		No Sample taken No Water Present or stagnant pool		No Sample taken No Water Present or stagnant pool		No Sample taken No Water Present or stagnant pool		Clear/Sunny		Clear/Sunny	
VISUAL OBSERVATIONS	24 Hr Rainfall:	0.0"								0.0"		0.0"	
VISUAL OBSERVATIONS	Flow Level:	Low								Normal		Normal	
VISUAL OBSERVATIONS	Water Clarity:	Clear/Transparent								Clear/Transparent		Clear/Transparnet	
VISUAL OBSERVATIONS	Water Color:	Tannic								No Color		No Color	
VISUAL OBSERVATIONS	WaterSurface:	Clear								Clear		Clear - some ice	
VISUAL OBSERVATIONS	Water Odor:	Natural/None								Natural/None		Natural/None	
CHEMICAL	Air Temp:	26.6°C								15.1°C		3.8°C	
CHEMICAL	Water Temp:	25.4°C								8.2°C		2.9°C	
CHEMICAL	pH (±0.25):	6.0	6.0							6.0	6.0	6.0	6.0
CHEMICAL	Dissolved Oxygen (±0.6): mg/L	5.10	5.00							7.40	7.40	9.60	9.80
CHEMICAL	Conductivity: µS/cm	40								70		60	
CHEMICAL	Turbidity: NTU	12.80	12.80							11.80	11.90	5.94	5.68
CHEMICAL	Settleable Solids: mL/L	ø								ø		ø	

E. coli:

Plate	Colonies	Colonies	Colonies	Colonies	Colonies	Colonies
Blank-	ø				ø	ø
1-	1				6	1
2-	2				10	ø
3-	1				4	ø
Total # Colonies	4				20	1
cfu/100mL:	133				667	33

Lower Oconee River Sampling Report

SITE INFORMATION	Site ID:	LC #10											
	Stream Name:	Lotts Creek											
	Location Description:	Lotts Creek at Clarks Bluff Road											
	Coordinates:	32.096856	-82.636015										
	Monitor(s):	Rahn Milligan											
	Event Date:	8/8/2017		9/6/2017		10/17/2017		11/20/2017		12/12/2017		1/19/2018	
	Time Sample Collected:	10:42 a.m.				12:50 p.m.		12:50 p.m.		10:58 a.m.		10:32 a.m.	
VISUAL OBSERVATIONS	Weather:	Partly Cloudy		No Sample taken No Water Present or stagnant pool		Clear/Sunny		Partly Cloudy		Clear/Sunny		Clear/Sunny	
	24 Hr Rainfall:	0.0"				0.0"		0.0"		0.0"		0.0"	
	Flow Level:	Low				Low		Low		Normal		Normal	
	Water Clarity:	Clear/Transparent				Clear/Transparent		Clear/Transparent		Clear/Transparent		Clear/Transparnet	
	Water Color:	Tannic				Tannic		No Color		No Color		No Color	
	WaterSurface:	Clear				Clear		Clear		Clear		Clear	
	Water Odor:	Natural/None				Natural/None		Natural/None		Natural/None		Natural/None	
CHEMICAL	Air Temp:	28.9°C				20.0°C		16.1°C		17.2°C		3.8°C	
	Water Temp:	25.9°C				21.0°C		12.6°C		8.2°C		3.1°C	
	pH (±0.25):	5.0	5.0			5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	Dissolved Oxygen (±0.6): mg/L	4.30	4.00			1.80	1.90	2.60	2.50	8.20	8.00	10.20	10.40
	Conductivity: µS/cm	30				50		40		50		40	
	Turbidity: NTU	11.50	11.90			6.44	6.69	4.66	4.48	4.76	4.70	3.79	3.98
	Settleable Solids: mL/L	ø				ø		ø		ø		ø	
BACTERIAL	*E. coli:*												
	Plate	Colonies		Colonies		Colonies		Colonies		Colonies		Colonies	
	Blank-	ø				ø		ø		ø		ø	
	1-	4				1		ø		7		2	
	2-	3				1		ø		6		ø	
	3-	7				ø		ø		5		ø	
	Total # Colonies	14				2		ø		18		2	
	cfu/100mL:	466				66		ø		600		66	

Lower Oconee River Sampling Report													
SITE INFORMATION	Site ID:	OR #11											
	Stream Name:	Oconee River											
	Location Description:	Oconee River at Clarks Bluff Road											
	Coordinates:	32.083996	-82.622455										
	Monitor(s):	Rahn Milligan											
	Event Date:	8/8/2017		9/6/2017		10/17/2017		11/20/2017		12/12/2017		1/19/2018	
	Time Sample Collected:	11:29 a.m.		10:20 a.m.		1:31 p.m.		1:10 p.m.		11:25 a.m.		10:55 a.m.	
VISUAL OBSERVATIONS	Weather:	Partly Coudy		Overcast		Clear/Sunny		Partly Cloudy		Clear/Sunny		Clear/Sunny	
	24 Hr Rainfall:	0.0"		0.0"		0.0"		0.0"		0.0"		0.0"	
	Flow Level:	Normal		Normal		Low		Low		Normal		Normal	
	Water Clarity:	Clear/Transparent		Clear/Transparent		Clear/Transparent		Clear/Transparent		Clear/Somewhat Turbid		Clear/Transparnet	
	Water Color:	No Color		No Color		No Color		No Color		No Color		No Color	
	WaterSurface:	Clear		Clear		Clear		Clear		Clear		Clear	
	Water Odor:	Natural/None		Natural/None		Natural/None		Natural/None		Natural/None		Natural/None	
CHEMICAL	Air Temp:	30.0°C		23.8°C		22.2°C		16.1°C		17.1°C		7.2°C	
	Water Temp:	30.2°C		27.6°C		23.6°C		15.2°C		12.2°C		7.2°C	
	pH (±0.25):	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	Dissolved Oxygen (±0.6): mg/L	6.80	7.00	6.80	6.40	7.80	8.00	8.80	8.90	10.40	10.00	11.00	11.20
	Conductivity: µS/cm	150		140		130		120		90		100	
	Turbidity: NTU	8.87	9.35	9.87	11.50	9.88	10.80	9.65	9.71	71.80	73.20	21.70	21.60
	Settleable Solids: mL/L	ø		ø		ø		ø		0.5		<0.3	
BACTERIAL	*E. coli:*												
	Plate	Colonies		Colonies		Colonies		Colonies		Colonies		Colonies	
	Blank-	ø		ø		ø		ø		ø		ø	
	1-	ø		ø		ø		ø		3		ø	
	2-	ø		ø		ø		ø		1		ø	
	3-	ø		1		ø		ø		ø		ø	
	Total # Colonies	ø		1		ø		ø		4		ø	
	cfu/100mL:	ø		33		ø		ø		133		ø	

Lower Oconee River Sampling Report

SITE INFORMATION	Site ID:	OR #12											
	Stream Name:	Oconee River											
	Location Description:	Oconee River at Bells Ferry Road											
	Coordinates:	31.979568	-82.556033										
	Monitor(s):	Rahn Milligan											
	Event Date:	8/8/2017		9/6/2017		10/17/2017		11/20/2017		12/12/2017		1/19/2018	
	Time Sample Collected:	12:33 p.m.		9:25 a.m.		2:14 p.m.		2:00 p.m.		12:10 p.m.		11:38 a.m.	
VISUAL OBSERVATIONS	Weather:	Pasrtly Cloudy		Overcast		Clear/Sunny		Partly Cloudy		Clear/Sunny		Clear/Sunny	
	24 Hr Rainfall:	0.0"		0.0"		0.0"		0.0"		0.0"		0.0"	
	Flow Level:	Normal		Normal		Low		Low		Normal		Normal	
	Water Clarity:	Clear/Transparent		Clear/Transparent		Clear/Transparent		Clear/Transparent		Cloudy/Somewhat Turbid		Cloudy/Somewhat Turbid	
	Water Color:	No Color		No Color		No Color		No Color		No Color		Brown/Muddy	
	WaterSurface:	Clear		Clear		Clear		Clear		Clear		Clear	
	Water Odor:	Natural/None		Natural/None		Natural/None		Natural/None		Natural/None		Natural/None	
CHEMICAL	Air Temp:	31.1°C		23.9°C		21.1°C		17.2°C		15.1°C		8.8°C	
	Water Temp:	30.0°C		27.2°C		23.4°C		15.0°C		10.5°C		6.9°C	
	pH (±0.25):	8.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	Dissolved Oxygen (±0.6): mg/L	6.70	6.40	6.40	6.30	7.60	7.60	9.00	8.80	9.40	9.00	11.40	11.50
	Conductivity: µS/cm	140		140		130		120		90		90	
	Turbidity: NTU	12.10	11.70	10.90	11.00	12.10	12.50	10.40	10.20	40.60	39.40	27.10	26.40
	Settleable Solids: mL/L	ø		ø		ø		ø		<0.3		<0.3	
BACTERIAL	*E. coli:*												
	Plate	Colonies		Colonies		Colonies		Colonies		Colonies		Colonies	
	Blank-	ø		ø		ø		ø		ø		ø	
	1-	ø		ø		ø		ø		2		ø	
	2-	1		ø		ø		ø		1		ø	
	3-	ø		1		1		ø		6		ø	
	Total # Colonies	1		1		1		ø		9		ø	
	cfu/100mL:	33		33		33		ø		300		ø	

Pollutant Sources

Agricultural Land

Cropland represents approximately 7 percent of the watershed area. This land use is a potential source of sediment pollution because it is traditionally disturbed annually and is subject to impacts by high intensity summer rainfall events occurring during the growing season and cultivation activities. Agricultural operations that utilize traditional cropping techniques leave the majority of cultivated land without a cover due to chemical and mechanical control of herbaceous pests to enhance yield potential. The lack of cover results in soil movement due to wind and water erosion that can reach levels of up to 5 tons of soil per acre per year depending on soil type, terrain, and rainfall intensity.

Field borders, especially along county unpaved roads, could provide extensive benefits. However, there are very few examples of where this practice is in place at the present time. When asked, agricultural producers cited some barriers to implementation that included commodity prices, land rental rates, practice establishment requirements, or the lack of desire to implement.

Hay and pasture land represent approximately 4 percent of the watershed area, but this land use will have little impact on sediment loading.

However, potential sources of sediment pollution and fecal contamination could come from livestock having direct access to streams and waterways resulting in streambank degradation and fecal deposition as well as through runoff from adjacent fields and feeding areas. According to NRCS personnel, many of the watershed's livestock producers have fenced livestock out of streams along with the installation of watering facilities for the livestock.

NRCS cost-share programs as well as the U.S. Fish and Wildlife, Partners for Fish and Wildlife program have been effective and useful in this effort. However, there still remain a number of producers that have not adopted these practices within the watershed. They represent a group that may be in need of educational outreach on the importance of these practices, guidance on the usage and implementation of these practices, and/or potentially need financial assistance provided for their installation within the producers' respective operations.

Forestland

Forestland is the largest land use in the HUC-10 watershed by area representing approximately 37 percent of the watershed. It is predominantly owned by private individuals, but there are some corporate and state-owned lands as well. The forestlands management is generally driven by economic motives, and management activities include site preparation, planting, thinning, and clearcutting. Occasionally, forestland owners also incorporate pine needle (straw) harvesting within their operations. Aside from harvesting pine straw, these management activities usually occur on a 20 to 40 year rotation, depending on landowner objectives and economic drivers, and activity on any given acre is generally very intermittent, possibly once every five to ten years.

Site preparation for tree planting is generally regarded to be the most soil disturbing activity on forestland. However, recent changes to site preparation techniques have resulted in less soil disturbance. Chemical site preparation and/or mechanical site preparation that doesn't disturb the soil surface is now very common. Also, soil disturbance is minimized during the planting process through the use of V-blade equipped dozers coupled to planting machines which is not uncommon.

Stream crossings on forestland is the activity with the most potential to contribute to increased sediment loading, especially during road construction and timber harvesting if adequate crossing management practices have not been utilized. Additionally, off tracking of soil and mud from unpaved roadways onto paved road surfaces during harvesting operations create opportunities for increased sediment movement into waterbodies and streams during wet periods. While temporary practices such as matting or temporary timber bridges are being used throughout the watershed, more effective alternatives such as permanent stream crossings, where applicable, utilizing culverts, bridges or stabilized ford crossings have yet to be adopted on a wide scale. Timber companies have been early adopters of these practices in the watershed, but private landowners have been less eager to install the practices due to cost and the lack of available cost-share funding. However, the utilization of stream crossings is extremely important as part of an overall road maintenance program that will enhance access for timber management activities as well as recreation activities.

Residential/Urban

There is little residential and/or urban expansion in this watershed. Single family residences are most common. The only potential sources of sediment pollution would be failure to utilize or improper usage of minimal erosion control measures during construction or development activities. The failure of on-site septic systems and illicit discharges of raw sewage could be potential sources of fecal coliform loading throughout the watershed as well.

Unpaved roads

Due to the volume of unpaved roads, their numerous intersections with tributaries and waterways throughout the watershed, and their direct impacts of sedimentation observed during the visual survey, it is the Advisory Committee's opinion that they represent the largest contributor of sediments in the watershed. They also represent the most challenging contributor to address with specific solutions. Many of the situations reviewed can be improved through technical solutions such as re-sizing culverts to avoid culvert blow-outs, installation and stabilization of plunge pools, or utilization of check dams. Other conditions require governmental/political efforts such as funding paving of problematic areas and securing proper right-of-ways for road shoulders and drainage discharges. Additional coordination may need to be undertaken with Georgia Department of Transportation (GDOT) and others for specific financial and/or technical assistance.

VI. Recommended Management Measures

Properly designed, installed and maintained Best Management Practices (BMP) are highly effective in preventing erosion and managing the resultant sedimentation. These practices can effectively reduce current sediment loading within the watershed and expedite the natural repair of the impaired segments. While some BMPs may be used across sectors or land uses, a unique set of practices has been identified for each contributing land use. The identified practices focus primarily on sediment pollution and fecal coliform, but ancillary benefits of some practices, such as a reduction in nutrient loading, could have a direct and positive affect on dissolved oxygen levels. Also, preventing turbidity levels high enough to block sunlight from reaching aquatic plant life may reduce plant mortality and the resultant decay which will prevent oxygen depletion. Depending on the land uses and BMPs utilized, estimated sediment load reductions could be range from 1 percent to upwards of 40 percent, and fecal coliform load reductions could range from 1 percent to 99 percent.

<u>Agricultural</u>

The implementation of systems of BMPs reduces nonpoint source pollution. BMPs are defined as structural, vegetative, or managerial conservation practices which reduce or prevent detachment, transport and delivery of nonpoint source pollutants to surface or ground waters. The BMPs result in fewer nutrients and waste being delivered to the water bodies.

In traditional cultivated cropland the soil is disturbed annually as well as throughout the growing season and is subject to impacts from high intensity summer rainfall events. Due to erosion being a three step process including soil particle detachment, particle transport, and particle deposition, any measure that prevents one of these steps will be useful in minimizing or controlling sedimentation. Potential sediment pollution from agricultural cropland may be eliminated or reduced from the utilization of an individual BMP or a site specific suite of BMPs identified in the *Best Management Practices for Georgia Agriculture, Conservation Practices to Protect Surface Water Quality* published by the Georgia Soil and Water Conservation Commission. Practices specific to sediment control include the following:

- Conservation Cover
- Contour Farming
- Critical Area Planting
- Field Border
- Grade Stabilization Structure
- Crop Rotation
- Contour Buffer Strip
- Sediment Basins
- Filter Strips
- Grassed Waterways
- Conservation Tillage
- Cover Crop
- Diversions
- Forage and Biomass Planting
- Riparian Buffers

- Row Arrangement
- Terrace
- Tree/Shrub Establishment

Practices specific to fecal coliform reduction other than applicable ones listed above include the following:

- Access Control
- Anaerobic Digester
- Animal Mortality Facility
- Composting Facility
- Fence
- Nutrient Management
- Pipeline & Water Well
- Stream Crossing
- Waste Facility Closure
- Waste Storage Facility
- Waste Treatment Lagoon
- Waste Transfer

Forestland

Management practices applicable to forestry operations that assist in the control of sediment include the following:

- Brush Management
- Early Sessional Habitat Development and Management
- Firebreaks
- Forest Management Plans
- Forest Stand Improvement
- Forest Trails and Landings
- Grade Stabilization Structure
- Herbaceous Weed Treatment
- Lined Waterway and Outlet
- Prescribed Burning
- Riparian Forest Buffers
- Silvopasture Establishment
- Stream Habitat Improvement and Management
- Stream Crossing
- Tree/Shrub Establishment

The Georgia Forestry Commission (GFC) is the lead State agency responsible for monitoring non- point source pollution on forestland and responding to public complaints relating to forestry activities. The GFC Water Quality Program produced *Georgia's Best Management Practices for Forestry, a* manual that describes practices to minimize negative water quality impacts, illustrates BMP installation and usage, and references applicable Federal and State mandates. In addition to the manual, the GFC offers Master Timber Harvester training courses on the importance and necessity of utilizing BMPs to minimize non-point source pollution and thermal pollution. To ensure minimum BMP usage compliance, the GFC also conducts a "Silvicultural BMP Implementation and Compliance Survey" every two years. In the 2017 survey report, stream crossings, firebreaks/burning, and forest roads had the lowest statewide implementation rates of 88%, 90%, and 91% respectively. When looking specifically at the Lower Coastal Plains area, the implementation rates were 83%, 88%, and 89% respectively.

Currently, the Natural Resources Conservation Service (NRCS) offers technical assistance as well as financial assistance in the form of cost-share/incentive programs to eligible landowners to implement agricultural and silvicultural practices throughout their operations.

Residential/Urban

There is little residential and/or urban expansion within the watershed. Other than insuring that all subsequent development follows the most current *Manual for Erosion and Sediment Control in Georgia* as published by the Georgia Soil and Water Conservation Commission, and that all new residential septic systems be properly installed in accordance with current standards along with encouraging proper septic system maintenance on all existing systems., there are no specific measures recommended for this land use. These issues can only be addressed through local governments adopting an Erosion and Sedimentation Control Ordinance or through GA EPD regulatory oversight of the areas within their jurisdiction, through local health departments requiring inspections on all new septic system installations, and through public outreach and education on the importance of proper septic system maintenance.

Unpaved roads

Many of the pollution contribution components of an unpaved road can be improved upon with the usage of technical solutions such as properly sized and installed culverts, utilization of headwall, splash aprons, and plunge pools in conjunction with culverts, and properly graded road surfaces and ditches. Other conditions will require efforts on a more political level such as securing necessary right-of-ways for proper drainage/discharge feature installation or for paving repetitive problem areas. Additionally, public and political figures will need to generate public support for the usage and implementation of unpaved road BMPs that are traditionally not used to prevent unwanted opposition when public funds are allocated for that purpose. Also, coordination between Georgia Department of Transportation (GDOT), local road departments, and any other applicable entity should be undertaken to ensure efficient use of resources and maximize financial and technical assistance.

Specifically within this watershed, sediment pollution from unpaved roads may be reduced through the utilization of BMPs that are found in the *Georgia Better Back Roads Field Manual* published by the Georgia Resource Conservation and Development Council, Inc. which includes structural, vegetative, and operational management practices that may be utilized individually or in combination with others to manage and/or control the movement of sediments. Examples of these practices include:

- Culverts
- Dust Control
- Gabions
- Grass Seeding
- Headwalls
- Matting And Blankets
- Plunge Basins (pools)
- Rock Check Dams
- Rock Filter Dams
- Sediment Basins
- Splash Aprons
- Turnouts

VII. Working With The Public

To further enhance the overall effectiveness of a watershed management plan, public engagement and educational opportunities to increase public awareness of water quality problems within the watershed are critically important. Being informed and knowledgeable of the problems and the associated implications will improve overall public support for remediation and prevention of water quality degradation within the watershed. The overall objective of the educational outreach component is to provide information on current watershed conditions and how any current impairments will negatively affect overall watershed health. Additionally, the promotion of good stewardship of the resource and the usage of best management practices will be emphasized throughout these educational settings. Sector specific educational programs will also be offered to further strengthen the importance of preventing pollutant loading through the usage of best management practices that are appropriate for the situation and effective in preventing potential pollutant loading.

Specifically, Forest landowners will be encouraged to participate in landowner workshops/field days that provide current information on environmental regulations relating to water quality, silvicultural best management practice design, installation, and maintenance, and current trends and innovations in site preparation, planting, and harvesting. Agricultural producers will be encouraged to participate in producer workshops and landowner field days that will provide current information on the benefits of agricultural BMPs with specific emphasis on conservation tillage practices and irrigation water management. Livestock producers will be offered opportunities to learn about grazing land management and the usage of livestock BMPs with emphasis on water quality, streambank protection, and nutrient management. Local governments will be encouraged to participate in the Georgia Better Back Roads Training Workshops developed by the Georgia Resource Conservation and Development (RC&D) Council as well as Erosion and Sedimentation Control Certification workshops developed by the Georgia Soil and Water Conservation Commission.

The overall success of this watershed management plan will require participation and cooperation from active land users, governmental agencies and entities, and the general public. Providing opportunities for everyone to better understand water quality issues within the watershed, how those issues impact overall watershed health, ways to improve water quality and watershed health, and what programs are available to assist with water quality improvement projects will greatly increase awareness, participation, and cooperation.

VIII. Long-Term Monitoring Plan

The objective of long-term monitoring within the watershed is to determine if water quality standards are achieved following the implementation of the measures outlined in this plan. It is important to perform instream monitoring to gauge water quality improvement as well as determine effectiveness of remediation activities. The data collected is crucial in supporting periodic strategic planning, identifying priority areas for remediation, and evaluating the effectiveness of BMPs. It also allows for trends to be identified and analyzed as well as identify any additional water quality problems should they develop.

Metrics to be monitored long-term shall include ambient temperature and water temperature, Nephelometric Turbid Units (NTU) levels, water pH, dissolved oxygen concentration, conductivity, settleable solids, and *E. coli* levels. All data collected shall be performed by a Georgia Adopt-A-Stream (GA AAS) certified person following current methodologies, utilizing GA AAS approved equipment, sampling kits, and/or supplies, and following an approved Sampling and Quality Assurance Plan (SQAP). Samples should be taken at a minimum of once monthly, and data evaluated to determine if additional samples are needed due to abnormal or critical levels of any particular metric being monitored. It may also prove beneficial to monitor specific BMP installation sites in areas that were noticed to be directly contributing to the impairment (*i.e*. unpaved road drainage features directly discharging sediment laden waters into streams or livestock exclusion areas) to monitor overall effectiveness of the BMPs and make necessary changes if needed.

IX. Implementation, Evaluation, and Revision

Management Strategies

The overall effectiveness of this management plan relies on the aforementioned holistic approach of watershed management. The approach requires that all potential pollution sources be addressed through education/outreach to increase public and landowner awareness of the problems; encourage the implementation and utilization of BMPs through providing planning, technical, and financial assistance; monitor the effectiveness of the management plan and implemented practices through long-term monitoring; and make necessary revisions to the plan as needed.

Management Plan

In addition to technical assistance being provided by federal and state agencies, financial assistance in the form of a cost-share/incentive program for the implementation of agricultural and silvicultural BMPs coupled with cost-sharing with local governments on the implementation of unpaved road BMPs is necessary to achieve sediment load reductions within the watershed. The amount of funding needed to obtain current water quality standards through BMP implementation across all sectors is not known at this time, but in addition to current federal funding resources available, the application of funds through a Section 319(h) Federal Water

Pollution Control Act grant or series of grants targeting specific activities of the plan will be necessary for timely implementation and water quality improvement.

While landowners and local governments throughout the entire watershed will be eligible to participate in any cost-share/incentive program, priority will be given to subwatersheds based on monitoring data and impairment listings due to the fact that efforts in these areas will have the greatest impact on water quality improvement. Currently, the priority subwatersheds are Larry Creek – Oconee River, Lotts Creek, and Lotts Creek – Oconee River due to the current impaired listing of streams within them.

Implementation Plan and Interim Milestones

It is anticipated that the implementation of this watershed management plan will exceed five years, but smaller, more focused projects may be implemented in shorter time periods. To monitor progress of plan implementation, a series of measurable milestones have been developed, but a periodic review of accomplishments as compared to the implementation schedule will be needed to determine whether task milestones are being met. These reviews will also determine if revisions or amendments are necessary to address both progress and set-backs.

Implementation Partners	
Entity/Organization	Contribution
City of Ailey	Cash and In-Kind Contributions
City of Glenwood	Cash and In-Kind Contributions
City of Mount Vernon	Cash and In-Kind Contributions
Georgia Forestry Commission (GFC)	Technical Assistance, Financial Assistance, and In-Kind Contributions
Georgia Soil and Water Conservation Commission (GSWCC)	Technical Assistance, Financial Assistance, and In-Kind Contributions
Laurens County Commission	Cash and In-Kind Contributions
Montgomery County Commission	Cash and In-Kind Contributions
Natural Resources Conservation Service (NRCS)	Technical Assistance and Financial Assistance
Ohoopee River Soil and Water Conservation District	Technical Assistance, Financial Assistance, and In-Kind Contributions
Pine Country Resource Conservation and Development Council	Technical Assistance, Cash and In-Kind Contributions
University of Georgia Cooperative Extension Service	Technical Assistance and In-Kind Contributions
Wheeler County Commission	Cash and In-Kind Contributions

Implementation Plan						
Goal: Implement Best Management Practices to reduce Sediment Loads and Fecal Coliform loads in order to meet water quality standards						
Task	Agency Responsible	Funding Source	Measure	Milestone		
				Short	Mid	Long
				(<2 yrs)	(2-5 yrs)	(>5 yrs)
Objective 1: Reduce Sediment loads from unpaved roads within the watershed						
Task 1: Develop criteria to identify critical areas of unpaved roads where unpaved roads have a direct impact on streams and waterways	Local governments, Road Departments	Local funds, Section 319(h) grant, in-kind match	Percentage of locations where unpaved roads directly impact streams and waterways identified	All	All new road construction	All new road construction
Task 2: Develop remediation plans for critical impact areas and prioritize implementation of plans	Local governments, Road Departments	Local funds, Section 319(h) grant, in-kind match	Percentage of remediation plans developed	50%	50%	All new impact areas
Task 3: Install BMPs	Local governments, Road Departments	Local funds, Section 319(h) grant, in-kind match	Percentage of remediation plans implemented	50% - contingent upon funding	50% - contingent upon funding	All new impact areas
Objective 2: Reduce Sediment loads from agricultural lands within the watershed						
Task 1: Identify agricultural producers in watershed	NRCS	In-kind	Percentage of producers	All	All new producers	All new producers
Task 2: Identify agricultural producers with no current Conservation Plan and assist with development of Plan	NRCS	In-kind	Number of producers identified	All	All new producers	All new producers
			Number of Conservation Plans developed	All	All new producers	All new producers
Task 3: Contact producers for participation in cost-share programs – target producers in priority subwatersheds	NRCS	In-kind	Number of producers identified within priority subwatersheds	All	All new producers	All new producers
			Number of applications submitted for cost-share program in priority subwatersheds	10	5	5
Task 4: Install BMPs	NRCS,	Producer,	Percentage of land area of	50	25	25

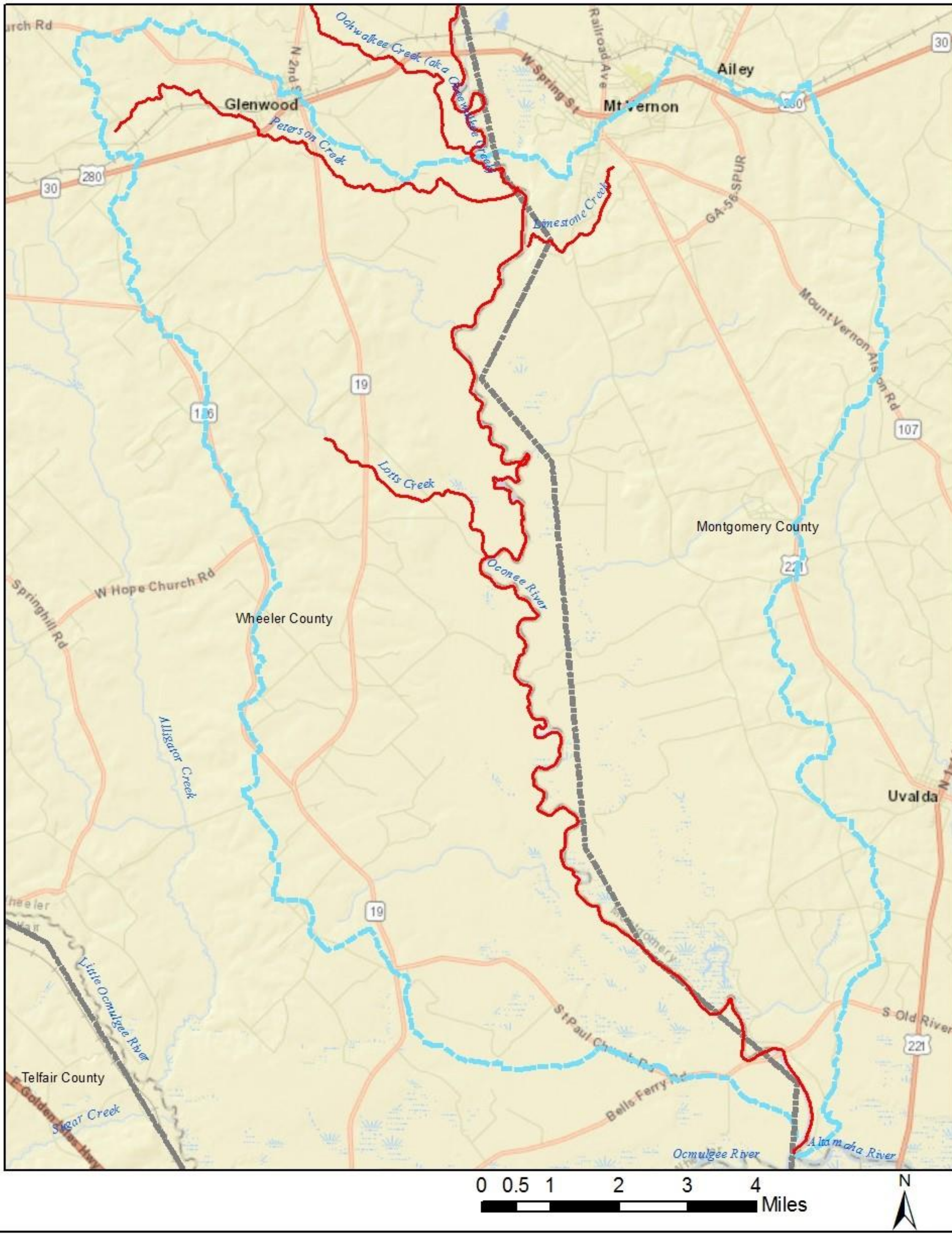
	Producer	Section 319(h) grant, EQIP	priority subwatersheds affected by BMP program			
			Number of participants	10	5	5
			Load reduction estimate	TBD	TBD	TBD
Objective 3: Reduce fecal coliform loads from agricultural lands within the watershed						
Task 1: Identify agricultural producers in watershed	NRCS	In-kind	Percentage of producers	All	All new producers	All new producers
Task 2: Identify agricultural producers with no current Nutrient Management Plan (NMP) or Conservation Plan and assist with development of Plan	NRCS	In-kind	Number of producers identified	All	All new producers	All new producers
			Number of Nutrient Management Plans or Conservation Plans developed	All	All new producers	All new producers
Task 3: Identify agricultural producers with current NMP or Conservation Plan and review to insure proper Implementation	NRCS	In-kind	Number of producers identified	All	All new producers	All new producers
			Number of Nutrient Management Plans or Conservation Plans reviewed	All	All new producers	All new producers
Task 4: Contact producers for participation in cost-share programs – target producers in priority subwatersheds	NRCS	In-kind	Number of producers identified within priority subwatersheds	All	All new producers	All new producers
			Number of applications submitted for cost-share program in priority subwatersheds	10	5	5
Task 5: Install BMPs	NRCS, Producer	Producer, Section 319(h) grant, EQIP	Percentage of land area of priority subwatersheds affected by BMP program	50	25	25
			Number of participants	10	5	5
			Load reduction estimate	TBD	TBD	TBD
Objective 4: Reduce Sediment loads from silvicultural lands within the watershed						
Task 1: Identify forestry	GFC, NRCS	In-kind	Percentage of producers	All	All new	All new

producers in watershed					producers	producers
Task 2: Identify forestry producers with no current Forest Stewardship Plan and assist with development of Plan	GFC, NRCS	In-kind	Number of producers identified	All	All new producers	All new producers
			Number of Forest Stewardship Plans developed	All	All new producers	All new producers
Task 3: Contact producers for participation in cost-share programs – target producers in priority subwatersheds	GFC, NRCS	In-kind	Number of producers identified within priority subwatersheds	All	All new producers	All new producers
			Number of applications submitted for cost-share program in priority subwatersheds	10	5	5
Task 4: Install BMPs	GFC, NRCS, Producer	Producer, Section 319(h) grant, EQIP	Percentage of land area of priority subwatersheds affected by BMP program	50	25	25
			Number of participants	10	5	5
			Load reduction estimate	TBD	TBD	TBD
Objective 5: Monitor water quality of load reduction achievement						
Task 1: Update EPD – approved SQAP for post-BMP monitoring	RC&D, Contractor	Section 319(h) grant, In-kind, cash match	EPD - approved-SQAP and updates as needed to reflect new pre- and post-BMP monitoring	100%	N/A	
Task 2: Conduct post-BMP monitoring BY AAS-qualified personnel utilizing approved SQAP	RC&D, Contractor	Section 319(h) grant, In-kind, cash match	Number of samples collected	12/site/year	N/A	N/A
			Load reduction	Meet water quality standards for designated use	Meet water quality standards for designated use	Meet water quality standards for designated use
Task 3: Implement long-term water quality monitoring by AAS-qualified personnel under EPD – approved SQAP	RC&D, Contractor	TBD	Number of samples collected	N/A	TBD	TBD
			Load reduction	N/A	Meet water quality standards	Meet water quality

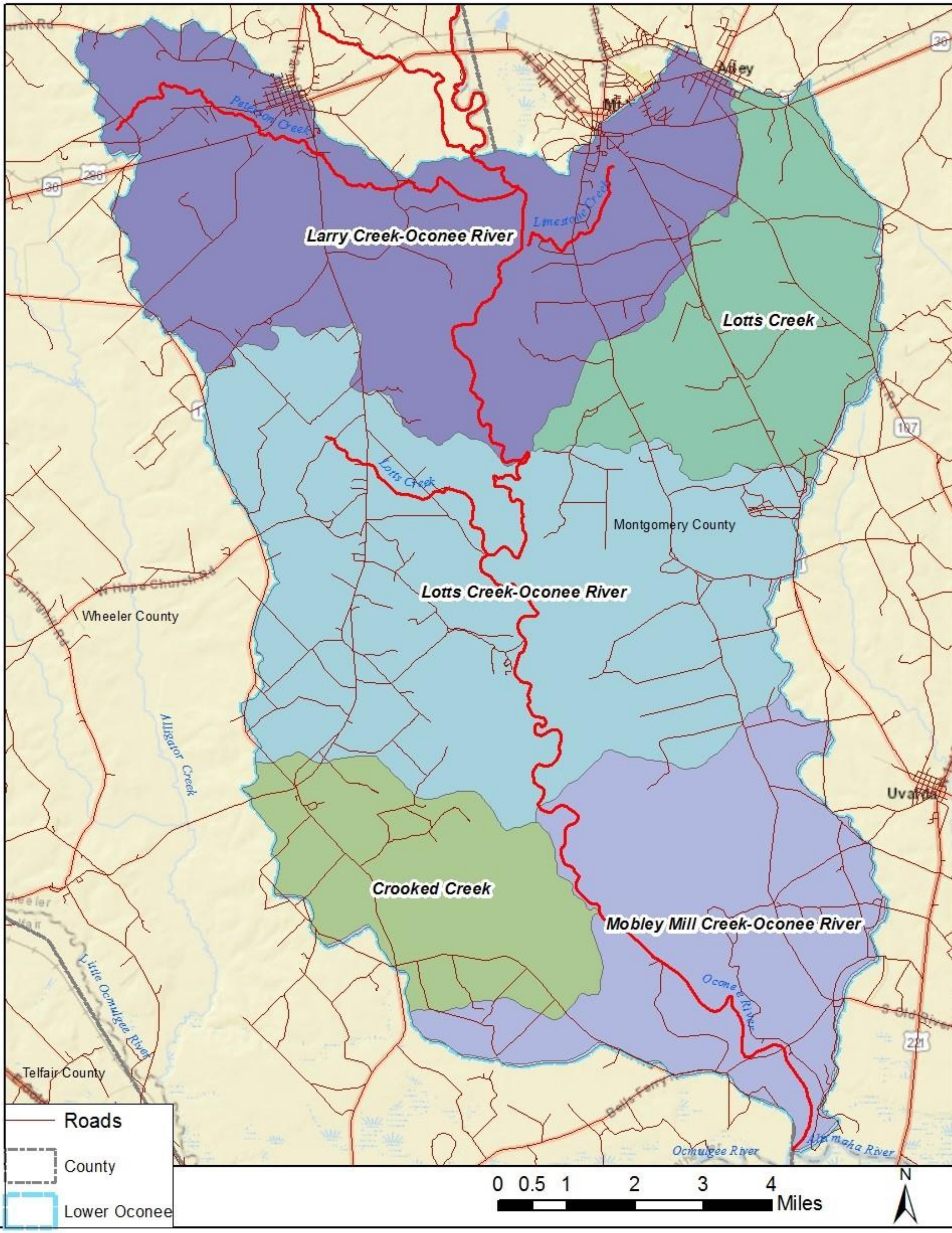
					for designated use	standards for designated use
Objective 6: Conduct Education Outreach						
Task 1: Develop, coordinate, and host Field Day	RC&D, GSWCC, Local Soil & Water Conservation District, UGA Cooperative Extension, NRCS	Section 319(h) grant, In-kind, cash match	Number of attendees	15	N/A	N/A
Task 2: Present sector specific information relating to pollution prevention, BMP utilization, water quality improvement, and/or available assistance programs at producer meetings in each of the counties in the watershed	RC&D, GSWCC, Local Soil & Water Conservation District, UGA Cooperative Extension, NRCS	Section 319(h) grant, In-kind, cash match	Number of Presentations	4	N/A	N/A
			Number of attendees per presentation	10	N/A	N/A
Task 3: Develop newspaper articles on Lower Oconee River water quality, pollution control efforts, and available assistance programs	RC&D, GSWCC, Local Soil & Water Conservation District, UGA Cooperative Extension, NRCS	Section 319(h) grant, In-kind, cash match	Number of articles published	4	4	N/A
			Number of readers reached	2,000	2,000	N/A

X. Appendix

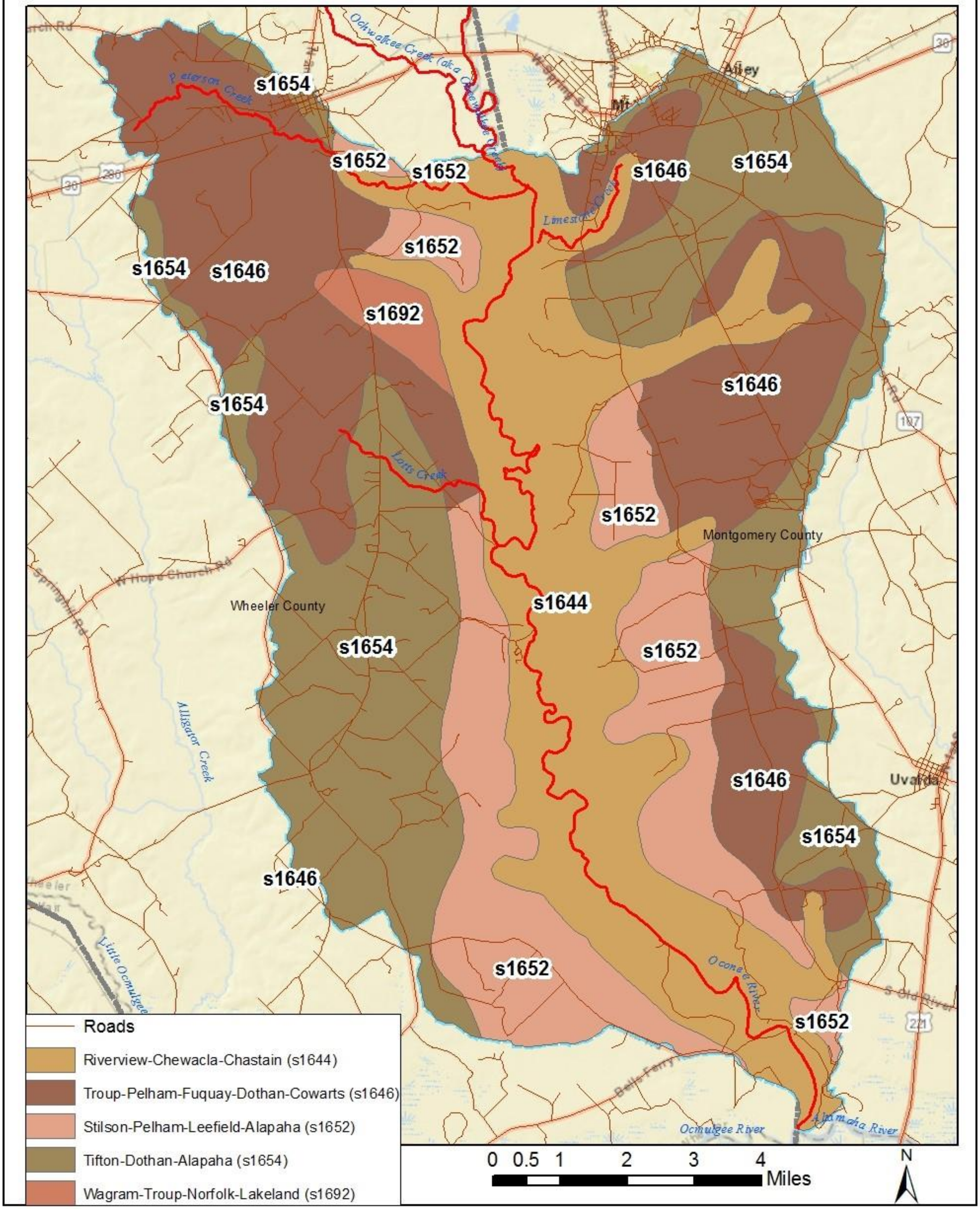
Map 1: Lower Oconee Watershed



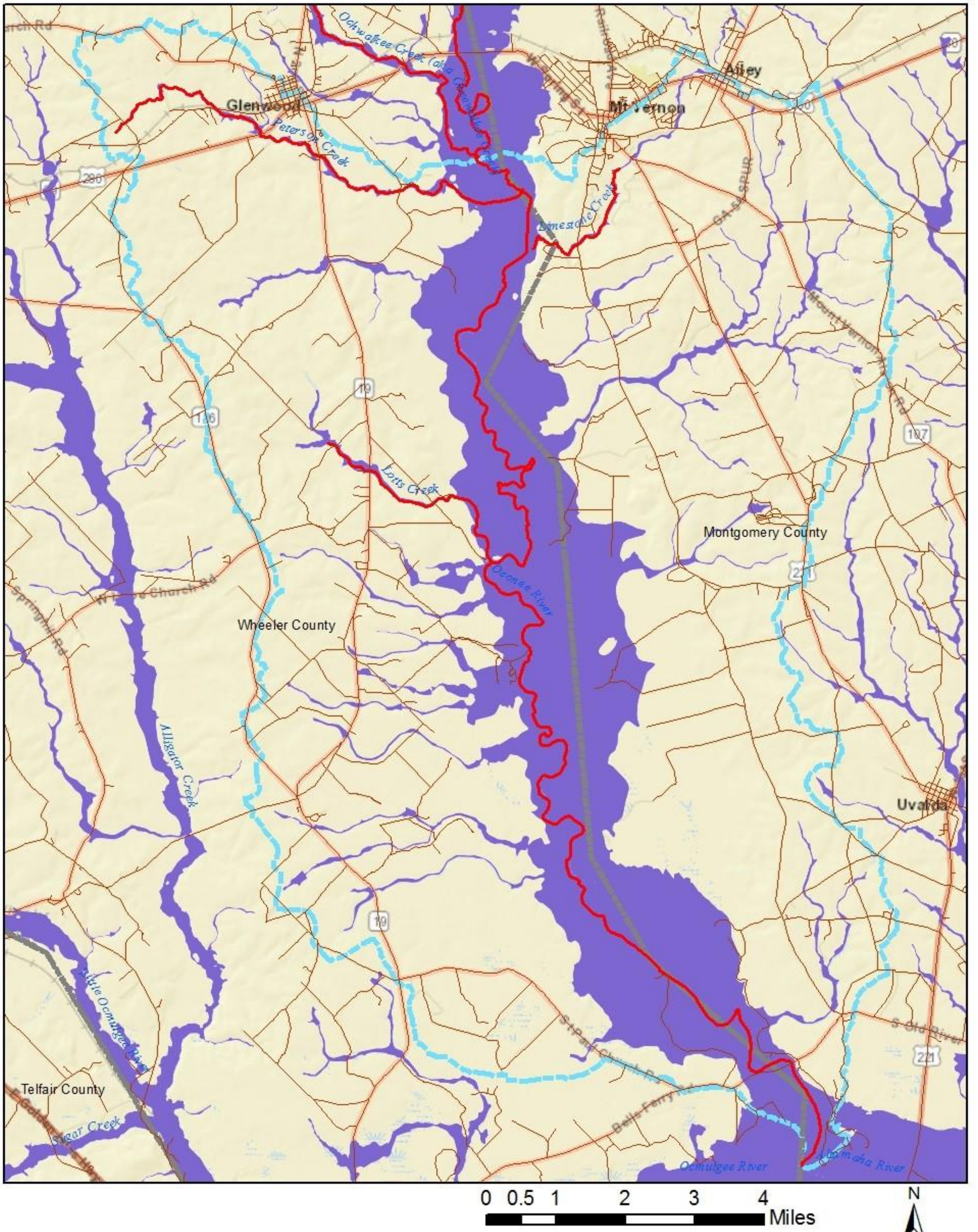
Map 2: Lower Oconee Subwatersheds (HUC12)



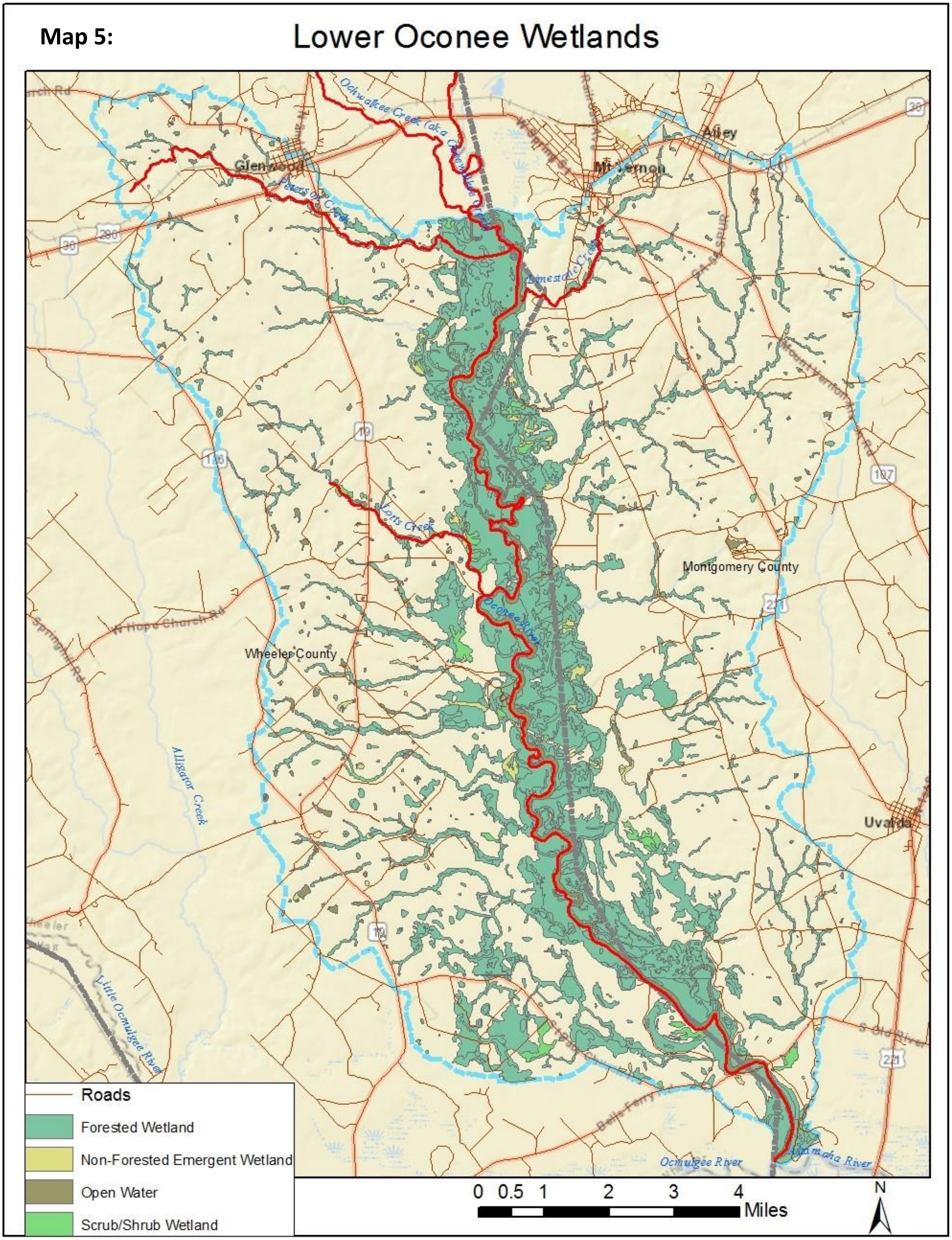
Map 3: Lower Oconee Watershed Soils



Map 4: Lower Oconee FEMA Floodplains

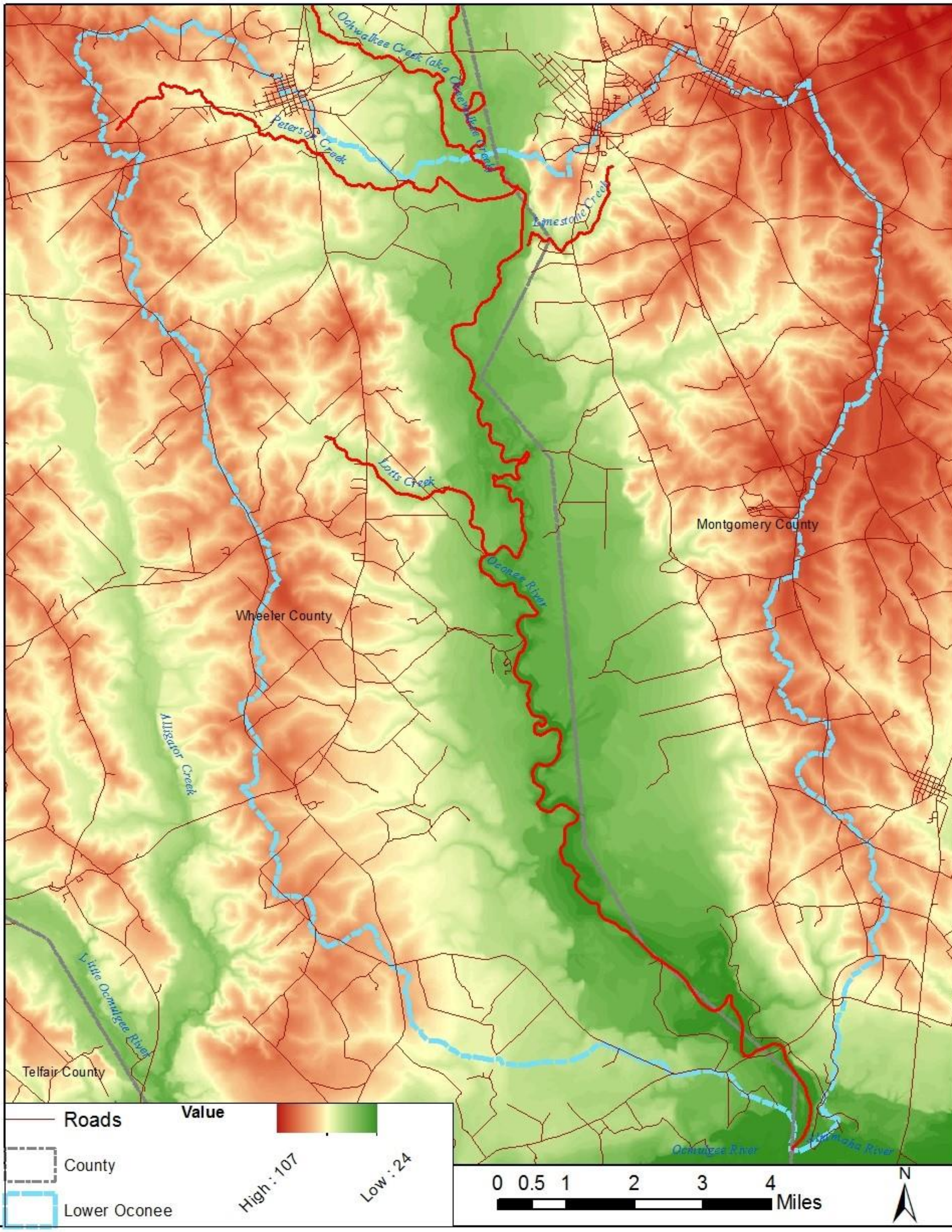


Map 5:

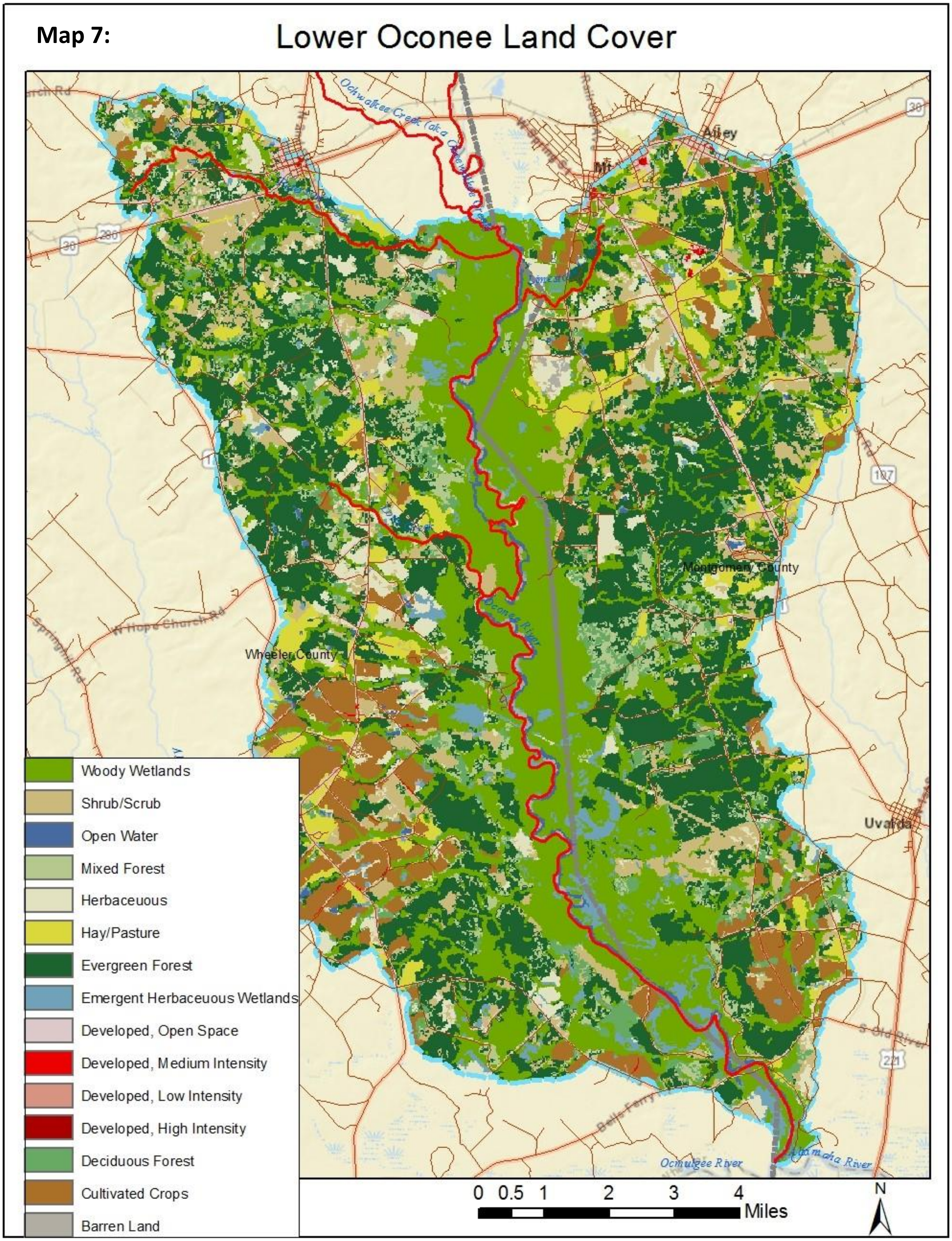

Lower Oconee Wetlands
Glenwood
Mt Vernon
Ailey
Uvalda
Montgomery County
Wheeler County
Lotts Creek
Oconee River
Limestone Creek
Alligator Creek
Little Ocmulgee River
Ocmulgee River
Altamaha River
W Hope Church Rd
Roads
Forested Wetland
Non-Forested Emergent Wetland
Open Water
Scrub/Shrub Wetland
0 0.5 1 2 3 4
Miles
N

Map 6:

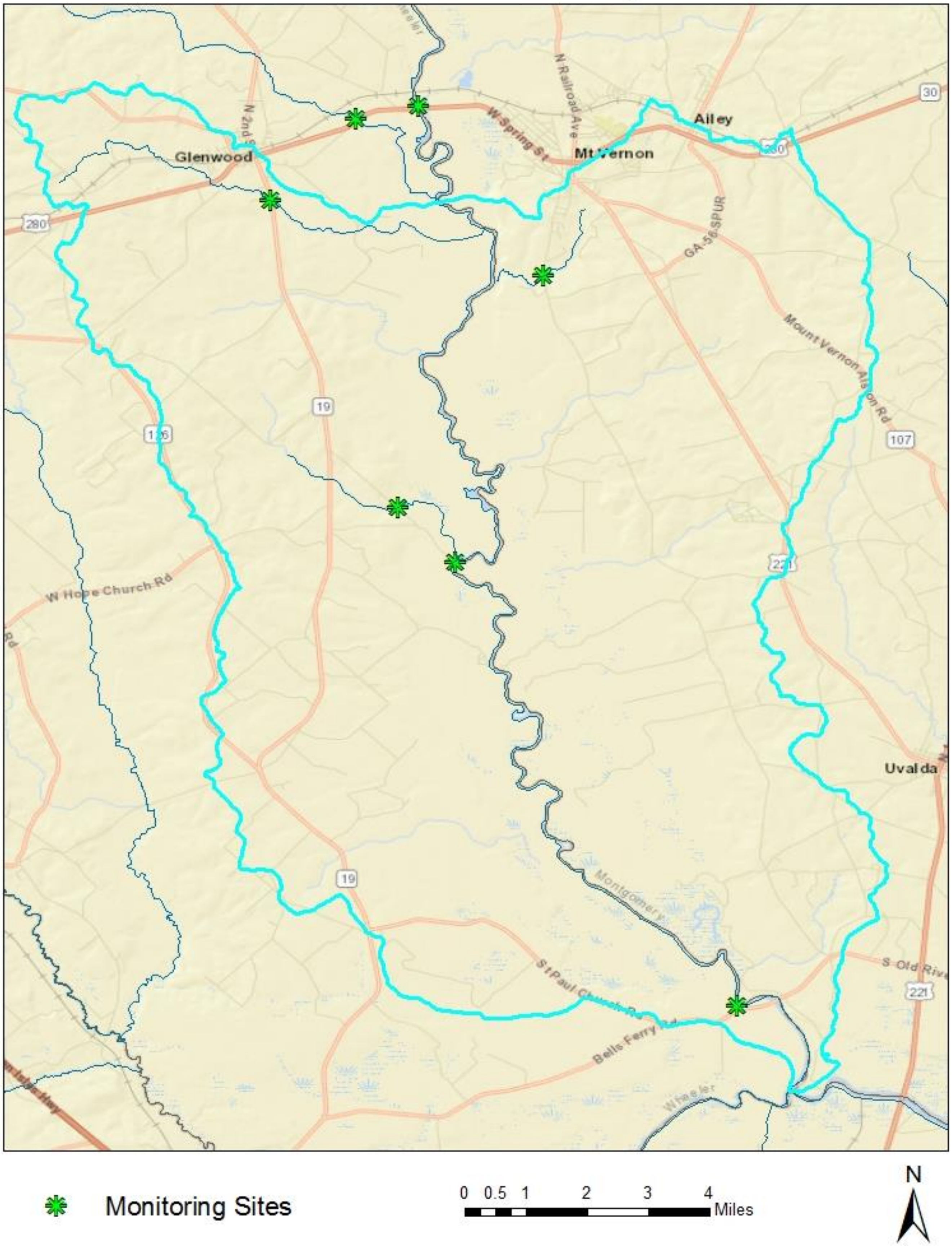
Lower Oconee Watershed Elevation



Map 7:


Lower Oconee Land Cover
Ochwalkee Creek (aka Ochwalkee Creek)
Alley
Mt
Montgomery County
Wheeler County
Oconee River
W Hope Church Rd
Uvalda
Ocmulgee River
Altamaha River
Bells Ferry
S Old River
Woody Wetlands
Shrub/Scrub
Open Water
Mixed Forest
Herbaceuous
Hay/Pasture
Evergreen Forest
Emergent Herbaceuous Wetlands
Developed, Open Space
Developed, Medium Intensity
Developed, Low Intensity
Developed, High Intensity
Deciduous Forest
Cultivated Crops
Barren Land
0 0.5 1 2 3 4
Miles
N

Map 8: Lower Oconee Monitoring Sites



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