

Development and Implementation of Tired Creek Watershed Management Plan - 2018



Funding for this project is made possible
By an U.S. EPA Section 319(h) Grant
From the Non-Point Source Program
Environmental Protection Division
Georgia Department of Natural Resources

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ACRONYM GLOSSARY

319 (H) Clean Water Act (CWA) §319(h) Non-Point Source (NPS) Grant Program

AAS- Georgia Adopt-A-Stream

ARCWP-Tired Creek Watershed Partnership

BMP – Best Management Practice

BOD – Biochemical Oxygen Demand

CBOD – Carbonaceous Biochemical Oxygen Demand

CFU/ML- Colony Forming Unit per miller liter

CWA – Clean Water Act

CWP – Clean Water Partnership

DO – Dissolved Oxygen

E- Endangered Species

EPA- Environmental Protection Agency

FC- Fecal Coliform

FSA- Farm Services Agency

GAEPD- Georgia Environmental Protection Division

GFC-Georgia Forestry Commission

GWPPC-Georgia Water Planning and Policy Center at Albany State University

HUC – Hydrologic Unit Code

NBOD – Nitrogenous Biochemical Oxygen Demand

NLCD – National Land and Cover Database

NOAA – National Oceanic and Atmospheric Administration

NPDES – National Pollutant Discharge Elimination System

NPS – Nonpoint Source

NRCS – Natural Resource and Conservation Service

NTU – Nephelometric Turbidity Units

PPM- Parts per million

PS- Point Source

PS/NPS- Point and Nonpoint Source

RC&D -Resource Conservation and Development

Region 5 Model 5- Excel workbook that provides a gross estimate of sediment and nutrient load reductions

RUSLE- Revised Universal Soil Loss Equation

SOD – Sediment Oxygen Demand

STEPL- Spreadsheet Tool for Estimating Pollutant Load

T- Threatened Species

TDS – Total Dissolved Solids

TMDL – Total Maximum Daily Load

TN – Total Nitrogen

TP – Total Phosphorous

TSS – Total Suspended Solids

USDA- United State of Department of Agriculture

USEPA – United States Environmental Protection Agency

USFWS- United States Fish and Wildlife Services

USGS- US Geology Survey

WMP- Watershed Management Plan

Tired Creek Watershed Management Plan

Executive Summary

Through a competitive application process, the Georgia Environmental Protection Division (GAEPD) executed a FY2012 Section 319(h) Contract with the Golden Triangle Resource Conservation and Development (RC&D) Council to provide technical assistance for the development of a 9-Element Watershed Management Plan (WMP) by collecting water quality monitoring data, existing water and land use data, education and outreach in the form of establishing an advisory committee, hosting public meetings, creating a website, identifying landowners for BMP cost-share projects, and distribution of educational materials for the Tired Creek Watershed. The GAEPD 2002 Total Maximum Daily Load (TMDL) Implementation Plan did not meet the U.S. Environmental Protection Agency's guidelines for 9-Element watershed planning and the local community's interest in the watershed, it was necessary to develop a new watershed management plan. The components of this plan were prepared using USEPA *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*, which provide guidelines for a watershed approach to restore impaired waters. The 9-Element criteria are:

1. Identification of causes and sources of pollution that need to be controlled.
2. Estimate pollutant load reductions needed.
3. Develop management measures needed to achieve goals, including restoration and protection measures, future impacts in the watershed, etc.
4. A schedule for implementing the management measures identified in the plan.
5. Interim milestones for determining whether nonpoint source management measures or other management control actions are being implemented.
6. A set of criteria, including water quality monitoring, that can be used to determine whether pollutant load reductions are being achieved over time.
7. A monitoring component that can be used to track the effectiveness of implementing the watershed management plan over time.
8. An information and education component that will be used to enhance public understanding of the project.
9. An estimate of the amount of technical and financial assistance needed to implement the plan.

Golden Triangle RC&D Council derived from stakeholder and community concerns, results of targeted water quality monitoring, current land use data, the 2002 and 2006 TMDL Implementation Plan to make the following recommendations on Best Management Practices installations and the potential causes which include:

- Non-Point Source Urban runoff
- Municipal Sewage spills
- Historic Spray field issues/spills
- Maintenance/Repair/Establishment of Riparian/Streamside Buffers
- Ensuring land use/erosion control practices are being utilized by city and county
- Reduction of dumping and trash from bridges
- Continued Watershed Education on importance of protecting water resources

Installation of adaptive BMPs practices should lead to a reduction in Fecal Coliform of 25% for Tired Creek, 85% for Parkers Mill, and 65% for Little Tired Creek. Dissolved oxygen reductions are stated at 0% for Little Tired Creek. This is due to historical discharge issues with a now closed plant in Grady County. The estimated load reductions will be accomplished through the use of watershed management strategies, site specific location opportunities, and customized BMP installations using National Resources Conservation Services (NRCS) and Department of Forestry Conservation Practices.

Key measures that will lead to the success of this WMP will be the number of participants (landowners, the City of Cairo and Whigham, Grady County Road and Bridge department and local business willing to install appropriate BMPs for the listed impairment. Also, educational and outreach components will continue to play a key role in implementing this WMP, as was done prior to its completion through encouraging landowner participation and informing the public about the negative impacts of nonpoint source pollution and the importance of stewardship for water quality improvement. Education and outreach will continue to be carried out by:

- Holding Public Meetings
- Educational Workshops and Field Days
- Developing and Distributing Brochures
- Updates on Golden Triangle RC&D Website and Facebook page

1.0 Introduction

The purpose of developing this WMP is to provide a tool that demonstrates a holistic approach to water quality management by actively engaging stakeholders within the watershed and the selection of highly effective water quality management strategies that will be implemented to correct the problems.

Golden Triangle RC&D established the Tired Creek Watershed Partnership, which includes: Ochlocknee River Water Trail, Bird Song Nature Center, Keep Grady County Beautiful, Thomas University U.S. Fish and Wildlife Service, Natural Resource Conservation Service, and the Water Policy and Planning Center. Additional stakeholders participated through public community meetings and events held in Grady County. These sessions brought together local landowners, business, other concerned local organizations and local government officials to discuss issues and gather community participation.

A community survey was created and distributed at public meetings, paddle events, University events, local businesses, public libraries, and was placed on Golden Triangle's website. A total of 100 surveys were distributed and 28 people responded to the survey that either live, work, or both within the watershed area. The survey included multiple choice options, along with a fill-in the blank section with questions inquiring about what the public sees as the biggest problems facing the Tired Creek. The following are responses the public sees as concerns and/or potential stressors:

- Creek/Streamside Erosion
- Leaking Sewage septic
- Unpaved Dirt Roads
- Urban Storm Runoff
- Sedimentation
- Flow Obstruction
- Lack of Education
- Pollution
- Illegal Dumping

Of these responses, the top four concerns are flow obstruction, pollution, illegal dumping and lack of education. Golden Triangle addresses these primarily through evaluating water quality monitoring, evaluation of land use and characterization of physical features and habitats. Through interaction with the Tired Creek Watershed Partnership a combination of adaptive on the ground approaches were recommended, including long term management measures for the most effective BMPs to improve water quality in the Tired Creek Watershed.

The recommended BMPs described in this WMP would effectively reduce the amounts of Fecal Coliform bacteria and increase the levels of Dissolved Oxygen. The implementation and/or installation sites will be selected based upon the greatest potential effectiveness of the proposed BMP for the impairment.

During the first phase of implementing the WMP, Golden Triangle RC&D will administer and track the progress of the recommended management measures, monitor the effectiveness of BMPs and associated load reductions, and oversee the completion of tasks and milestones. The targeted BMP completion number for each type may be altered depending upon the type and number in a landowner's application. BMP completion is also greatly dependent on landowner and shareholder participation. Load reduction data will be made available to the Tired Creek Watershed Partnership. If the numbers of acreage for each BMP type is changed then the estimated load reduction numbers will be adjusted accordingly. Any changes to the BMP implementation schedule will be reported to GAEPD and the Tired Creek Watershed Partnership.

2.0 Partnership/Stakeholder Committee

The Tired Creek Watershed Partnership was formed in June 2015. The partnership/advisory board is comprised of local organizations and business, city planners, and public citizens. Four advisory meetings and three public town hall meeting. During the formation of the partnership it was important to identify individuals and/or groups that were and/or would be able to:

- make decisions on the Watershed Management Plan
- provide and/or gather data regarding the watershed
- partner by providing technical and financial assistance
- develop and conduct public outreach strategy
- develop web page on the existing Golden Triangle R&D website to list updates and events regarding the Watershed

Golden Triangle would like to acknowledge the Ochlockonee River Water Trail and Grady City Planning and Zoning Department for assistance in data gathering information, Advisory meeting input and participation. Their input allowed confirmation of City regulations and ordinance's and BMP practices are still being followed as per the 2002 TDML plan.

The full list of stakeholders, community partners, local landowners, and other organization contributions are listed in table 2.0 below.

Table 2.0

Organization	Name	Participation
Thomas University	Dr. Christine Ambrose	Watershed Partnership, Technical Assistance, Community Outreach, GIS Mapping
Ochlocknee River Water Trail	Margaret Tyson Vickie Redden	Stakeholder, Watershed Partnership, Community Outreach
Bird Song Nature Center	Kathleen Brady	Stakeholder, Watershed Partnership, Community Outreach
Keep Grady County Beautiful	Celeste Taylor	Watershed Partnership, Community Outreach
Grady County Road Department	Stanley Elkin	Stakeholder
Georgia Forestry Commission	Chuck Norvell	Watershed Partner, Technical Assistance
US Fish and Wildlife Service Panama City Field Office	Chris Metcalf	Watershed Partner, Technical Assistance
US Fish and Wildlife Service Fort Benning Field Office	Jim Bates	Watershed Partner, Technical Assistance
National Resource Conservation Service (NRCS)		Technical Assistance
Individual Citizen Participation	Beth Grant Ruthie Pfaff Alton Brown	Community Outreach
Water Policy and Planning Center	Marty McKimmey	Technical Assistance

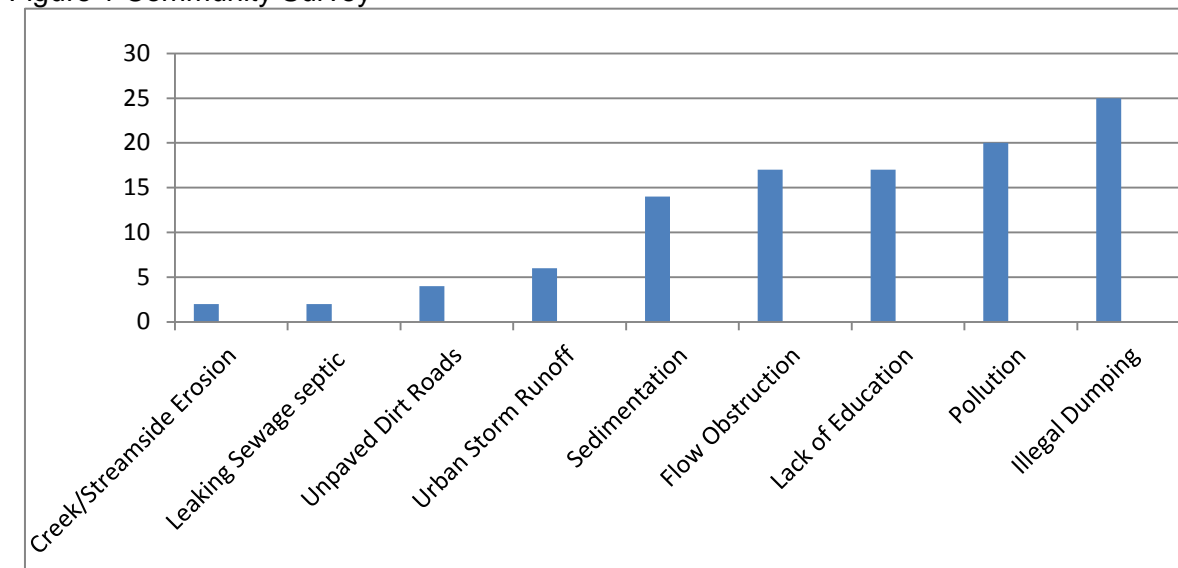
A community survey was created and distributed at the (2) two public meetings, local businesses, public libraries, and on the Golden Triangle website. A total of 100 surveys were distributed and 28 people responded to the survey that either live, work, or both within the watershed area. The survey included multiple choice options, along with a fill-in the blank section with questions inquiring about what the public sees as the biggest problems facing the Tired Creek.

The following are responses the public sees as concerns and/or potential stressors:

- Creek/Streamside Erosion
- Leaking Sewage septic
- Unpaved Dirt Roads
- Urban Storm Runoff
- Sedimentation
- Flow Obstruction
- Lack of Education
- Pollution
- Illegal Dumping

The top concerns and/or issues from survey were Sedimentation, Flow Obstruction, Pollution, and Illegal dumping. The results of the Community Survey were shared with the partnership/stakeholders, along with the visual survey and report that was completed of 2016. The results were compiled into 2 categories; A) those we can affect with the implementation of a Watershed Management Plan B) those we cannot affect due to time or cost constraints. The following are the top ranked issues/watershed stressors that the Partnership/Stakeholders/Community has identified within the Tired Creek.

Figure 1 Community Survey



Project Area Assessment

3.0 Physical Features

Geographic Location

The Ochlockonee River Basin, from the headwaters in Worth County to the Gulf of Mexico, covers an area of approximately 2,448 square miles. The basin is divided into the Upper and Lower Ochlockonee. The Tired Creek Watershed (HUC (10) 0311010301) and corresponding impaired waterbodies lie within the basin. The Tired Creek watershed is approximately 136.99 square miles and covers the southern part of Grady County, Georgia.

The Georgia Environmental Protection Division (GAEPD)'s Draft 2014 Integrated 305(b)/303(d) List of Streams Not Supporting Designated Uses includes 17 miles in Grady County as not meeting its designated use (fishing) because of violating criteria for Fecal Coliform and Biota Impacted Macroinvertebrate as follows:

- Little Tired Creek (SR 188 downstream of Cairo to Tired Creek), 6 miles listed for Fecal Coliform violation,
- Parkers Mill Creek (Headwaters to Tired Creek, Cairo), 5 miles listed for Fecal Coliform violation, and
- Tired Creek (Turkey Creek to Ochlockonee River, 6 miles for Fecal Coliform, Biota Impacted Macroinvertebrate

The potential causes and sources of nonpoint source pollutants are shown in Table 3.0 with the impairment relative to the potential cause, which were derived stakeholder and community concerns, results of targeted water quality monitoring, current land use data, the 2002 TMDL Implementation Plan.

Potential Causes Table 3.0

Identified Impairment	Potential Source/Causes
Fecal Coliform	Urban runoff Degraded/nonexistent buffers Fecal Matter from manure spreading on agriculture fields
Low Dissolved (Historical) Oxygen	Urban run-off (subdivisions and parks) Low Flow/High Temperatures Drought Limited Agriculture Row Crop Run-off Fecal Matter from Wildlife
Sediment	Non-vegetative banks Urban ditch erosion Limited Agricultural run-off

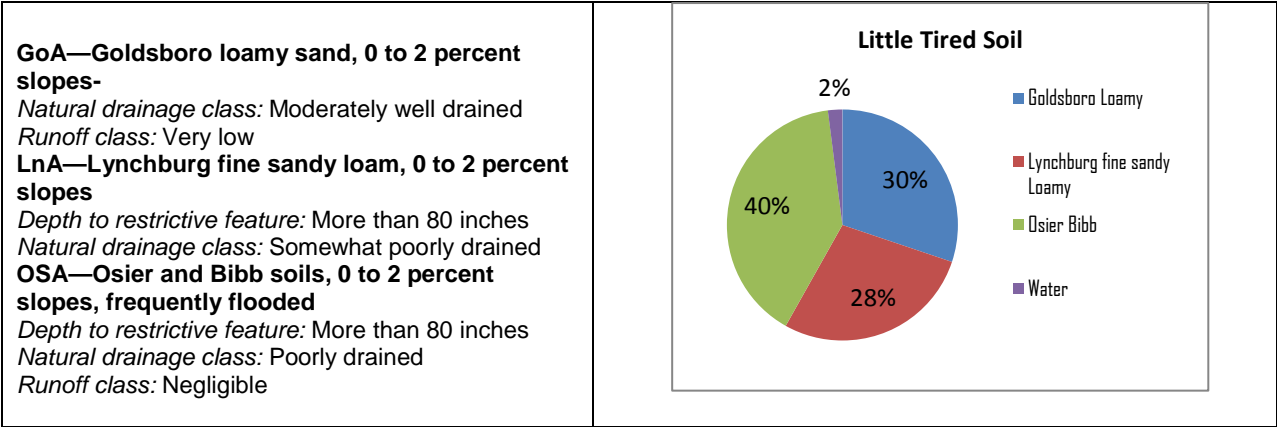
Topography

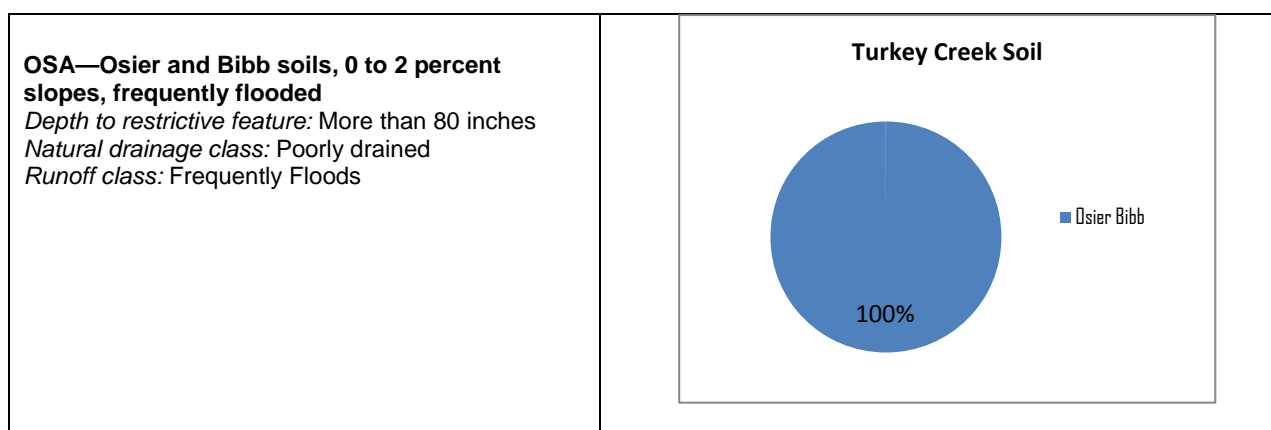
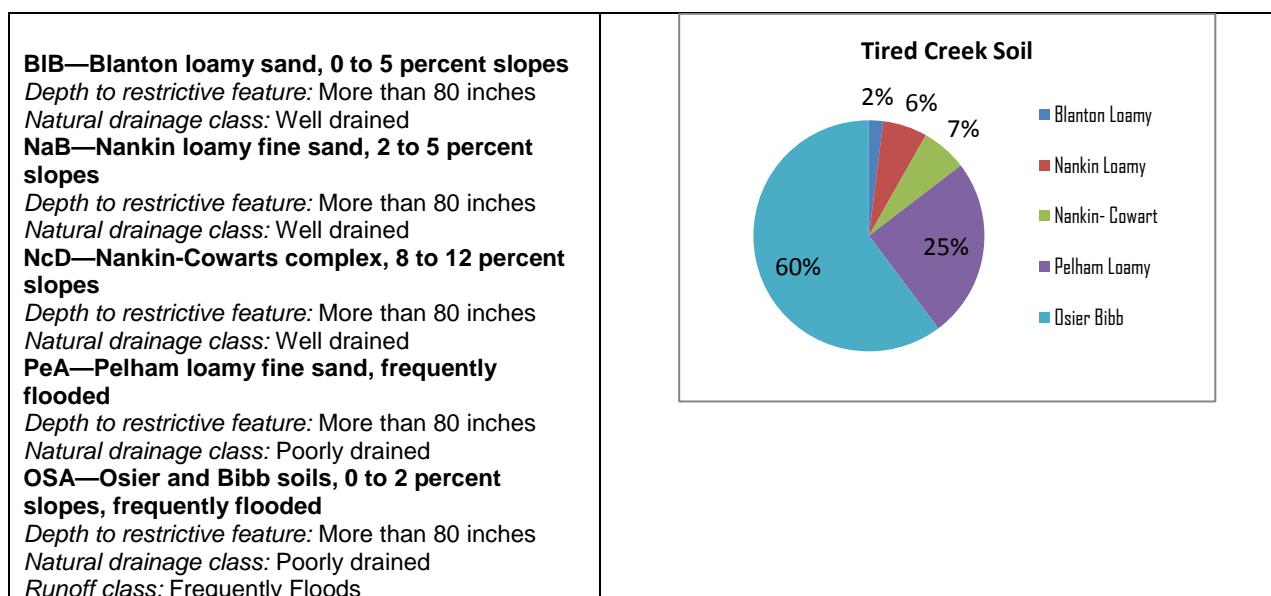
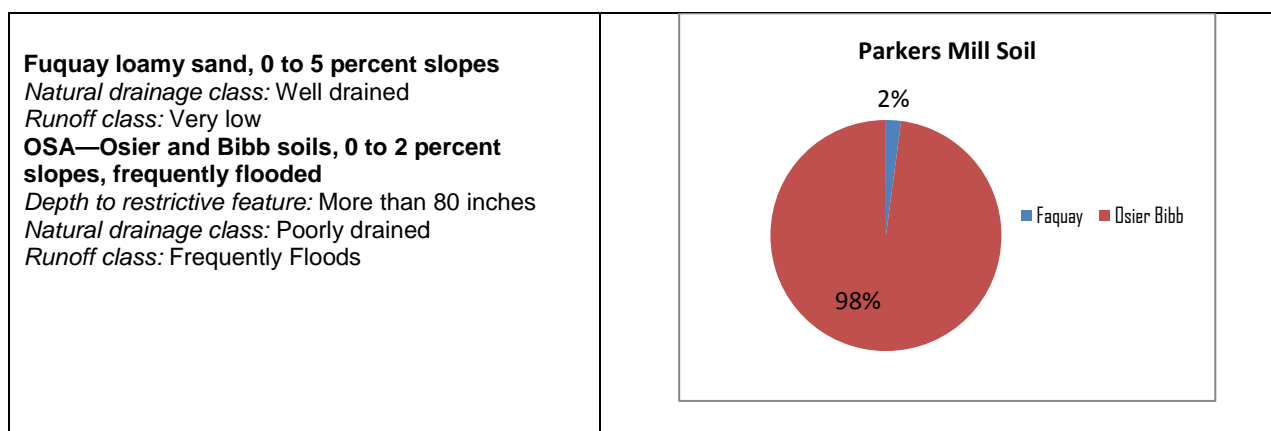
The Tired Creek Basin lies within the Coastal Plains region and due to the lack of riffles and shoals that dominate the Piedmont regions, create significant floodplain forest systems. This is due to the long expanse of contiguous habitat and the volume of water in the region. The Tired Creek Watershed is 91, 415 acres and contains 216 miles of stream, 294 acres of lakes and 18,852 acres of wetlands. Many of the tributary streams that feed into the river are considered alluvial with sandy bottoms. They are predominantly composed of sands, clays, and gravels. The land surrounding runs through both urban and residential neighborhoods before turning into a mixture of managed plantations, agriculture cropland, and livestock chicken farms. The Tired Creek is primarily croplands while the lower portions are forested.

Soil Types

The watershed lies within the Southeastern Plain/Dougherty Plain ecoregion, which is dominated by ultisols (sandy/ loamy surface layers and clayey subsoils) this makes the soil very erosive. The soil types associated within the Tired Creek are characterized by nearly level to gently sloping, well drained upland soils that are dissected by nearly level, poorly drained soils along narrow drainage ways. Most of the soils are strongly acid, low in organic matter content, and low in natural fertility. It should also be noted that even within the same geographic land area that different soil types and slopes exist. These variables will be taken into account within the BMP recommendation process. The soil associations for the geographic area around each creek and county are broken out below:

Soil Types





Climate

Data from the National Oceanic and Atmospheric Administration (NOAA) shows that rainfall in Southwest Georgia has increased from the drought conditions of 2012.

Table 5.1.4 Climate Data

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Current Location: Elev: 201 ft. Lat: 30.8696° N Lon: -84.2174° W
Station: **CAIRO, GA US USC00091463**

Global Summary of the Month for 2017

Generated on 09/10/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Date	Temperature (F)														Precipitation (Inches)										
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT			DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP10	DP1X		
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days					
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.01	>=.10	>=1.0			
Jan	54.9	66.6	43.3	297	14	76	26	25	09	0	0	3	0	5.14	1.19	23					10	9	2		
Feb	60.4	73.5	47.3	132	13	81	25	33	17	0	0	0	0	1.53	1.02	08					4	3	1		
Mar	60.4	73.1	47.8	181	49	86	30	27	17	0	0	2	0	1.39	0.57	02					3	3	0		
Apr	67.9	81.2	54.6	36	114	87	03	39	08	0	0	0	0	2.64	1.50	04					3	3	1		
May	72.8	84.7	60.9	6	215	93	29	48	06	4	0	0	0	3.78	1.82	05					8	7	1		
Jun	77.3	85.2	69.5	0	319	92	26	60	09	2	0	0	0	8.39	2.30	20					16	11	2		
Jul	81.4	90.4	72.4	0	459	95	10	70	15	19	0	0	0	4.29	1.70	18					10	8	1		
Aug	80.9	89.2	72.5	0	415	95	18	67	30	12	0	0	0	3.61	0.83	26					11	11	0		
Sep	76.1	85.5	66.7	6	340	93	30	60	13	6	0	0	0	4.21	1.70	11					11	5	1		
Oct	70.1	80.3	59.9	72	221	90	11	35	31	1	0	0	0	2.52	0.87	12					7	5	0		
Nov	59.4	71.6	47.2	192	25	83	08	32	20	0	0	1	0	0.37	0.16	23					4	2	0		
Dec	52.5	62.5	42.5	374	11	79	01	27	11	0	0	6	0	3.44	1.16	08					10	9			

Notes

(Blank) Data element not reported or missing.

+ Occurred on one or more previous dates during the month. The date in the Date field is the last day of occurrence.

A Accumulated amount.

X Monthly means or totals based on incomplete time series.

T Trace Amount.

The highest temperatures reflected are June at 85 degrees and July at 90. The largest rainfall amounts occurred in June at 2.30 inches.

Habitat

The Tired Creek supports a diverse and rich mix of aquatic and terrestrial communities. Wetlands and floodplains are an integral part of this system and can be impaired when a water resource is adversely affected by human activities such as land conversion, alteration and drainage due to silviculture, and fragmentation (GEPD, 2002). Aspects of urbanization, hydrologic alteration, impervious surfaces, and stream channelization can cause substantial degradation of the physical, chemical, and biological characteristics.

Previous watershed surveys and the original TMDL plan approved by EPD in 2002 show that there are federally threatened and endangered flora, fauna and aquatic life present, along with USFWS Critical Habitat Areas as shown below in Table 3.1.

Table 3.1

Threatened (T) and Endangered (Thomas County)				
Species	Federal Status	State Status	Habitat	Threats
Bird				
Wood Stork <i>Mycteria americana</i>	E	E	Primarily feed in fresh and brackish wetlands and nest in cypress or other wooded swamps	Decline due primarily to loss of suitable feeding in south Florida. Other factors include loss of nesting habitat, prolonged drought/flooding, raccoon predation on nest, and human disturbance of rookeries.
Red-cockaded woodpecker <i>Picoides borealis</i>	E	E	Nest in mature pine with low understory vegetation (<1.5m); forage in pine and pine hardwood stands > 30 years of age, preferably > 10" dbh	Reduction of older age pine stands and to encroachment of hardwood mid story in older age pine stands due to fire suppression
Reptile				
Gopher Tortoise <i>Gopherus polyphemus</i>	No Federal Status	T	Well-drained, sandy soils in forest and grassy areas, associated with pine over story, open understory with grass and sunny areas for nesting.	Habitat loss and conversion to closed canopy forest. Other threats include mortality on highways, and pet trade.
Invertebrate				
Oval Pigtoe <i>(Pleurobema pyriforme)</i>	E	E	River tributaries and main channels to slow to moderate currents over silty sand, muddy sand, and gravel substrates	Habitat modification, Sedimentation, and water quality degradation.
Invertebrate				
Purple bankclimber <i>(Elliptioideus sloatianus)</i>	T	T	Rivers and streams; usually found in moderate currents over sand, sand mixed with mud, or gravel substrates, swept free of silt by the current.	Habitat modification, Sedimentation, and water quality degradation
Invertebrate				
Ochlockonee moccasinshell (<i>Medionidus simpsonianus</i>)	E	E	Medium to large rivers; found in slight to moderate current over sand and gravel substrates; muddy sand substrates around tree roots.	Habitat modification, Sedimentation, and water quality degradation

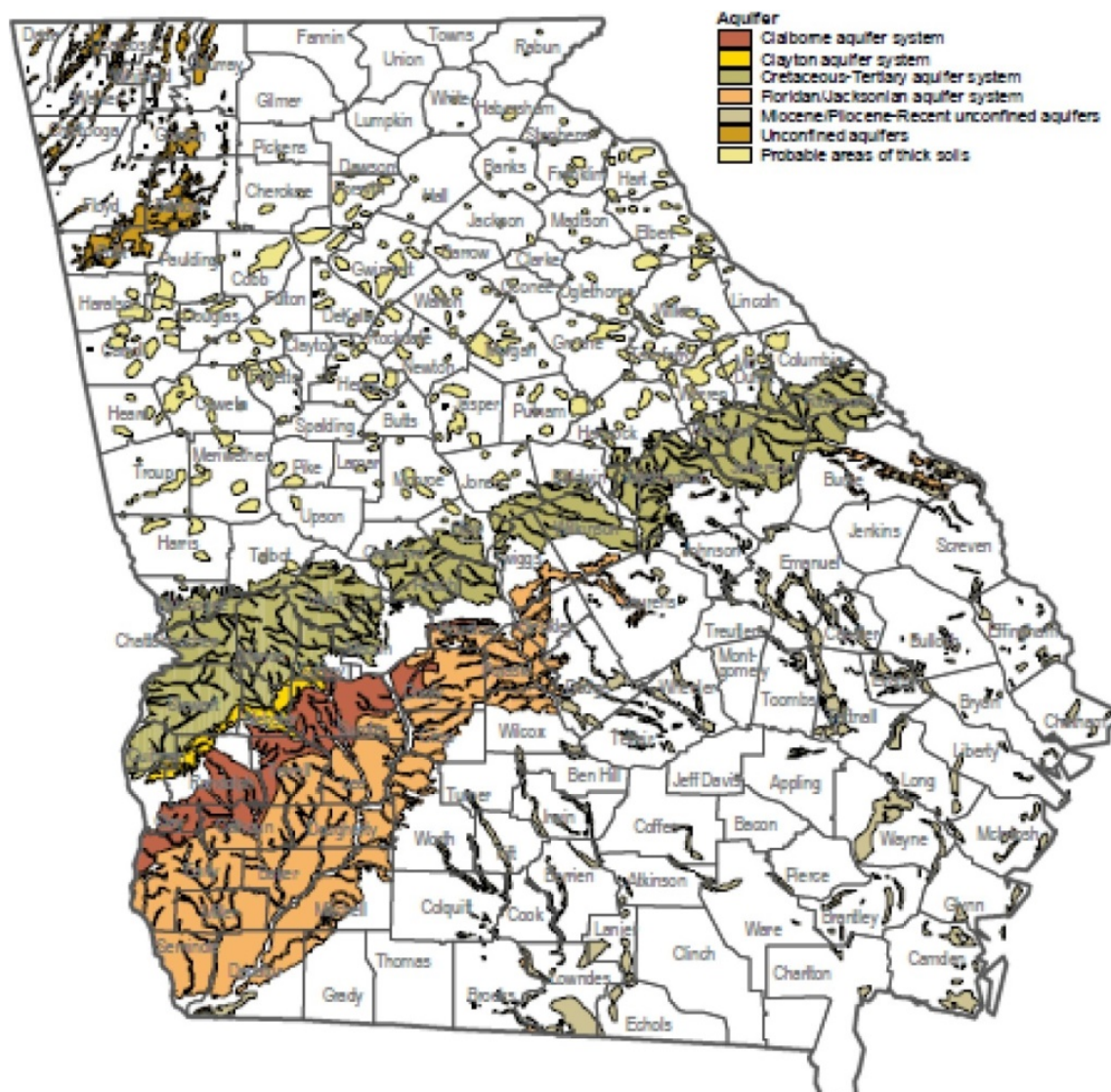
Recharge Areas

The ground water resources for the Tired Creek are supplied by the Floridian aquifer system. The recharge area lies within Mitchell County. The Floridian aquifer is characterized as a thick sequence of carbonate rocks (limestone and dolomite) that is easily permeated. According to the Department of Natural Resources Groundwater Pollution Susceptibility Map (Hydrologic Atlas 20) the area in Mitchell County lies within a “High” susceptibility zone for pollutants, while only the upper portion of Grady County lies within the “Average” susceptibility zones.

Pollutants can enter the re-charge areas through septic systems, agricultural waste, and run-off of fertilizers. See attachment J for Groundwater Pollution Susceptibility Map of Georgia and attachment K for Groundwater Recharge Area Map of Georgia (Hydrologic Atlas 18).

Georgia's Groundwater

Recharge Areas



Flood Plains

The Tired Creek Watershed does contain flood plain areas, but according to the Federal Emergency Management Agency (FEMA) mapping it is only a 1% flood hazard within the effected creeks. See Attachment L for FEMA Flood Plain Map.

Wetlands

The Tired Creek basin contains 20,287.98 acres of wetland areas within the affected areas. See Attachment K for Wetland Map.

4.0 LAND USE AND POPULATION CHARACTERISTICS

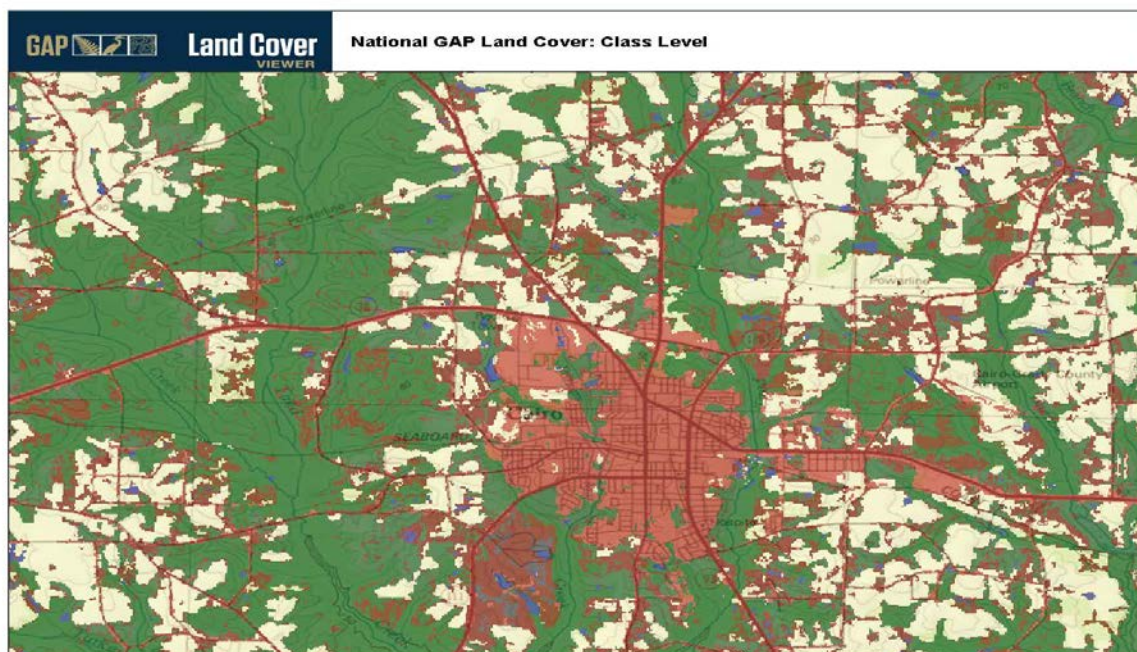
Land Cover


The health and stability of aquatic ecosystems is directly linked to the health and condition of the terrestrial ecosystems. Many factors can affect this balance:

- Land Use
- Deforestation
- Population Size

All land use has an effect on water quality, whether positive or negative. In forests and other areas with good vegetation cover and little disturbance, most rainfall soaks into the soil, collecting in recharge areas underground rather than runoff. In highly populated areas with pavement and buildings, little rainfall can soak into the soil, which can cause high runoff events.

Table 4.1 Land Cover



<div> <div>  <div> <div>Land Cover</div> <div>VIEWER</div> </div> </div> <div>Land Cover Report Grady County</div> </div>			
Land Cover Name	Hectares	Sq. Miles	% Total Area
Forest & Woodland	58,230.90	224.83	48.86 %
Warm Temperate Forest	37,942.92	146.50	65.16 %
Longleaf Pine & Sand Pine Woodland	13,840.56	53.44	36.48 %
Atlantic Coastal Plain Old River Drive	17.82	0.07	0.13 %
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland - Open Understory Modifier	13,678.38	52.81	96.83 %
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland - Scrub/Shrub Modifier	144.26	0.56	1.04 %
Southern Mixed Deciduous-Evergreen Broadleaf Forest	8,870.13	34.25	23.38 %
East Gulf Coastal Plain Limestone Forest	2,058.84	7.95	23.21 %
Southern Coastal Plain Dry Upland Hardwood Forest	6,587.37	25.43	74.26 %
Southern Coastal Plain Oak Dome and Hammock	223.92	0.86	2.52 %
Southeastern North American Ruderal Forest & Plantation	15,232.23	58.81	40.15 %
Deciduous Plantations	2,888.28	11.16	18.96 %
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland - Loblolly Modifier	1,731.87	6.69	11.37 %
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland - Oak/Hick Hardwood Modifier	1,114.83	4.30	7.32 %
East Gulf Coastal Plain Near-Coast Pine Flatwoods - Oak/Hick Hardwood Modifier	6.39	0.02	0.04 %
Blue Green Plantation or Managed Pine	9,490.86	36.64	62.31 %
Freshwater Aquatic Vegetation	20,287.98	78.33	34.84 %
Southern Floodplain Hardwood Forest	10,341.54	39.93	50.97 %
Southern Coastal Plain Blackwater River Floodplain Forest	10,341.54	39.93	100.00 %
Southern Coastal Plain Evergreen Hardwood & Conifer Swamp	4,550.22	17.57	22.43 %
Southern Coastal Plain Hydric Hammock	4,545.00	17.55	99.89 %
Southern Coastal Plain Seepage Swamp and Baygall	5.22	0.02	0.11 %
Southern Coastal Plain Basin Swamp	4,566.42	17.63	22.51 %
Atlantic Coastal Plain Nonfluviatile Swamp and Wet Hardwood Forest - Oak Dominated Modifier	123.57	0.48	2.71 %
Southern Coastal Plain Nonfluviatile Basin Swamp	4,442.85	17.15	97.29 %
Wet Longleaf Pine & Southern Flatwoods	829.80	3.20	4.09 %
Southern Coastal Plain Nonfluviatile Cypress Dome	829.80	3.20	100.00 %
Shrubland & Grassland	198.45	0.77	0.17 %
Temperate & Boreal Freshwater Wet Meadow & Marsh	198.45	0.77	100.00 %
Atlantic & Gulf Coastal Plain Pondshore & Wet Meadow	198.45	0.77	100.00 %
East Gulf Coastal Plain Depression Pondshore	136.44	0.53	68.75 %
Southern Coastal Plain Herbaceous Seepage Bog	62.01	0.24	31.25 %
Nonvascular & Sparse Vascular Rock Vegetation	85.05	0.33	0.07 %
Barren	85.05	0.33	100.00 %
Barren	85.05	0.33	100.00 %
Unconsolidated Stone	47.97	0.19	56.40 %
Undifferentiated Barren Land	37.08	0.14	43.60 %
Agricultural Vegetation	36,698.04	141.69	30.80 %
Herbaceous Agricultural Vegetation	36,698.04	141.69	100.00 %
Herbaceous Agricultural Vegetation	36,698.04	141.69	100.00 %
Cultivated Cropland	30,968.91	119.57	84.39 %
Pasture/Hay	5,729.13	22.12	15.61 %
Developed & Other Human Use	6,981.30	26.95	5.86 %
Developed & Urban	6,964.11	26.89	99.75 %
Developed & Urban	6,964.11	26.89	100.00 %
Developed, Open Space	5,481.45	21.16	78.71 %
Developed, Low Intensity	1,275.93	4.93	18.32 %
Developed, Medium Intensity	143.19	0.55	2.06 %
Developed, High Intensity	63.54	0.25	0.91 %
Current and Historic Mining Activity	17.19	0.07	0.25 %
Quarries, Mines, Gravel Pits and Oil Wells	17.19	0.07	100.00 %
Quarries, Mines, Gravel Pits and Oil Wells	17.19	0.07	100.00 %
Recently Disturbed or Modified	15,955.11	61.60	13.39 %
Recently Disturbed or Modified	15,955.11	61.60	100.00 %
Recently Disturbed or Modified	15,955.11	61.60	100.00 %

LAND USE

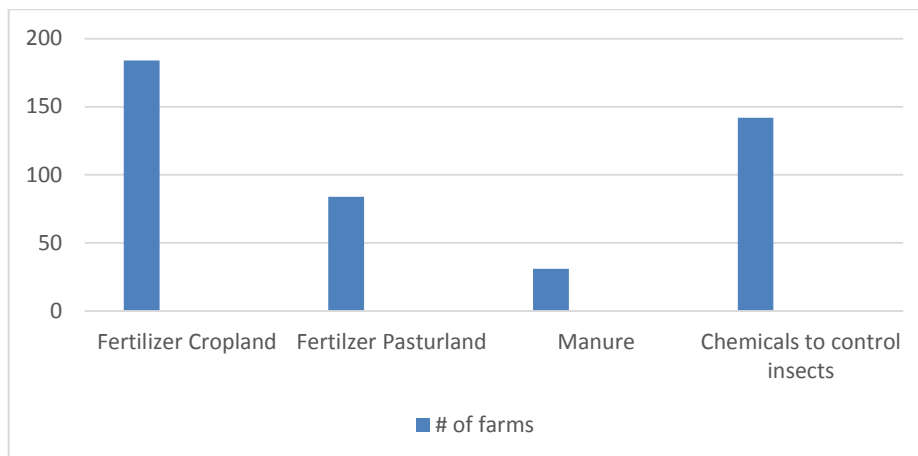
The Tired Creek Watershed lies within the larger Upper Ochlockonee River basin with occupies 6,330 square miles of which 1,460 square mile are within the state of Georgia. The Tired Creek area covers 136.99 square miles and covers the southern part of Grady County. Grady counties agriculture production is predominately row crop with 345 farms. Livestock farms of either chickens, beef/dairy cows or swine make up a total of 353 farms. Residential and urban land use are contributing issues due to greater amounts of impervious surfaces and storm water systems to convey oils, heavy metals, yard and pet waste. The run off of these pollutants does have a direct impact with the sources of pollutants entering the waterways.

Recommendations for control of this will be made in section 6.0.

AGRICULTURE USE

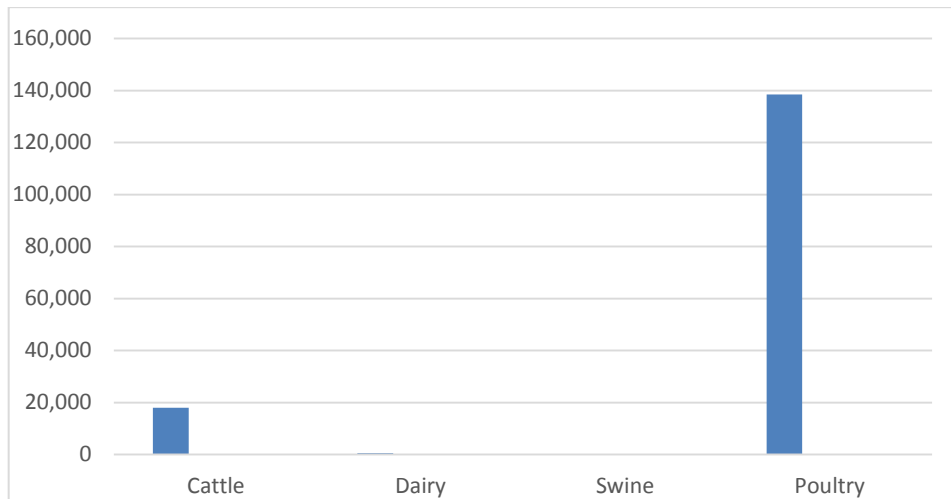
Agriculture use within the watershed is divided between livestock/poultry farms and row crops at a total of 698 farms totaling 130,258 acres with 78 farms having irrigated land of 9,230 acres. This information was used to assist with the appropriate BMP recommendations, pollutant load reductions, and ensure measureable progress is being made. (Table 4.2 shows the applications of fertilizer and chemical applications within the watershed compiled from the 2012 Georgia Farm Gate Report by County and Crop) and Table 4.3 shows the number of livestock farms)

Table 4.2 Agriculture Fertilizer and Chemical Applications



USDA 2012 Agricultural Census by County
Total number of Row Crop Farms 345

Table 4.3 Live Stock Farms



Total number of Poultry Farms 96

Total number of Livestock Farms 257

Table 4.4 Municipal and Industrial Uses

PERMIT_NAME	PERMIT_NO	COUNTY	RIVER_BASIN	PERMIT_TYPE	PERMIT_SUBTYPE
Cairo, City of	GAG820048	Grady	Unknown	General Pesticides	Municipal
Cairo, City of (Cairo WPCP)	GA0025771	Grady	Ochlockonee	NPDES General LAS AFO (300 to 1000 AU)	Municipal
Johnson Ranch	GAG920038	Grady	Ochlockonee		Industrial
Koyo Bearings USA LLC	GAP050028	Grady	Ochlockonee	Pretreatment	Industrial
Pinewood Nursing Center	GAG550047	Grady	Ochlockonee	General PID	Municipal

LAS Facilities

Permit #	Facility Name	Facility Description	County	Dominion	Reporting Year (FY)	Remaining Capacity (yd3)	Average Daily Tons	Rate of Fill (yd3/day)	Years Remaining	Estimated Fill Date	Waste Type
065-002D(SL)	Cairo - 6th Ave (SL)	Unlined Sanitary Landfill	Grady	Public	2017	377,011	36	72	21	8/1/2038	C&D
065-002D(SL)	Cairo - 6th Ave (SL)	Unlined Sanitary Landfill	Grady	Public	2017	51,782	77	154	1	12/1/2018	MSWL

Water Withdrawal Permits

River Basin	Permit Holder (Individual)	Permit ID	Permit Type	County	Date Permit Issued	Acreage	Surface Water Source	SW Rate (GPM)
Ochlockonee	VAN PONDER	A10-065-0318	Surface Water	Grady	10/29/2010	26	TRIBUTARY OF LITTLE TIRED CREEK & BELDER CIRCLE POND	450
Ochlockonee	ROBERT E LEE	A91-065-0178	Surface Water	Grady	11/16/1993	100	OCHLOCKNEE RIVER	1000

Demographics

Population size plays an important role in the watershed, as populations increase within both urban and rural communities this can affect, degrade, displace, alter or in worse cases eliminate natural habitats. These increases can lead to the potential for more urban and agricultural runoff.

Watersheds with higher populations tend to exhibit greater impacts on waterways and habitats.

The July 2017 US Census Bureau data shows a .08 % decrease in overall population for Grady County. It should however be noted that new businesses within Grady County has increased by 5% from 2015 to current date.

(Attachment E)

PEOPLE	
Population	
Population estimates, July 1, 2017, (V2017)	24,819
Population estimates base, April 1, 2010, (V2017)	25,011

5.3 Water Body and Watershed Conditions

Water Quality Standards

The Clean Water Act and USEPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for their water bodies that are not meeting their designated uses due to pollutants. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in- stream water quality conditions, so that states can establish water quality based controls to reduce pollution from both Point and Nonpoint Sources and restore and maintain the quality of their water resources (USEPA, 1991).

These Standards are established to provide and enhance the following:

- Water quality and prevention of pollution
- Protect the public health and welfare of drinking water supplies
- Conservation of fish, wildlife and other beneficial aquatic life
- Agricultural, industrial, recreational, and other reasonable and necessary uses to maintain and improve the biological integrity of the waters of the State

Table 5.3.1 below shows the recommended ranges approved by Georgia Environmental Protection Division (391-3-6-.03 *Water Use Classifications and Water Quality Standards*)

Water Quality Characteristic of Concern	Ecological or Health Effect	Standard	Notes
Dissolved Oxygen	High levels of Dissolved Oxygen are necessary for fish respiration	5.0 mg/l average 4.0 mg/l min	GA water quality standards
Temperature	Fish suffer metabolic stress at high temperatures.	90 c max	GA water quality standards
Fecal Coliform	Fecal Coliforms do not pose a health threat but serve as an indicator for bacteria that can cause illness in humans and aquatic life.	200 col/100ml(May-Oct) 1000 col/100 ml(Nov - April) 4000 col/100 ml(anytime)	GA water quality standards
Phosphorus	Macronutrient affects aquatic productivity and trophic state.	No effective standard in GA	Water body specific
Total Nitrogen	Macronutrient affects aquatic productivity and trophic state.	4.0 mg/l	GA water quality standards

Source Assessment

The Tired Creek Watershed is 136.99 acres and contains 17 miles of stream, 294 acres of lakes and 18,852 acres of wetlands. The Georgia Environmental Protection Division (GAEPD) 305(b)/303d list (2010) identifies 30 miles of impaired streams. Table 5.3.2 provides the non-point source pollutant listed for each area.

Table 5.3.2

Water Body Segment Name	County Location(s)	Criterion Violated or Water Quality Concern	Listing Status Category 4a, 5 or 1
Little Tired - SR 188 downstream of Cario to Tired Creek	Grady	FC	4a
Parkers Mill – Headwaters to Tired Creek	Grady	FC	4a
Tired Creek- Turkey Creek to Ochlockonee	Grady	FC and Biota Impated macroinvertebrates	

The Original TMDL Implementation Plan for Tired Creek was completed in 2002. However, the Implementation Plan does not meet the USEPA nine element criteria, which was established much later. The 2002 TMDL Implementation Plan indicated that the Fecal Coliform and Dissolved Oxygen pollutant issues were a result of failures to control run-off from storm water and urban areas, historic lift station and spray field issues, dumping and run off from bridges. The following summarizes the potential actions described in the 2002 TMDL Plan that could reduce Fecal Coliform and Dissolved Oxygen loading from nonpoint sources in the Tired Creek and.

Potential actions that could reduce the Fecal Coliform and Dissolved Oxygen Load:

- Install/Maintain buffers including Bio Retention and Conservation
- Use of the Georgia Best Management Practices for land disturbing activities
- Identification of any malfunctioning Septic Systems
- Adoption of proper unpaved road maintenance practices for sedimentation
- Homeowner education- what not to dump down storm drains/bridges
- Reduction of trash and dead animals on bridges and in creeks
- Redesign of Wastewater Treatment Plant

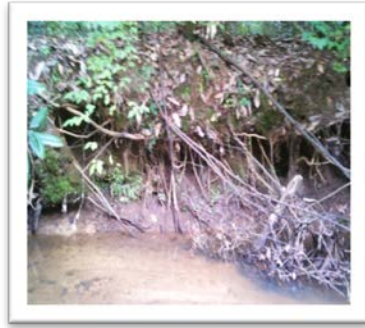
VISUAL SURVEY

A visual field survey was completed fall of 2016, summer of 2017 and summer of 2018 to aid in the identification of the possible sources of Point/Non- Point Source pollution.

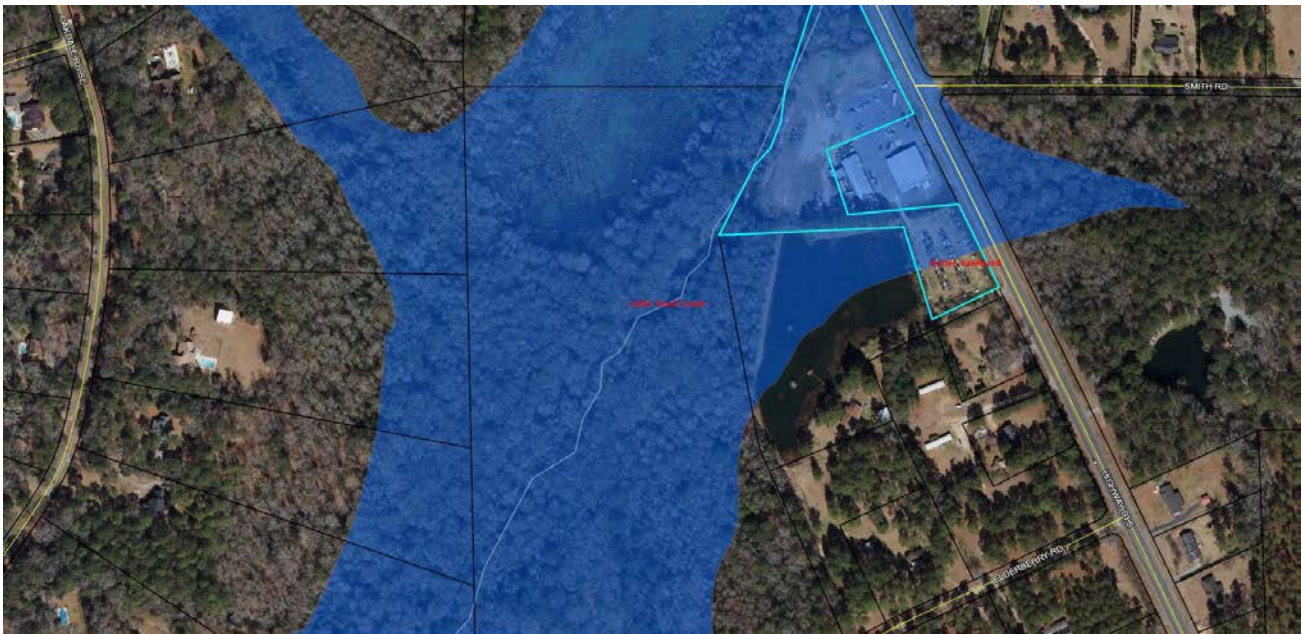
The results of this survey showed the following:

Little Tired Creek

- o Degraded /nonexistent buffers, urban run-off from business



Business- Junkyard



Parkers Mill –City of Cairo Urban

- o Degraded buffers, blocked and damaged culvert pipes, stream debris, trash



Parkers Mill- Degraded/ nonexistent buffers Business Monrovia Nursery upstream of creek



Tired Creek- Sedimentation and degraded banks



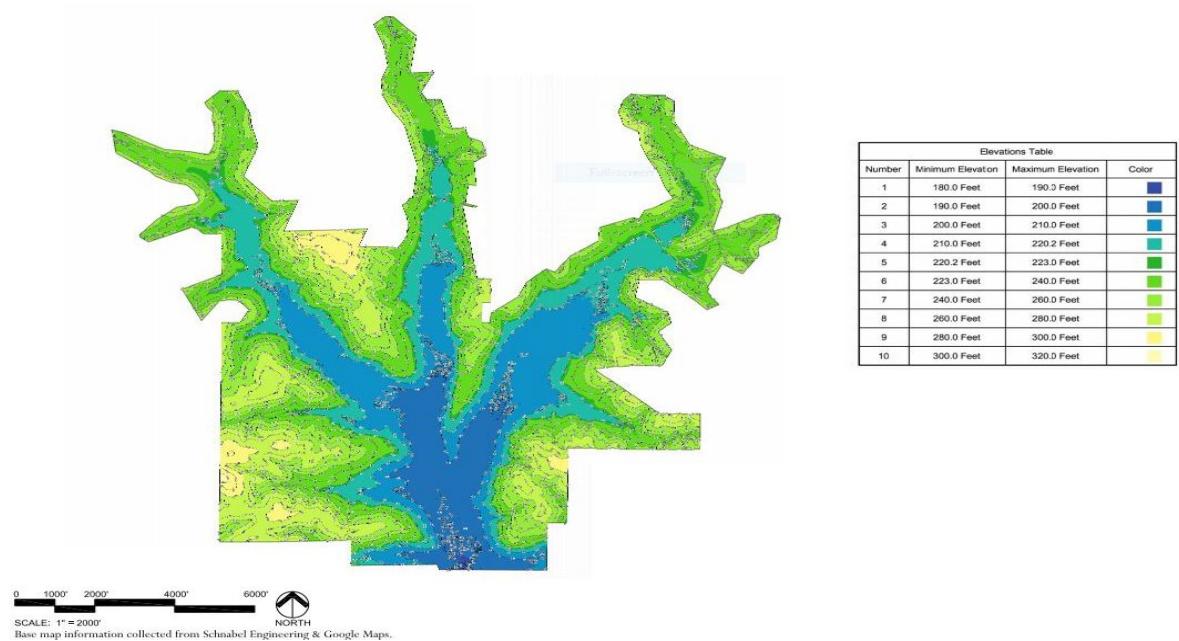
Turkey Creek

Low Flow and Sedimentation



Tired Creek Lake

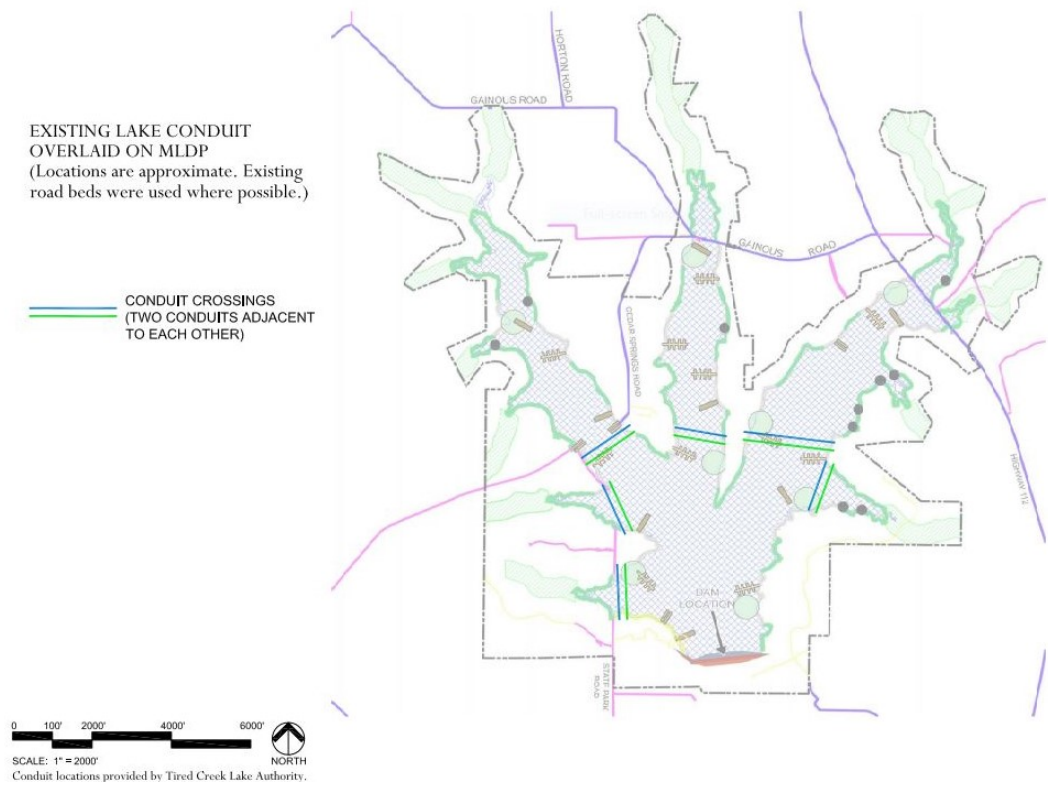
Even though Tired Creek Lake was not listed within the scope of this project, due to the location of the lake and the tributaries that feed it both upstream and downstream it is important to note the work being completed at the site and on State Park road (dirt road to Lake).



TIED CREEK LAKE

FIGURE 2.6: ELEVATION ANALYSIS

2.6



TIED CREEK LAKE

FIGURE 2.21: EXISTING LAKE CONDUIT LOCATIONS

2.21

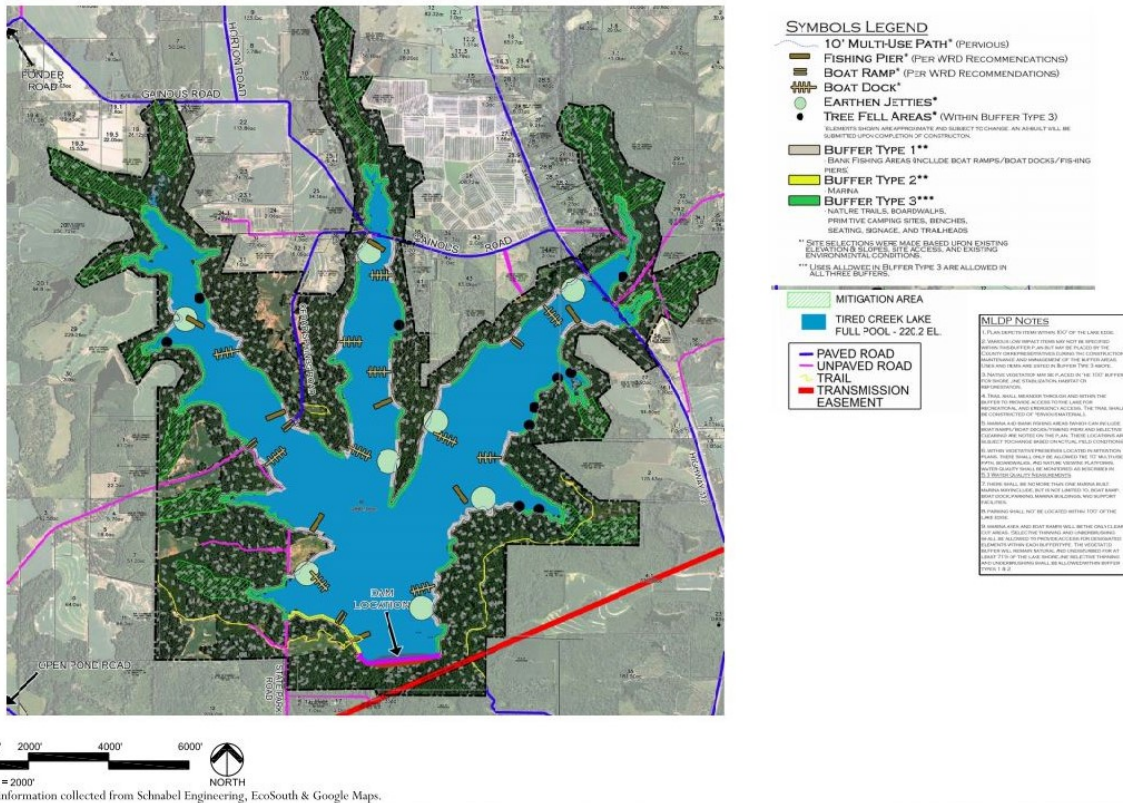


FIGURE 2.13: COMPOSITE ANALYSIS 2

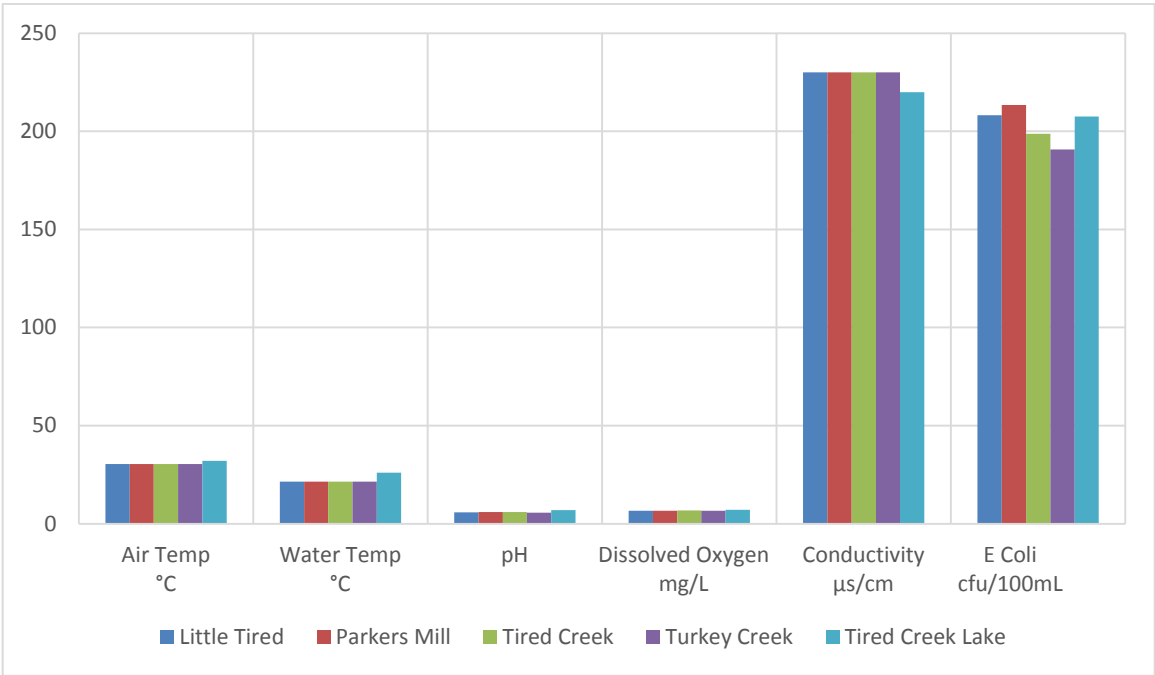
Spraying of duckweed at lake, and road construction on State Park Rd leading to Tired Creek



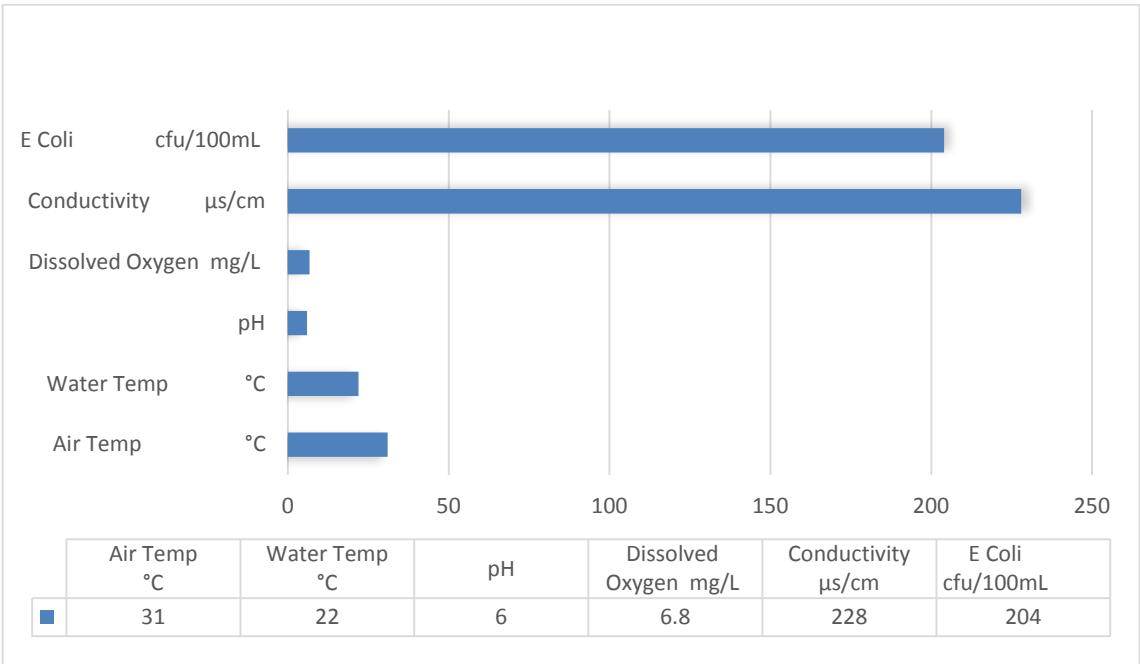
Water Quality Monitoring

Water sampling/monitoring, and visual surveys assessments were completed from April 2016 to September 2018. Full data results are located in Attachment B.

Summary of each Creek



Average of Creeks all together



6.0 Recommended Best Management Practices/Strategies

The consensus of Golden Triangle RC&D and the Tired Creek Watershed Partnership (ACWP) is that through the recent water quality monitoring, visual surveys, and research of historical data, the 2002 recommendations are still valid and required for the creation of this WMP to identify appropriate BMPs that need to be implemented within the Tired Creek Watershed to reduce the levels of Fecal Coliform, and Dissolved Oxygen. This Section discusses the proposed BMPs that were derived from Golden Triangle's investigations.

Golden Triangle RC&D and Watershed Partnership recommend implementing a combination of adaptive on the ground approaches, including long term management measures for the most effective BMPs to improve the overall water quality of the Tired Creek Watershed. The actual management measures to be implemented however are subject to modification based upon landowner participation, site specific need and opportunity, as well as future availability of funding.

The management strategies focus on environmental, programmatic and social indicators in recommending the appropriate Best Management Practices for Little Tired Creek (SR 188 downstream of Cairo, Parkers Mill (Headwaters to Tired Creek) and Tired Creek (Turkey Creek to Ochlocknee)

BMP practices approved by NRCS, DNR, USFWS specifications will include both structural and non-structural approaches for agriculture, urban pollutant controls, and public educational and outreach activities throughout the entire watershed.

Implementation of Best Management Practices (BMPs)

6.1.2 Structural BMP Recommendations to Address Fecal Coliform/Dissolved Oxygen and Sedimentation, including but not limited to the following:

- Grass Swales
- Infiltration Basin
- Infiltration Trench
- LID/Filter/Buffer Strip
- LID/Infiltration Swale
- LID/Infiltration Trench
- LID/Vegetated Swale
- Sand Filter/Infiltration Basin
- Sand Filters
- Vegetated Filter Strips
- Culvert Pipe
- Channel Stabilization
- Stormwater Runoff (combined BMP)
- Critical Area planting

- Better Back Road – Sedimentation and Transport Load of Fecal Coliform- Tired Creek Lake

Installation of better back road practices for the transport of sedimentation and fecal coliform loading into streams and creeks.

*This item is being added as a place holder. Current work on State Park Road for the Tired Creek Lake project is currently under construction and permitting by EPD via the lake project.

6.1.3 Non-Structural BMPs

- Riparian Buffers- Address Sedimentation/Dissolved Oxygen- All creeks

Protect water quality by slowing nutrient, pollutants, and sediment runoff. Buffers can either be herbaceous or forested. They can provide vegetation types, water quality protection, groundwater recharge, and wildlife habitat.

- Watershed debris and trash clean-up-address habitat alteration-All Creeks

While conducting visual survey of the watershed, it was noted that illegal dumping of old furniture, tires, litter was observed within the creeks. Not only is litter in streams unsightly, but trash and other debris in streams negatively impact aquatic organisms.

* It should also be noted here that there are numerous waste management dumpsters that sit up stream and in most cases at the entrance of access areas to Lil Tired, Tired, and Turkey Creek.

6.2 Load Reduction Methodology Region 5 Model 5

The Region 5 Model 5 Load Reduction model will be used to estimate the load reducing effects created by the installation of planned BMPs. The model uses the pollutants controlled calculation and documentation for Section 319 watershed training manual. The program is segmented into five different BMP categories for estimation of load reductions. These categories are gully stabilization, bank stabilization, agricultural fields, feedlots and urban runoff. Many different subcategories are listed under each category. The program only gives an estimation of load reduction and makes many assumptions in doing so. Load reduction calculations are given for sedimentation, phosphorus, and nitrogen. Monitoring is the only true way to determine actual load reductions achieved by BMP installations.

Load Reduction Methodology

- The load reduction model requires the input of a soil rainfall/runoff erosive number of “R” value, for load reduction estimations. Within the three counties in the watershed there are three different soil erosive “R” values according to the RUSLE (Revised Universal Soil Loss Equation) values. Thomas has an “R” value of 400.

- The load reduction model requires that a soil erodibility factor, or “K” factor, is used to estimate load reductions. Soils within Georgia have “K” values that range from 0.05 to 0.43. The majorities of the soils within the watershed are sandy surfaces with loamy or clayey subsoil’s, and have “K” values from 0.13 to 0.15. An average “K” value of 0.14 will be used to calculate load reduction values.
- A length of slope and steepness factor, or “LS” factor, is required to calculate load reduction values. The “LS” value is a site specific value that must be calculated from each BMP site. Most crop lands in Georgia have slope lengths that range from 60 to 250 feet. For load reduction calculations an average of 150 feet for slope length and an average of 3% slope will be used. This will be a “LS” factor value of 0.24.
- The Region 5 Model requires a cover management factor, or “C” factor in order to calculate load reductions. The program automatically inserts a “C” value into the calculation based on the county in which the BMP is installed. “C” factor values range from 0.20 to 0.39 within the watershed. An average value of 0.33 will be used in the load reduction calculations.
- The Region 5 Model requires a support practice factor, or “P” factor, to calculate load reductions. The model automatically inserts a “P” factor based on the county/counties selected. The watershed has “P” factors that range from 0.75 to 0.98. A “P” value of 0.76 will be used to calculate load reductions.
- The Region 5 Model gives an estimated soil loss per year in ton/acre/yr. Each of the counties within the watershed has different soil loss estimations according to the model. The counties range from 2.56 to 4.62 tons/acre/yr for soil loss. A number of 3.79 will be used to calculate load reductions.
- The BMPs to be completed are an estimate based on applications that have been filled out by Landowners and Shareholders. The BMPs installation sites are subject to Landowner participation.
- Urban runoff calculations do not show estimation for sedimentation, phosphorous, and nitrogen. Urban runoff calculations are needed to calculate load reductions for rural area subdivisions and dirt roads. The Gully stabilization calculations will be used to estimate load reductions for these areas.

Table 6.2.1

Project Stream Name and 303(d) Location	Violation	TMDL Percent Reduction
Little Tired Creek SR 188 downstream of Cairo to Tired Creek	FC	65% - 2006 (FC)
Parkers Mill Creek – Headwaters to Tired Creek	FC	85% - 2006 (FC) *Historical DO
Tired Creek Turkey Creek to Ochlockonee	FC, Biota Impacted macroinvertebrate	25%- 2006 (FC) Biota 2001

6.3 Recommended Best Management Strategies and Load Reductions

The following table is an estimation of the BMPs that will be completed within Phase 1 (Section 319(h) FY13 Contract). The table contains an estimated number of acres that will be affected or a number of livestock to be excluded. Completion of the BMPs will depend heavily on landowner participation and desires. Table 6.3.2 provides the type of BMP recommended and projected number for installation.

Table 6.3.1

Pollutant	BMP Type	Number of BMPs Installed	Sediment Reduction (tons/year)	Phosphorous Reduction (lbs/year)	Nitrogen Reduction (lbs/year)
Fecal Coliform/ Dissolved Oxygen Sediment	Filter Strips	10 @ .25 acres per	236	36.7	5.4
Fecal Coliform/ Dissolved Oxygen Sediment	Riparian Buffers	25 acres	236	36.7	5.4
Fecal Coliform/ Dissolved Oxygen Sediment	Storm Water Runoff (combined BMP)	25 acres	236	36.7	5.4
Fecal Coliform/	Septic Tank Installation	2 site	236	36.7	5.4

Table 6.3.2 Estimated Cost

BMP Type	Critical Number	Estimated Costs
Filter Strips	10 acres	\$292.00 per acre=\$1,460
Riparian Buffers	25 acres	\$946.00per acre=\$23,650
Storm Water Runoff	25 acres	\$537.15 per acre = \$16,114.50
Septic Tank Installation	2 sites	\$10,000

As mentioned in the Executive Summary, this project was funded in part with a Section 319(h) Grant, whereby the recommendations derived in developing the WMP would be implemented after GAEPD approved the plan. Interested landowners and business developers were identified during the public outreach and education element of the data gathering for the WMP.

As part of this planning process, an implementation summary chart was created to recap the recommendations of this plan with project priority ranking and estimated costs. The chart is organized by sub watershed/creek name, and identifies potential stressors, recommended BMPs and estimated costs. Additionally, the chart identifies responsible organizations/partners to lead on implementation activities.

Table 6.3.3

<u>Stream Name</u>	<u>Potential Stressors</u>	<u>Priority</u>	<u>BMPs</u>	<u>Estimated Cost</u>	<u>Responsible Organization</u>
<u>Parkers Mill</u>	<u>Urban Runoff/Fecal Coliform/Dissolved Oxygen/Sedimentation</u>	<u>#1</u>	Grass Swales	<u>\$100,000</u>	<u>GTRCD/FWS/Grady County</u>
			Infiltration Basin		
			Infiltration Trench		
			LID/Filter/Buffer Strip		
			LID/Infiltration Swale		
			LID/Infiltration Trench		
			LID/Vegetated Swale		
			Sand Filter/Infiltration Basin		
			Sand Filters		
			Vegetated Filter Strips		
			Culvert Pipe		
			Channel Stabilization		
			Stormwater Runoff (combined BMP)		
			Riparian Buffers		
			Critical Area planting		

Lil Tired Creek	Ag/Residential/Urban-Fecal Coliform/Dissolved Oxygen/Sedimentation #1		\$30,000	GTRCD/FWS/ Grady County
		Critical area planting		
		Stormwater Runoff (combined BMP)		
		Grass Swales		
		Vegetated Filter Strips		
		Riparian Buffers		
Tired Creek	Ag - Fecal Coliform/Dissolved Oxygen/Sedimentation #1		\$20,000	GTRCD/FWS/ Grady County
		Critical area planting		
		Vegetated Filter Strips		
		Riparian Buffers		
Turkey Creek	Ag - Fecal Coliform/Dissolved Oxygen/Sedimentation #1		\$25,000	GTRCD/FWS/ Grady County
		Critical area planting		
		Vegetated Filter Strips		
		Septic systems		
		Riparian Buffers		

Milestones

Table 6.3.4 : Proposed Implementation Schedule for WMP

	2019	2020	2021
Milestones/Tasks			
Execute Contract			
Project Activity 1: Develop criteria to identify and contact landowners/City of Thomasville for installation of BMPs			
Task #2: Implement Urban BMPs			
Task #3: Conduct two (2) BMP field days and workshops at selected sites (1 each year)			
Task #5: Continue with Tired Creek Partnership for advisement on implementing the WMP			
Task #7: Expand Tired Creek Partnership by recruiting new members			
Project Activity 2: Refine Better Back Road projects with County Administrators			
Project Activity 2: Refine Better Back Road projects with County Administrators			
Project Activity 3: Develop long-term water quality monitoring plan to measure BMP effectiveness			
Task #8: Prepare QA/QC water quality monitoring plan for post BMPs			
Task #9: Conduct two(2) Adopt-A-Stream Training (1 each year) to assist with water quality monitoring			
Task #10: Conduct post BMP water quality monitoring according to GAEPD approved QA/QC sampling plan			
Project Activity 4: Conduct public outreach and education through Rivers Alive Cleanup projects			
Task #13: Conduct two (2) Rivers Alive Clean-Up (1 each year) in targeted county			
Project Activity 5: Evaluate management strategies			
Task #14: Incorporate into the 2018 WMP results of installing BMPs, water quality monitoring, public education and outreach, and assessment of future needs to improve water quality			
Submit Quarterly Invoices & Status Reports			
Submit Final Close-Out Report			

7.0 Public Education and Outreach

Education and Outreach components are essential for this plan to reach wide and varied audiences on topics regarding Non-Point Source pollution, aquatic habitats, and the importance of protecting and improving water quality within the watershed. This will include landowner, homeowner, stakeholder, county and city administrators and workers, along with teacher and/student education.

Educating students on the value of Georgia's water resources and how they can help is pivotal in creating a sense of environmental stewardship. Environmental awareness is not meant to be short-lived, but rather when instilled at a young age, can persist throughout a lifetime. Children are the future and their knowledge of environmental impacts is pivotal to the preservation of our valuable natural resources.

Education and Outreach will be completed by utilizing the following:

Education Component	Target Audience
Adopt –A- Stream Monitoring	All
Rivers-A-Live Clean-up	All
Erosion and Sediment Control	Landowners, homeowners, city and county administration and workers
BMP demonstrations/field days	Landowners, homeowners, city and county administration and workers
Septic Tank /Dumping Awareness	Landowners, homeowners
Volunteering	All

1) Strategy:

The main strategy of the Tired Creek WMP is to eventually improve the water quality in the impaired sections of the watershed and protect the water quality in the remaining part of the watershed for the streams to become fully supporting of their designated use. This would allow the watershed to be removed from the EPD's 305(b)/303(d) lists. The education and outreach will be designed to increase the public's awareness of:

- a) The ecological significance of the Tired Creek Creek Watershed
- b) Appropriate BMPs and how they are used to reduce nonpoint source pollutants.
- c) How urban and storm water runoff, farming and other land use practices affect the watershed
- d) The endangered and protected species located with the Tired Creek Watershed

2) Implementation:

Outlined below are the actions that will be taken to implement the education and outreach strategies of this WMP. Many of which the NRCS uses in its EQIP Program. Therefore, Golden Triangle RC&D will work closely with NRCS, Georgia DNR, Georgia Forestry Commission and USFWS personnel to carry out the following actions:

- a) Promote the implementation of BMPs concerning type, cost, and effectiveness
- b) Hold erosion and sedimentation control workshops
- c) Educate a wide range of ages and audiences concerning water quality
- d) Educate individuals about the urban runoff issues within the watershed
- e) Erect signs to educate the public about the watershed and about water protection
- f) Educate the public on how septic tanks, dumping of yard clippings, and oil and grease can affect the Tired Creek Watershed's water quality.

These educational and outreach actions will be implemented in the watershed through the following strategies:

Nine (9) Partnership meetings will be held. These meetings will be rotated between the counties involved in order to get more participation from each county. During these meetings, the Partnership will be updated about the plan and water quality protection efforts. Individuals will also have the opportunity to express any specific areas of concern within the watershed.

- a) Conduct two (2) BMP field days where BMP projects will be reviewed and the importance of the BMPs and water quality will be discussed. Discussions could also include any ecological or endangered species concerns.
- b) Produce Public Service Announcements through local newspapers and Golden Triangle website and Facebook page to promote activities and events related to the watershed.
- c) Partner with school science teachers, County extension offices, local water trail organizations, Girl and Boy Scout troops, and other organizations to bring awareness, education, and the importance of the watershed to the community.
- d) Erect two (3) watershed education signs which will be posted on the major highways and roads entering the Tired Creek Watershed area. See Figure 7-1 for a picture of the watershed signs.
- e) Conduct two (2) Adopt-A-Stream training workshops.
- f) Conduct two (2) Rivers Alive clean-up events.
- g) Creation of brochure on Septic Tanks (what to dump what not to dump) for homeowners
- h) Storm drain markers

YOU ARE ENTERING THE LITTLE TIRED CREEK WATERSHED
Please Protect Our Waters



Paid for in part through a grant from the USEPA in partnership with Georgia Environmental Protection Division under the Provisions of Section 319(h) of the Clean Water Act.

8.0 Long Term Monitoring of the WMP and Water Quality

As shown in the Proposed Implementation Schedule, the WMP was written to cover a 10-year time period and interim milestones and measures of success of the plan are broken down into three phases; short-term, mid-term, and long-term. A summary of each interim milestones and success criteria for each phase of the WMP is included in Table 8.2

One of the elements of a 9-element plan is to include a process for long-term monitoring of water quality as well as the Plan itself. Golden Triangle RC&D personnel and volunteers with QA/QC certification from Georgia Adopt-A-Stream will conduct water quality monitoring over the next 3 years and recorded within the Adopt-A-Stream database.

The water quality monitoring will be designed to collect biological, chemical, and bacteriological data following the implementation of the recommended BMPs. Table 8.1 shows the type of monitoring and the parameter assessed.

Table 8.1	
Water Quality Monitoring Type	Parameter Assessed
Biological	• Habitat
Chemical	• Temperature
	• Ph
	• Turbidity
	• Conductivity
Bacteriological	• Fecal Coliform

BMP Monitoring

For all structural BMPs implemented, a post construction inspection should be conducted. Post construction should occur immediately following installation of the BMPs and should include water quality monitoring of the targeted pollutant soon after and if possible over several years.

The long term monitoring data will be used to assess and measure the effectiveness of the BMPs by:

- Showing removal of material over the entire time period
- Showing relational periods for significant storms or dry periods and imports/exports of pollutants
- Accurately representing the entire total loads (pre and post) BMP implementation

Table 8.2

<u>Phase</u>	<u>After Implementation</u>	<u>Milestones</u>	<u>Measure of Success</u>
<u>Short-term</u>	<u>3 months to 2 years</u>	<u>Implement management measures in WMP</u>	<u>List BMPs for this time period</u>
	<u>3 months to 2 years</u>	<u>Post BMP Success Monitoring</u>	<u>List measures</u>
<u>Mid-term</u>	<u>2 to 5 years</u>		
<u>Long-term</u>	<u>5 to 10 years</u>		

Future Revisions and Plan Success

Public reviews should be conducted by the local stakeholder group of the implementation schedule, accomplishments, and monitoring results to determine whether or not the goals of the WMP are being met. The WMP is a “living” document, meaning the goals and objectives contained within can be modified, strengthened, and/or removed based upon water quality results and the needs of the stakeholders in the watershed. For long term success of the plan, it is recommended that the WMP be reviewed and evaluated on an annual basis to determine if milestones and associated success criteria are being accomplished. After the annual review, revisions should be made to the WMP.

9.0 Financial and Technical Assistance

Technical and financial assistance will be sought from many different organizations to protect water quality in the watershed. As previously discussed Golden Triangle RC&D has developed a very diverse partnership/stakeholder committee, which will be instrumental in providing technical assistance and financial support through their agency and/or government programs.

GAEPD's approval of this WMP will provide Golden Triangle RC&D with Section 319(h) grant funds to coordinate with landowners in the watershed for cost-share BMP projects during the implementation of the project. The NRCS also accepts landowner applications for installation of BMPs through its EQIP program, USFWS through their Partners for Fish and Wildlife Program, and CSP through Farm Service Agency). Golden Triangle RC&D will evaluate each land owner's request to find the most beneficial program to improve the water quality and reduce pollutants within the affected creeks. Listed below are the programs available through NRCS that are being utilized in the watershed.

The Farm Service Agency's Conservation Stewardship Program (CSP) – a voluntary conservation program that encourages producers to improve resource conditions such as soil quality, water quality, water quantity, air quality, habitat quality and energy in a comprehensive manner by:

- Undertaking and installing additional conservation activities
- Improving, maintaining, and managing existing conservation activities.
- Taking land in environmentally sensitive areas out of agriculture production and plant native vegetation, such as Long Leaf Pine, Honey Bee pollinator habitats, wildlife habitat, etc.

CSP offers participants two possible types of payments:

- Annual payment for installing and adopting additional activities, and improving, maintaining, and managing existing activities
- Supplemental payment for the adoption of resource-conserving crop rotations

Environmental Quality Incentives Program (EQIP) – a voluntary program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices to improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland.

Financial assistance payments through EQIP are made to eligible producers, to implement approved conservation practices on eligible land or to help producers develop Conservation Activity Plans (CAP) to address specific land use issues. Payments are made on completed practices or activities identified in an EQIP contract that meet NRCS standards. Payment rates are set each fiscal year and are attached to the EQIP contract when it is approved.

NRCS, DNR, or US Fish and Wildlife services will oversee the BMP projects to be certain that they are completed using the certified guidelines. An NRCS, DNR, or US Fish and Wildlife representative will provide a final approval after projects are completed.

Costs estimates for implementation during the Phase 1 of this WMP are shown in Table 9.1 below.

Table 9.1 Estimated Cost

BMP Type	Critical Number	Estimated Costs
Filter Strips	10 acres	\$292.00 per acre=\$1,460
Riparian Buffers	25 acres	\$946.00per acre=\$23,650
Storm Water Runoff	25 acres	\$537.15 per acre = \$16,114.50
Septic Tank Installation	2 sites	\$10,000

10.0 Implementation Milestones, Evaluation and Revision

Schedule and Milestones for Implementing Management Strategies

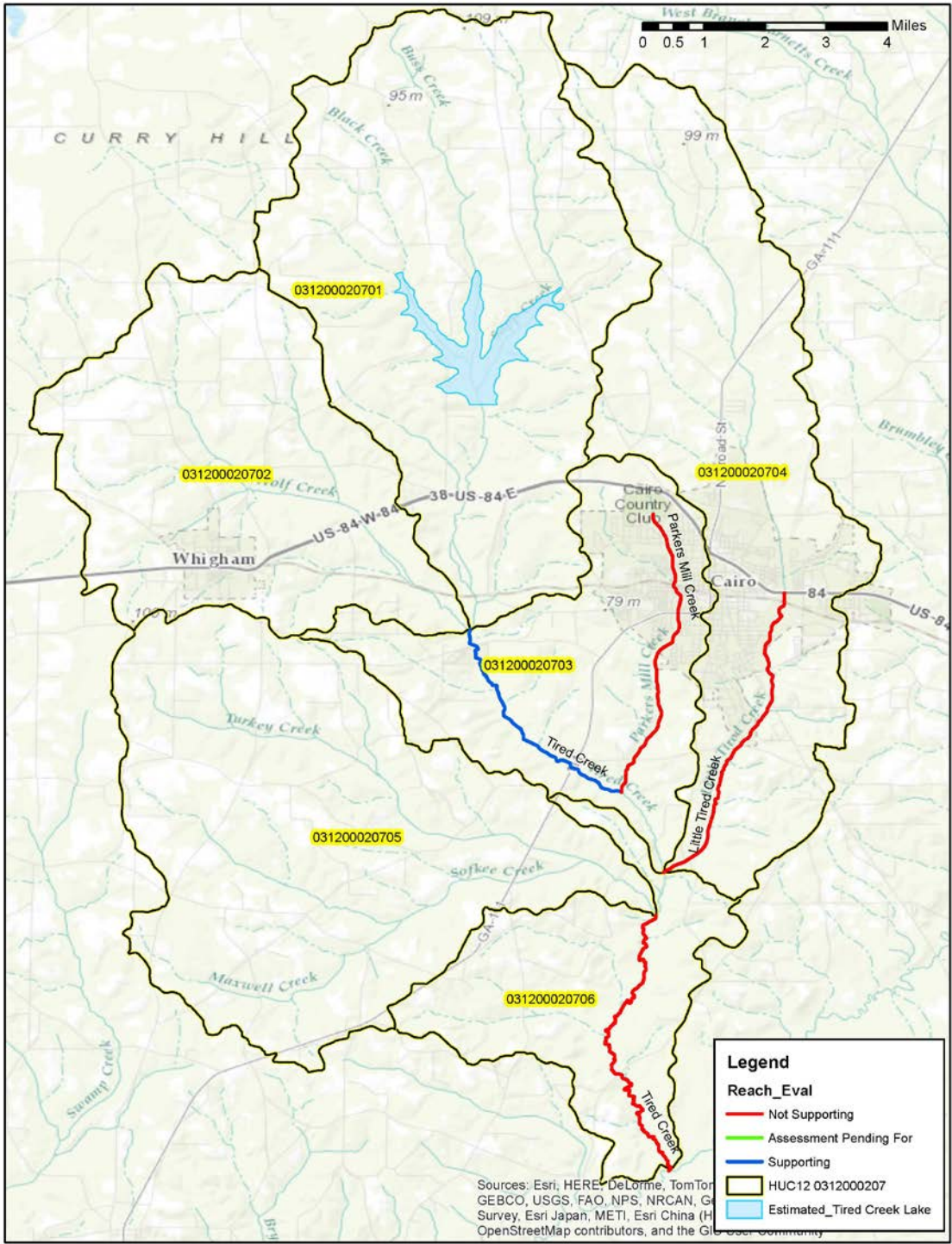
	2019	2020	2021
Select identified high risk priority areas for BMPs	1/19	1/20	1/21-6/21
Contract with landowners for installation of BMPs	3/19	3/20	1/21-6/21
Install BMPs	4/19	4/20	1/21-6/21
Hold quarterly Tired Creek Watershed Partnership meetings	1/19, 4/19, 6/19,8/19 12/19	1/20, 4/20 6/20,8/20 12/20	1/21, 4/21, 6/21,8/21 12/21
Conduct field days		3/20	3/21
Work with school groups and other organizations	2/19	8/20	Through May 2021
Conduct water sampling	Once BMP installed	Once BMP installed	Once BMP installed
USFWS surveys	6/19	6/20	
Calculate load reductions for each completed BMP	Once BMP installed	Once BMP installed	Once BMP installed
Hold Adopt-A-Stream training courses	6/19	1/20	
Conduct Rivers Alive cleanups	10/19	10/20	
Continue with updates to the OCWP website	6/19	6/20	6/21

The effectiveness of the recommended BMPs for the Tired Creek Watershed Management Plan will be tracked by qualitative and quantitative measures.

Qualitative Measures	Quantitative Measures
<ul style="list-style-type: none">• Individual/Group Participation• Partnership Meeting• Workshops• BMP Field Days• Adopt-A-Stream Training• Clean-up Events• Education and Outreach Effectiveness• Pre-Post Surveys	<ul style="list-style-type: none">• Watershed Monitoring Results• Adopt-A-Stream testing (including US Fish and Wildlife biological monitoring/chemical testing)• Load Reduction Reporting (monitoring for BMP effectiveness)

Golden Triangle RC&D final recommendations for this Watershed Management Plan is for additional funding and phases for BMP installations within the Tired Creek basin to effectively reduce source pollutant loads into Tired Creek.

Appendix A Watershed Boundary and Impairment



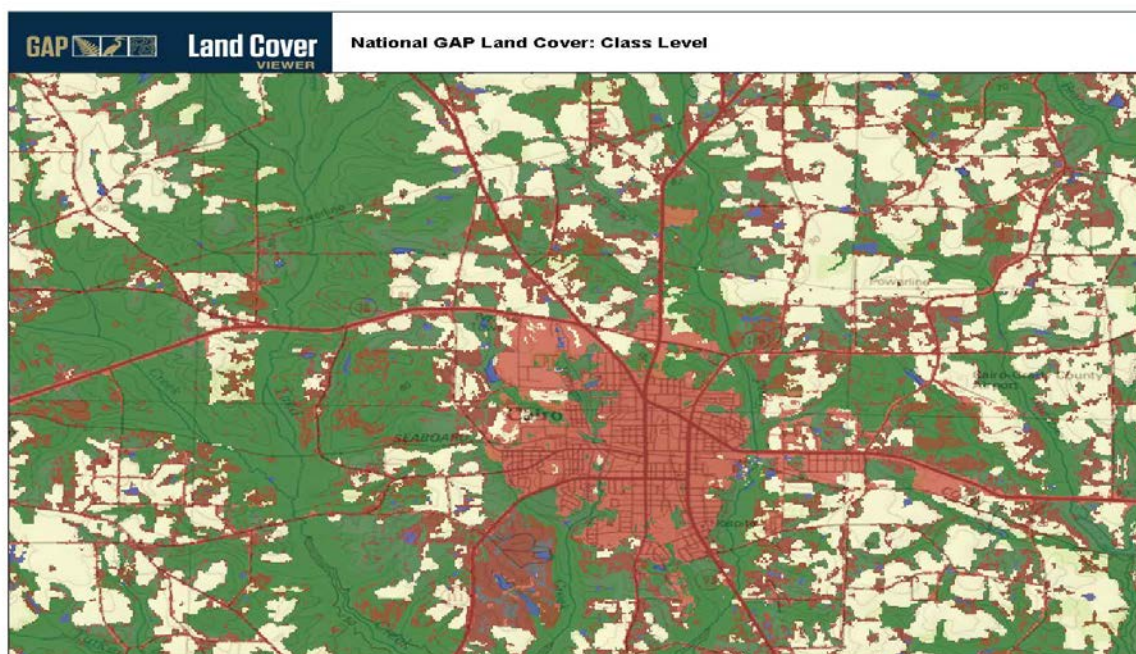
Appendix B

Population of within Tired Creek Watershed

PEOPLE	
Population	
Population estimates, July 1, 2017, (V2017)	44,779
Population estimates base, April 1, 2010, (V2017)	44,719
GEOGRAPHY	
Geography	
Population per square mile, 2010	82.1
Land area in square miles, 2010	544

Attachment D

Land Use/Cover Changes through MRLC



Source: National Land Cover Database 2011 (NLCD 2011) produced by Federal Multi-Resolution Land Characteristics (MRLC)

PERMIT_NAME	PERMIT_NO	COUNTY	RIVER_BASIN	PERMIT_TYPE	PERMIT_SUBTYPE
Cairo, City of	GAG820048	Grady	Unknown	General Pesticides	Municipal
Cairo, City of (Cairo WPCP)	GA0025771	Grady	Ochlockonee	NPDES	Municipal
Grady Aggregates Corporation (Cairo Quarry)	GA0036731	Grady	Flint	NPDES General LAS AFO (300 to 1000 AU)	Industrial
Johnson Ranch	GAG920038	Grady	Ochlockonee		Industrial
Koyo Bearings USA LLC	GAP050028	Grady	Ochlockonee	Pretreatment	Industrial
Pinewood Nursing Center	GAG550047	Grady	Ochlockonee	General PID	Municipal

Water Withdrawal Permits

River Basin	Permit Holder (Individual)	Permit ID	Permit Type	County	Date Permit Issued	Acreage	Surface Water Source	SW Rate (GPM)
Ochlockonee	VAN PONDER	A10-065-0318	Surface Water	Grady	10/29/2010	26	TRIBUTARY OF LITTLE TIRED CREEK & BELDER CIRCLE POND	450
Ochlockonee	ROBERT E LEE	A91-065-0178	Surface Water	Grady	11/16/1993	100	OCHLOCKNEE RIVER	1000

LAS Facilities

Permit #	Facility Name	Facility Description	County	Dominion	Reporting Year (FY)	Remaining Capacity (yd3)	Average Daily Tons	Rate of Fill (yd3/day)	Years Remaining	Estimated Fill Date	Waste Type
065-002D(SL)	Cairo - 6th Ave (SL)	Unlined Sanitary Landfill	Grady	Public	2017	377,011	36	72	21	8/1/2038	C&D
065-002D(SL)	Cairo - 6th Ave (SL)	Unlined Sanitary Landfill	Grady	Public	2017	51,782	77	154	1	12/1/2018	MSWL

Enforcement Orders EPD- Grady County Water Quality Issues

<u>Facility</u>	<u>Order</u>	<u>Status/Date</u>
Pinewood Healthcare & Rehab, LLC Grady County	EPD-WP-8422 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 6-Feb-2018 View
Koyo Bearings USA LLC Grady County	EPD-WQ-8214 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 10-Jan-2017 View
Chicken Houses Agricultural Developement-Construction Activity; order issued to Mrs. Vy Dao Grady County	EPD-WQ-7001 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 23-Jul-2015 View
Graco Fertilizer Company/Cairo Grady County	EPD-WQ-5160 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 4-Jan-2010 View
DOT #BR000-0003-00 (842) 01project site/Joyner Road; order issued to GA Department of Transportation Grady County	EPD-WQ-5101 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 16-Jun-2009 View
Graco Fertilizer Company; order issued to Graco Fertilizer Company, Mr. Tom K. LeGette, Jr., and Mr.	EPD-WQ-5059 <i>Water Quality Control Act</i>	Executed On 9-Feb-2009 View

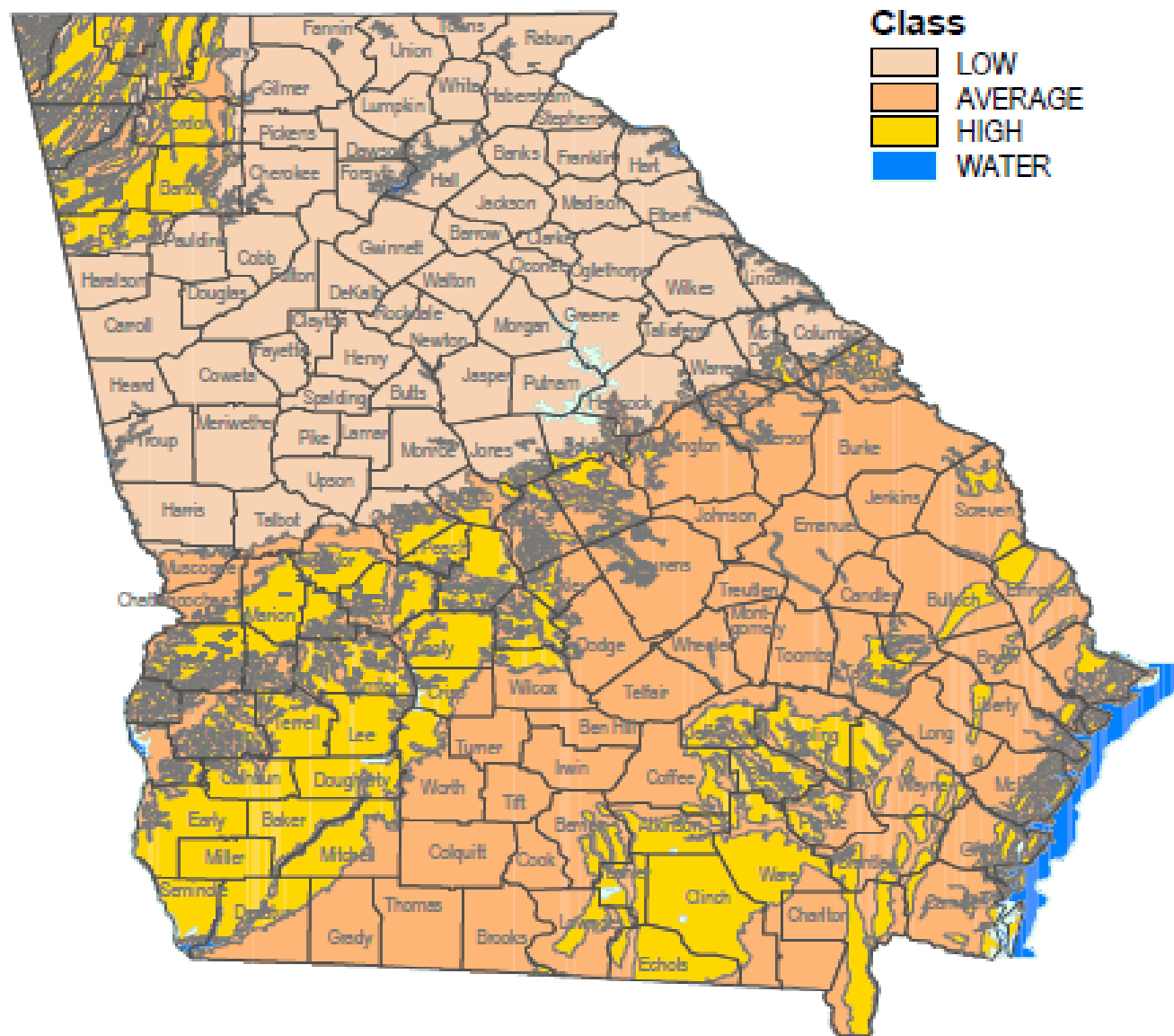
Enforcement Orders EPD- Grady County Water Quality Issues

Facility	Order	Status/Date
Robert T. LeGette Grady County	<i>(including Surface Water Allocation)</i>	
Motorcross track-pond construction/Cairo; order issued to Ms. Colleen Millsaps Grady County	EPD-WQ-SDO-05-011 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 29-Jun-2005 View
City of Cairo sewer system Grady County	EPD-WQ-4447 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 29-Jun-2005 View
City of Cairo wastewater treatment facility and Seventh Avenue lift station Grady County	EPD-PCEP-03-435 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 5-Jan-2004 View
City of Cairo sewer system and wastewater treatment facility Grady County	EPD-WQ-4171 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 21-Aug-2003 View
City of Cairo/7th Street lift station and wastewater treatment plant Grady County	EPD-PCEP-03-395 <i>Water Quality Control Act (including Surface Water Allocation)</i>	Executed On 8-May-2003 View
City of Cairo land application system	EPD-PCEP-02-320	Executed On View

Enforcement Orders EPD- Grady County Water Quality Issues

<u>Facility</u>	<u>Order</u>	<u>Status/Date</u>
Grady County	Water Quality Control Act (including Surface Water Allocation)	12-Mar-2002
City of Cairo land application system Grady County	EPD-PCEP-01-269 Water Quality Control Act (including Surface Water Allocation)	Executed On 23-Jul-2001 View
City of Cairo wastewater treatment plant Grady County	EPD-PCEP-01-256 Water Quality Control Act (including Surface Water Allocation)	Executed On 18-May-2001 View
City of Cairo wastewater treatment plant and sewer system Grady County	EPD-WQ-3749 Water Quality Control Act (including Surface Water Allocation)	Executed On 15-Jun-2000 View

Groundwater Pollution Susceptibility

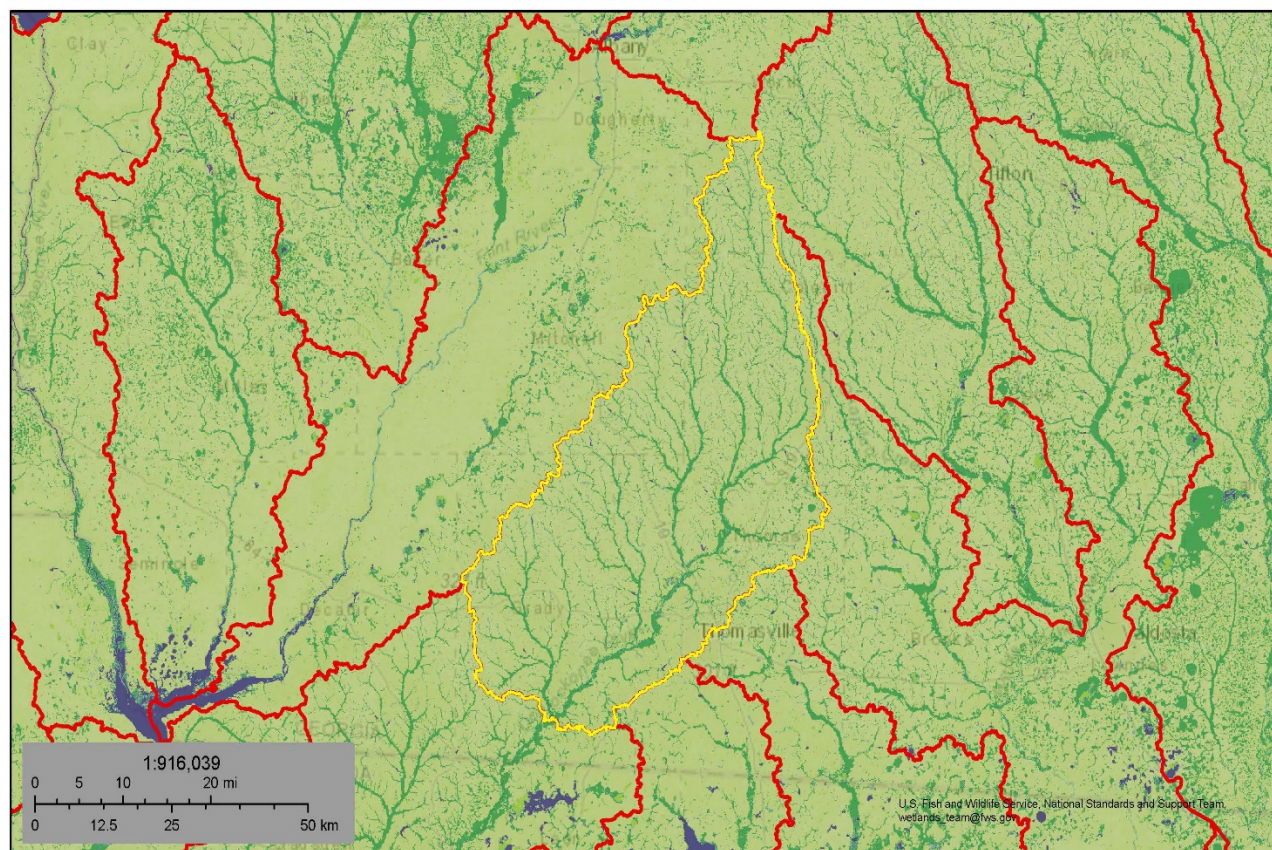


Produced by the Georgia Department of Community Affairs





Tired Creek



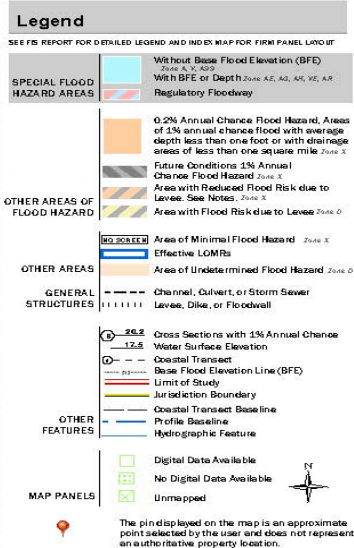
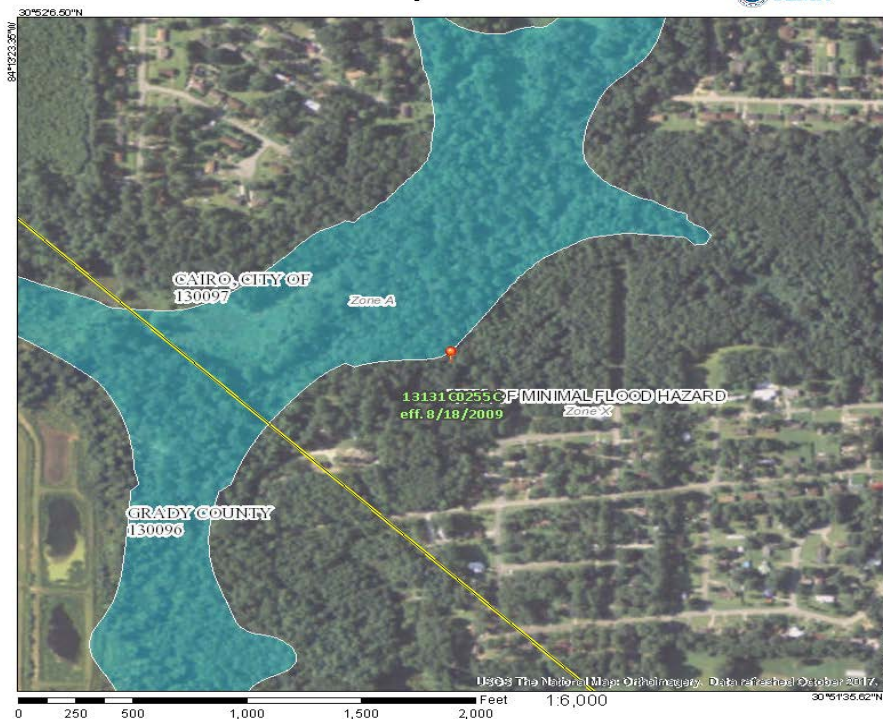
September 6, 2018

Estuarine and Marine Deepwater	Freshwater Forested/Shrub Wetland	Other
Estuarine and Marine Wetland	Freshwater Pond	Riverine
Freshwater Emergent Wetland	Lake	

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

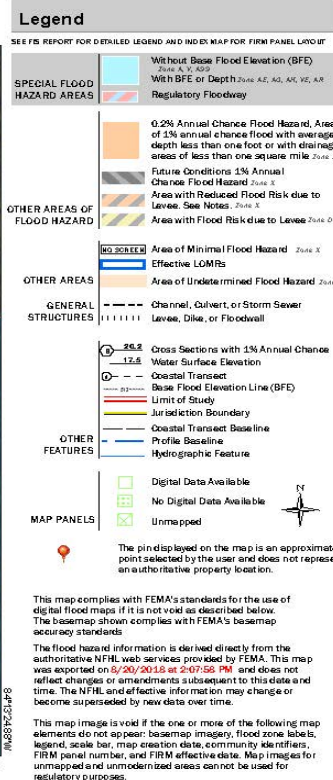
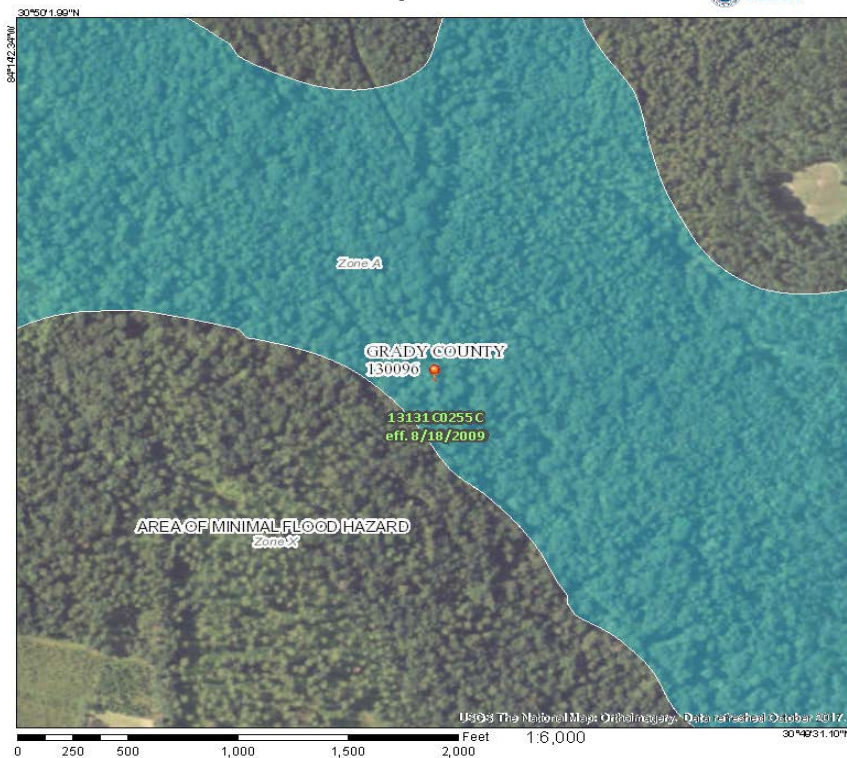
National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

National Flood Hazard Layer FIRMette

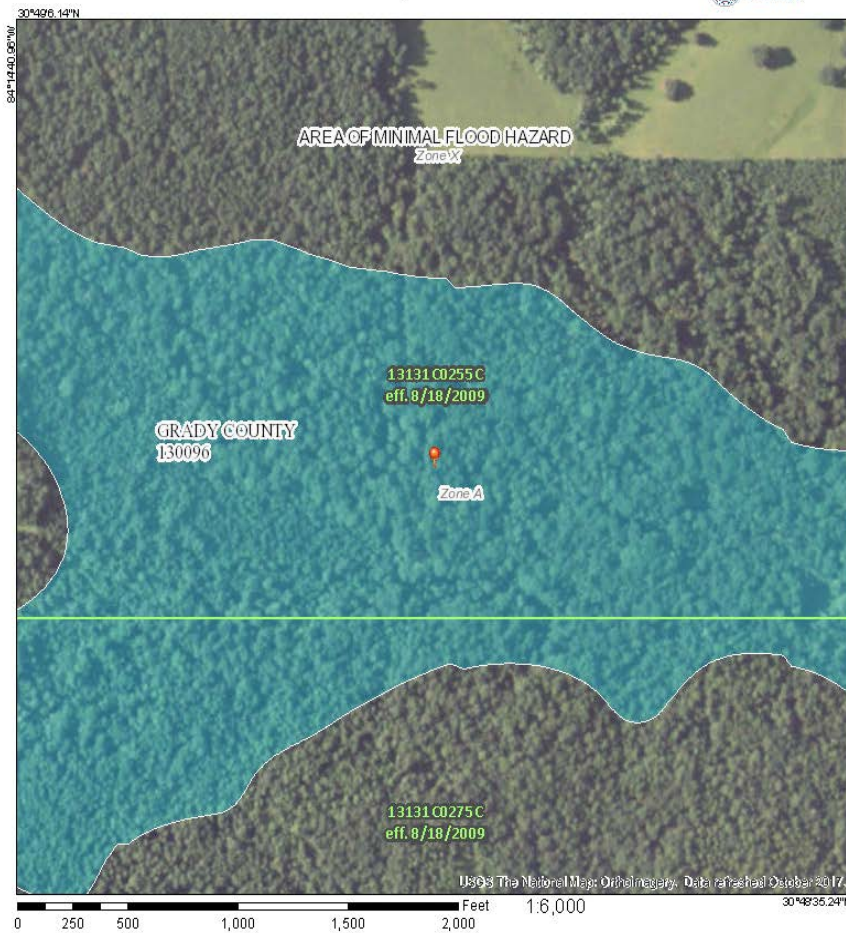


Parkers Mill

National Flood Hazard Layer FIRMette



National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

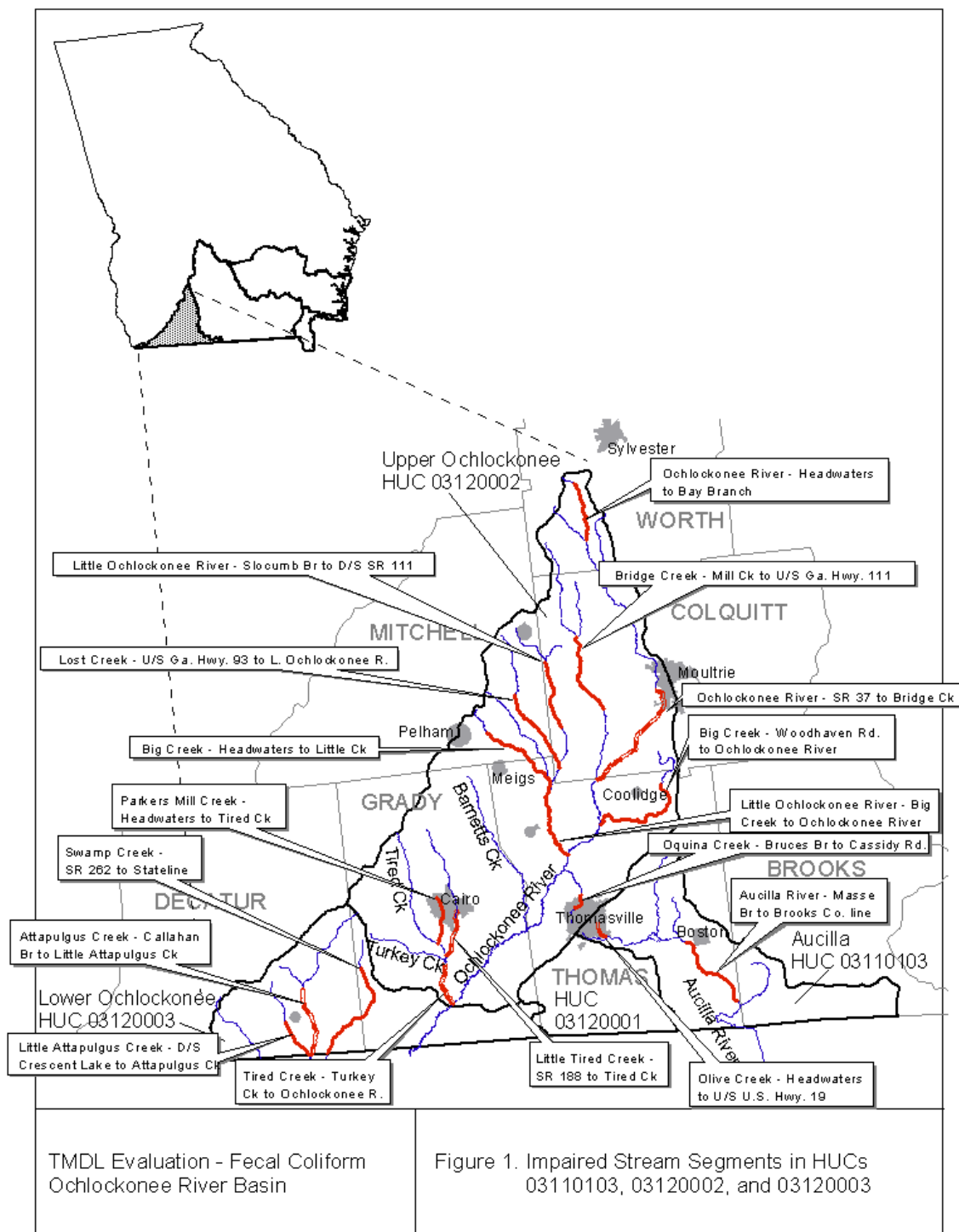
SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, V, AG-1
	With BFE or Depth Zone A-F, AG-1, AG-2, AG-3, AG-4, AG-5, AG-6
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee. See Notes. Zone X
	Area with Flood Risk due to Levee Zone D
OTHER AREAS	Area of Minimal Flood Hazard Zone X
	Effective LOMRs Zone X
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	Cross Sections with 1% Annual Chance Water Surface Elevation 25.2 17.8
	Coastal Transsect
	Base Flood Elevation Line (BFE)
	Limit of Study
OTHER FEATURES	Jurisdiction Boundary
	Coastal Transsect Baseline
	Profile Baseline
	Hydrographic Feature
MAP PANELS	Digital Data Available
	No Digital Data Available
	Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/20/2018 at 2:10:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



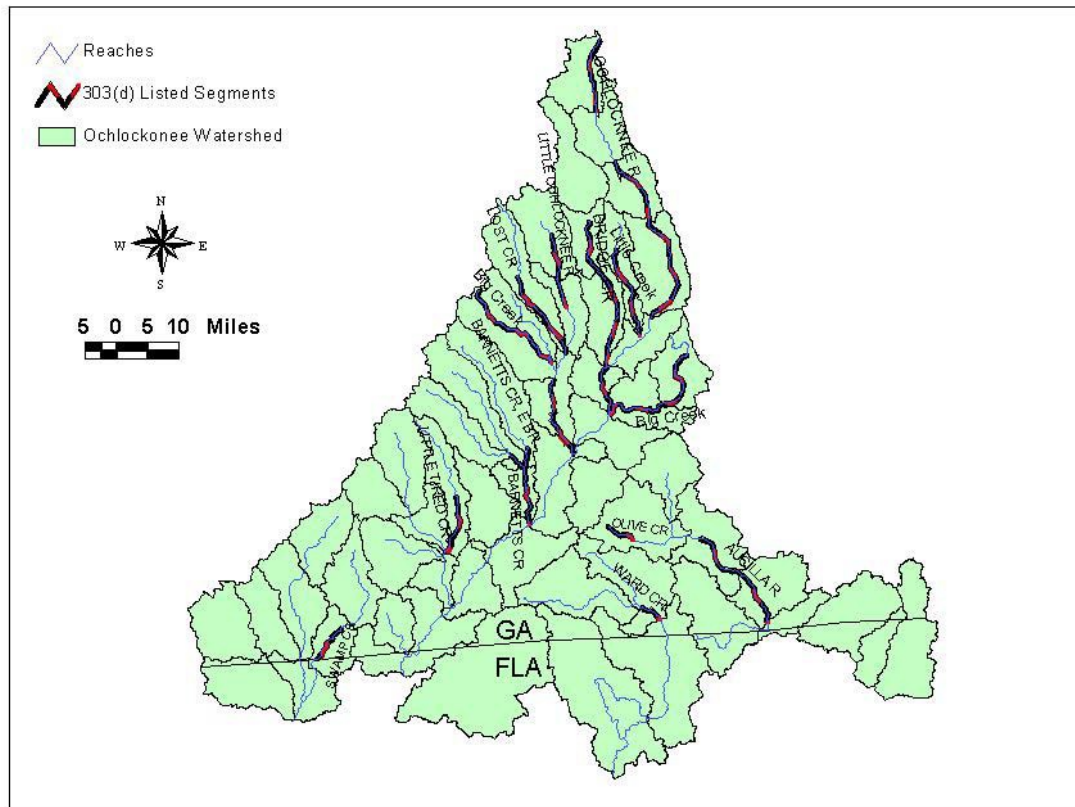


Figure 2-2. 303(d) Listed Segments for Dissolved Oxygen in the Tired Creek Basin

Attachment L Ochlockone FC Original TMDL Segment

Ochlockonee River Basin Fecal Coliform TMDLs	Final
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Table 12. Fecal Coliform Loads and Required Fecal Coliform Load Reductions

Stream Segment	Current Load (counts/ 30 days)	TMDL Components					Percent Reduction
		WLA (counts/ 30 days) ¹	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
Attapulgus Creek	1.00E+15			2.58E+14	2.87E+13	2.87E+14	71
Aucilla River	2.68E+13	3.62E+10		9.88E+12	1.10E+12	1.10E+13	59
Big Creek - Woodhaven Rd. E. of Coolidge to Ochlockonee River	7.93E+14			5.28E+14	5.87E+13	5.87E+14	72
Big Creek - Headwaters to Little Creek near Meigs	4.71E+13			1.48E+13	1.65E+12	1.65E+13	65
Bridge Creek	3.71E+13	2.89E+10		1.03E+13	1.15E+12	1.15E+13	69
Little Attapulgus Creek	5.26E+14			1.72E+14	1.91E+13	1.91E+14	64
Little Ochlockonee River - Slocumb Branch to downstream SR 111 near Moultrie	1.98E+14			1.32E+14	1.47E+13	1.47E+14	51
Little Ochlockonee River - Big Creek to Ochlockonee River near Ochlockonee	7.21E+13	4.46E+10		6.95E+13	7.73E+12	7.73E+13	0
Little Tired Creek	1.63E+13			5.05E+12	5.62E+11	5.62E+12	65
Lost Creek	6.32E+12			1.72E+12	1.91E+11	1.91E+12	70
Ochlockonee River - Headwaters, upstream Ga. Hwy. 112 near Sylvester to Bay Branch	7.55E+12			2.24E+12	2.49E+11	2.49E+12	67
Ochlockonee River - SR 37 downstream Moultrie to Bridge Creek	3.44E+13	1.03E+12		2.66E+13	3.07E+12	3.07E+13	11
Olive Creek	1.94E+12			9.10E+11	1.01E+11	1.01E+12	48
Oquina Creek	1.15E+14	1.21E+12		7.54E+13	8.51E+12	8.51E+13	89
Parkers Mill Creek	2.90E+14			1.14E+14	1.26E+13	1.26E+14	85
Swamp Creek	1.29E+13			9.51E+12	1.06E+12	1.06E+13	18
Tired Creek	1.25E+13			8.41E+12	9.35E+11	9.35E+12	25

Notes: ¹ The assigned fecal coliform load from each NPDES permitted facility for WLA was determined as the product of the fecal coliform permit limit and the facility average monthly discharge at the time of the critical load.

Ochlockonee River Basin Dissolved Oxygen TMDLs**Final**

Table D-18

Little Tired Creek - Segment #18				TMDL = WLA + LA					
				TOC(lb/yr)	TN(lb/yr)	TP(lb/yr)			
				4,858,045	204,964	28,616			
Nonpoint Sources (LA)	TOC(lb/yr)	TN(lb/yr)	TP(lb/yr)	TOC(lb/yr)	TN(lb/yr)	TP(lb/yr)	TOC(lb/yr)	TN(lb/yr)	TP(lb/yr)
Contributing Subwatersheds	Existing Loads			Allocation Loads (LA)			% Reduction		
031200C20805	4,432,845	204,964	19,758	4,432,845	204,964	19,758	0.00	0.00	0.00
Total	4,432,845	204,964	19,758	4,432,845	204,964	19,758	0.00	0.00	0.00
Point Sources (WLA)	Existing Loads			Allocation Loads (WLA)			% Reduction		
W.B Roddenberry - Cairo (GA0001660)	425,200	0	8,858	425,200	0	8,858	0.00	0.00	0.00
Total	425,200	0	8,858	425,200	0	8,858	0.00	0.00	0.00

- WB Roddenberry is historical discharge. Plant has been closed.

References

USFWS 2015 Threatened and Endangered Species Grady County
Georgia Department of Natural Resources Rare Species Grady County
USDA 2013 Farmers Bureau Crop Report
USDA/NRC Soil Report Grady County
2001 DNR Georgia Ecoregion Descriptions
GEPD Watershed Protection Plan Development Guidebook
National Oceanic and Atmospheric Administration (NOAA) Climate Data
USGS
Thomas University, Georgia
Federal Emergency Management Agency (FEMA)
Total Maximum Daily Load Ochlockoknee River Fecal Coliform 2006
Total Maximum Daily Load Ochlockoknee River Dissolved Oxygen 2001
USFWS IPAC Data
USFWS Wetland Inventory Map
GAP 2012 Land Data