# Big Slough and Cooleewahee Creek Watershed Management Plan

Updated HUC 10s
Big Slough - 0313000805
Cooleewahee Creek - 0313000803

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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

BSCCWP-Big Slough Cooleewahee 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 - 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 Service

USGS- US Geology Survey

WMP- Watershed Management Plan

# Big Slough/Cooleewahee Creek Watershed Management Plan

## EXECUTIVE SUMMARY

The objective of Golden Triangle Resource Conservation and Development (RC&D) has been to establish a basis for measurement of conditions at various sites within the watersheds through water quality monitoring. This water quality monitoring ensures the most up to date and accurate information is available to locate non-point sources of pollutants.

Golden Triangle RC&D gathered the water monitoring information over a period of a year, including historic land cover data. The water monitoring information was documented within the Adopt-A-Stream website. Golden Triangle RC&D used the water monitoring information, along with historic land usage, to identify the stressors, to effectively develop implementation practices, and to recommend implementation practices of a Comprehensive U.S. Environmental Protection Agency (USEPA) Nine Key Element Watershed Management Plan (WMP) for the Big Slough and Cooleewahee Watersheds. The recommended Best Management Practices (BMPs), described in the WMP, would effectively reduce the amounts of Fecal Coliform bacteria and the low levels of Dissolved Oxygen identified in the original TMDL produced by USEPA.

The Big Slough and Cooleewahee Watersheds cover an area in excess of 365,000 acres. In such a large geographic area, long term Partner and Stakeholder inputs will be needed to continually collaborate on the findings, analyze the data, and ensure recommendation of appropriate BMPs that allow for substantial reductions in contaminates within the watershed. Partner and Stakeholder inputs would be accomplished through long term educational awareness, conducting educational outreach, providing hands on workshops, participation and agreement by local Landowners to install BMPs, and long term water quality monitoring to measure the effectiveness and load reductions of BMPs installed. The recommended BMPs that are being projected would include but not limited to:

- Livestock Exclusion
- Critical Area Planting
- Grassed Waterway
- Heavy Use Area Protection
- Stream Crossing
- Pasture Planting
- Stream Bank Stabilization
- Better Back Road Installations

Educational and outreach components will continue to play a key role within the WMP. Golden Triangle RC&D will build upon the educational foundations laid with the TMDL revisions to further educate the Watershed residents on water quality, Point and Non-Point Source pollution issues, and encourage Landowner participation. This will be carried out by:

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

Big Slough reduction in dissolved oxygen (DO) is projected at 33%, Cooleewahee Creek reduction of fecal coliform (FC) is projected at 43%, sedimentation within both creeks is projected at 15%, this will be accomplished through the use of adaptive Watershed management strategies, site specific location opportunities, and customized BMP installations. Key measures of success within Big Slough/Cooleewahee Creek will include:

- Number of BMPs Implemented
- Number of Landowners Participating

## 1.0 INTRODUCTION

The purpose of developing this Watershed Management Plan (WMP) for Big Slough/Cooleewahee Creek 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 management strategies that will be implemented to solve the problems.

The components of this plan were prepared using USEPA Guidelines 9 Key Elements for Watershed Management Planning:

1. Identification of Pollutant Sources
2. Estimate of Pollutant reductions required
3. Identification of Management Measures to implement
4. Estimate funding needs and resources
5. Informational/Education outputs required
6. Schedule for implementation
7. Measureable milestones
8. Development of criteria to determine progress and success
9. Development of monitoring plan to evaluate success.

This document serves as an update to the 2001 TMDL Implementation 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.

## WATERSHED MANAGEMENT PLAN ORGANIZATION

Section 2 Stream Selection Description characterizes the watershed area of Big Slough and Cooleewahee Creek.

Section 3 Formation of Advisory/Stakeholder Committee describes how the partnership was formed.

Section 4 Source Assessment describes the State of Georgia Standards for pollutant levels, the current loading within the creeks, the probable sources of the pollutants and reductions needed to meet water quality.

Section 5 Assessment and Characterizations includes land cover data, climate data, threatened/endangered species, soil properties, population trends, water quality, and water body current stream conditions.

Section 6 Management Strategies/Recommendations/Load Reductions Phase 1 provides an overview of the types and required number of BMPs that will be recommended for implementation, and the projected load reductions that that should occur.

Section 7 Education and Outreach provides the education and outreach components that will be used for this Watershed Management Plan.

Section 8 Long Term Monitoring Plan provides framework for the long term plan.

Section 9 Implementation/ Other Funding Sources/ Evaluation/ Assessment/ Measurement of Progress provide a description of the measures that will be used to gauge the effectiveness of the Educational/Outreach, BMP installation, and condition of the creeks.

## 2.0 STREAM SELECTION

The Flint River originates on the south side of Fulton County, in metropolitan Atlanta, near Hartsfield International Airport. The river flows south to Lake Blackshear to Lake Seminole. At this point, the Flint converges with the Chattahoochee River in Lake Seminole at the Georgia- Florida border. The outflow from Lake Seminole forms the Apalachicola River in Florida, which ultimately discharges to the Gulf of Mexico.

Big Slough (HUC 0313000803) and Cooleewahee Creek (HUC 0313000805) sub watersheds, make up the Lower Flint River Basin Watershed (HUC 0313008) (see Appendix A, Location Maps of Big Slough and Cooleewahee showing Stream and Creeks). The watershed is located within the Southeastern Plain/Dougherty Plain ecoregion and covers five counties in southwest Georgia; Dougherty, Baker, Mitchell, Grady and Decatur (See Appendix B, County Percentages of Watershed). Even though the watersheds are contained within multiple counties, this Watershed Management Plan will focus on Mitchell, Dougherty and Baker counties due to the location of the Non-Point Source pollutants found.

Both streams are listed on Georgia Environmental Protection Divisions (GAEPD) 305 (b)/303(d) list as not supporting/partially supporting their designated use of fishing. Four (4) miles of Big Slough, near Pelham, GA in Mitchell County, exceeds criterion for Fecal Coliform, and Dissolved Oxygen. Sixteen (16) miles of Cooleewahee Creek, from Piney woods to Flint River near Newton, GA, exceeds the criterion for Fecal Coliform and sediment (See Appendix C, Impaired Area). Total Daily Maximum Loads (TMDLs) were established for Big Slough and Cooleewahee Creek in 1998 and a TMDL Implementation Plan was developed in 2004. Based on the TMDL Implementation Plan, water quality monitoring, visual surveys, and Stakeholder input, the Nonpoint Sources of pollutants are reflected in Table 2.0 with the impairments and potential causes.

Table 2.0 Potential Causes

| Identified Impairment | Potential Source/Causes |
|---|---|
| Nutrient Loading | Agriculture Row Crop Run-off<br>Livestock Run-off<br>Fecal Matter from Wildlife |
| Low Dissolved Oxygen | Agriculture Row Crop Run-off<br>Low Flow/High Temperatures<br>Drought |
| Sediment | Unstable Banks<br>Agriculture Row Crop Run-off |
| Habitat Alteration | Unstable Banks<br>Trash and Debris from Illegal Dumping |

2004 Original TMDL Recommendations-

Potential Actions that could reduce the Fecal Coliform Load

- If additional monitoring shows Fecal Coliform limits are being exceeded and agricultural uses are determined to be a contributor, implement appropriate Agricultural, Forestry, and Urban BMPs.
- Implement measures to ensure the buffer currently in place along the creek is not significantly disturbed. Agricultural/Forestry/Urban BMPs should be followed.
- Implement a program to identify improperly functioning septic systems and fix them.
- Implement a program to ensure all residential units have a sewage disposal system.
- Implement a public education program to educate people on the importance of disposing of waste in an acceptable manner.

Potential Actions that could reduce the Dissolved Oxygen

- Conduct additional monitoring within several areas of Big Slough
- Implement measures to ensure the buffer currently in place along the creek is not significantly disturbed. Agricultural/Forestry/Urban BMPs should be followed.
- Compliance with NPDES permit limits and requirements
- Adoption of proper unpaved road maintenance practices
- Implementation of Erosion and Sedimentation Control Plans for land disturbing activities
- Mitigation and prevention of stream bank erosion due to increased stream flow and velocities caused by urban runoff

Potential Actions that could reduce Sedimentation

- According to the 2004 Flint River Basin Revised TMDL Revision Plan the sediment load for Cooleewahee Creek is listed as “legacy” sediment, therefore no load reductions where listed, as it was felt that the stream would repair itself overtime.

The consensus of Golden Triangle RC&D and the Watershed Partnership is that through the current monitoring results collected in 2012, the 2004 recommendations are still valid and required for the creation of this WMP to identify appropriate BMPs that need to occur within both Big Slough and Cooleewahee Creek, to reduce the levels of Fecal Coliform, Dissolved Oxygen and Sedimentation. Section 6 discusses the proposed BMPs for this project.

## 3.0 FORMATION OF PARTNERHSIP/STAKEHOLDER COMMITTEE

Prior to the start of the TMDL Revision Contract that began February of 2012, two community listening sessions were held in Camilla, Georgia one in June and another in October of 2011 at the USDA Farm Services Building. These sessions were held to bring together local Landowners, Farmers, City and County officials to discuss issues and invite community participation within the Big Slough and Cooleewahee Creek watershed by:

- Identification and Formation of a Watershed Partnership/Stakeholder Committee
    - Those who can make decisions on the Watershed Management Plan
    - Those directly affected by the Watershed Management Plan
    - Those that have the current and historical data and knowledge on the issues regarding the watershed
- Identification of potential Partnering Organizations
    - Partners and Other organization's that can provide technical and financial assistance or knowledge of existing programs that could be used along with the Best Management Practices
- Development of Public Outreach Strategy
- Development of Webpage on the existing Golden Triangle R&D website to list updates and events regarding the Watershed

Each listening session was advertised via a Public Service Announcement within Mitchell, Grady, Decatur, Dougherty, and Baker Counties. These early meetings served as the springboard for the TMDL Revisions for Big Slough and Cooleewahee Creek Watershed.

Stakeholders, Community Partners, Local Landowners, and Other Organization contributions within the listening session were provided by:

- Dougherty County Assistant County Administrator - Michael McCoy- Stakeholder/Watershed Partnership/ Community Partner
- Mitchell County Administrator- Clark Harrell- Stakeholder/Watershed Partnership/ Community Partner
- Gary Wooten, David Holt, Richard Van, and James Adams- Local Landowner/Farmer
- Department of Forestry- Bert Early- Partnering Organization
- Camilla, GA Stripling Irrigation and Research Center- Ivey Griner- Stakeholder/Watershed Partnership/ Community Partner

- U.S. Fish and Wildlife Service Field Office Technical Support (Panama Florida) –Chris Metcalf and Jim Bates- Partnering Organization

- Water Policy and Planning Center Technical Support - Marty McKimmey- Partnering Organization

These early efforts enabled Golden Triangle RC&D to quickly form the Big Slough and Cooleewahee Creek Watershed Partnership (BSCCWP) in early January 2012. The Partnership/Stakeholder Committee is comprised of the following members:

- Dougherty County Assistant County Administrator - Michael McCoy
- Mitchell County Administrator- Clark Harrell (joined 2013)
- Local Landowner/Farmers- Gary Wooten, David Holt, Richard Van and James Adams
- Stripling Irrigation and Research Center- Ivey Griner
- U.S. Fish and Wildlife Service Field Office Technical Support – Chris Metcalf and Jim Bates

The BSCCWMP identified the following as issues of concern within the Watershed.

- Flooding and storm water management
- Channelization
- Pollution from livestock, agriculture, and wildlife
- Decreased or non-existent water flow

Meetings of the BSCCWMP were held February 5th, April 26th, and December of 2012. The progress with the TMDL Revisions, Water Quality Monitoring, and development of the Watershed Management Plan were discussed.

These meetings provided vital information during the TMDL revision and subsequent creation of the Watershed Management Plan by assisting with the selection of water monitoring testing sites, assess to the landowners properties for visual surveys, selection of priority sites for implementation, and other potential funding sources. A draft of the Watershed Management Plan was presented to the Watershed Partnership for review and comment in February 2013.

## 4.0 SOURCE ASSESSMENT

The Original TMDL Implementation Plan for Big Slough/Cooleewahee Creek was completed in 2004. However, the Implementation Plans did not meet the USEPA nine element criteria. Both Big Slough and Cooleewahee Creek 2004 TMDL Implementation Plan indicated that the Fecal Coliform was a pollutant issue and stated that the loading could be the result of failing or non-existent septic systems, wildlife, livestock, and agricultural practices. The biota of Sediment issue within Cooleewahee Creek may have resulted from former land uses or "legacy sediment therefore no load reductions where listed, as it was felt that the stream would repair itself overtime. Low Dissolved Oxygen in Big Slough was due to slow/or no flow water movement. Both plans recommended that further water quality testing be conducted.

Water sampling/ monitoring, visual surveys and stream bank assessments were completed from February 2012 to December 2012 for both Big Slough and Cooleewahee Creek. Sections 4.1 to 4.3 discuss the findings.

### 4.1 Point Sources

Big Slough

- East of Camilla and approved by GAEPD to handle the waste treatment for the City, there are two (2) large drain fields that have direct access into the creek.

### 4.2 Non-Point Source

#### Agricultural

Big Slough

- Large tracks of agricultural operations producing peanuts, cotton, corn, and soybeans with limited buffer zones.

Cooleewahee Creek

- Large tracks of agricultural operations producing peanuts, cotton, corn, and soybeans with limited or failing buffer zones. This has allowed erosion sediment issues such as stream bank degradation from runoff activities associated with these operations to present itself within four (4) sites along the creek.

Livestock Operations

Big Slough

- Livestock operations involving cows, horses, poultry, and sheep without sufficient buffer zones and exclusion fencing.

Cooleewahee Creek

- Livestock operations involving cows, horses, and sheep. Some of the livestock operations have exclusion fencing issues, which is allowing the livestock to have direct access with the creek.
- A fisheries operation 3/4 quarters of a mile due west of Highway 91 that has direct access into the creek.

Wildlife

Big Slough

- Large tracks of private hunting lands along with a beaver dam and pond. Abundant wildlife and feral hog populations evident.

Cooleewahee Creek

- Large pine plantations and private hunting lands with abundant wildlife and feral hog populations being evident.

Illegal Dumping

Big Slough/Cooleewahee Creek

- Signs of illegal dumping, distressed/dead or dying aquatic life were observed within both creeks.

Summary of Source Assessment

From the discussion with the BSCC Stakeholders and the visual surveys completed it is evident that there are excessive nutrients/algae blooms, choked overgrown channels, and extremely low/no flow that is causing the high Dissolved Oxygen levels. Ineffective/non-existent riparian buffer, inadequate buffer sizes, and not enough exclusion fencing that is causing the high Fecal Coliform levels. Stream bank erosion that is causing Sedimentation issues, along with flooding from the blocked channels. Illegal dumping is also an area of concern due to the negative impact in has on the animal habits and the potential contamination that can decrease water quality. Table 4.1 provides the projected load reductions for each pollutant.

Table 4.1

| Site/Pollutant | Current Load | Projected Reduction |
|---|---|---|
| Big Slough FC | 3400 | 150 cfu/100 ml |
| Big Slough DO | 6.8 | 6.0 ppm |
| Cooleewahee Creek FC | 266.80 | 150 cfu/100 ml |
| Cooleewahee Creek (Biota) | No data | |

## 5.0 ASSESSMENT AND CHARCTERIZATIONS OF CURRENT CONDITIONS

Big Slough (HUC 0313000803) covers 265,347 acres in Mitchell, Grady, and Decatur Counties with the largest portion of Big Slough being present within Mitchell County covering 70,596 acres. Cooleewahee Creek (HUC 0313000805) watershed covers an area of 99,792 acres in Dougherty and Baker Counties with the largest portion of the Creek being present within Dougherty County. Big Slough/Cooleewahee Creek have been listed on the GAEPD (d)/305(b) list since 1998 as not supporting its primary designation of fishing. Table 5.0 provides the non-point source pollutant listed for each area.

Table 5.0

| Water Body Segment Name | County Location(s) | Criterion Violated or Water Quality Concern | Listing Status Category 4a, 5 or 1 |
|---|---|---|---|
| Big Slough (4 miles) | Mitchell (near Pelham) | FC | 4a |
| Cooleewahee Creek (16 miles) | Dougherty and Baker (piney woods in Flint River near Newton) | FC,DO, BI | 4a |

The Watershed comprises varying soil types that can lend to sediment loading and Stream Bank alteration due to the soil composition and topography of the landscape. Section 5.1.1 will discuss the topography and Section 5.1.2 will detail the Soil Composition by County.

Both Big Slough and Cooleewahee Creek contain rural farming, agricultural and urban communities. Large private hunting plantations are also prevalent within the watershed. Section 5.2 will detail the Land Cover and Use.

## 5.1 PHYSICAL FEATURES

### 5.1.1 TOPOGRAPHY

A significant feature in the eastern edge of the Flint River Basin (HUC 0313008) which includes Big Slough (HUC 0313000803) and Cooleewahee Creek (HUC 0313000805) is the Dougherty Plain. The Dougherty Plain is a northeast-trending, wedge shaped, level to gently rolling lowland that pinches out where the Fall Line Hills and the Tifton Upland meet. The Dougherty Plain slopes southwestward with altitudes of 300 ft in the northeast to less than 100 ft near Lake Seminole. The flat to very gently rolling topography contains numerous sinkholes and associated marshes and ponds. Small streams in the Dougherty Plain District are also frequently intermittent during the summer (*Couch et al., 1996*). The Dougherty Plain is characterized by outcrops of limestone that results in karst topography, a limestone landscape, characterized by caves, fissures, and underground streams.

Human activity has transformed much of the Flint River basin today, but due to the uniqueness of the watershed a variety of different habitats - wetland areas, marsh areas, pine plantations and sink holes are present.

Due to this topography, open sink holes, and thinly covered crevices that exist within the Big Slough Watershed, very little filtering of pollutants from the underground water supply occur. Sink holes are a natural occurrence in this area, in which many of the geologic substrata are sedimentary, and in this case, primarily limestone. Erosion by subsoil water movements often create small caverns, their subsequent collapse then creates indentations at the surface which are commonly covered with a thinner layer of topsoil, which in turn limits their filtering actions *(TMDL DO Big Slough 2004).*

### 5.1.2 SOIL TYPES BIG SLOUGH AND COOLEEWAHEE CREEK WATERSHED

Soil and its inherent physical characteristics are an important component to consider when conducting natural resource management and land-disturbing activities. Permeability and erodibility are two factors in particular, which can potentially influence water quality. According to the USEPA, “groundwater contamination by pollutants such as pesticides and nutrients found in the surface releases are affected by the properties of the overlying soil. Soil permeability is one of the controlling factors for the rate at which a contaminant travels through soils. Soils with higher permeability facilitate the transport of pollutants into ground water.” (1998).

The soil types associated within Big Slough/Cooleewahee Creek are described as the Southeastern Plain/Dougherty Plain ecoregion, and dominated by ultisols. Ultisols are characterized by sandy/ loamy surface layers and clayey subsoils.

Soils in the Southern Coastal Plain areas are derived from marine and fluvial sediments eroded from the Appalachian and Piedmont Plateaus which makes this soil very erosive (*Flint River Basin Plan, Soil Survey by County from US Department of Agriculture*).

Both creeks also lie within the Floridan/Jacksonian aquifer systems which have a combination of sandy/ loamy surface layers and clayey sub soils that are subject to active erosion. The top three (3) soil associations for the geographic area around Big Slough/Cooleewahee Creek are broken out below by county.

Table 5.1.2 Big Slough

| Mitchell County Soil Associations |
|---|
| Hornsville-Wahee: Moderately well drained somewhat poorly drained soils that have a loamy surface layer and a clayey subsoil |
| Olser-Pelham: Poorly drained soils that are sandy throughout; have a sandy surface layer; a thick sandy subsurface layer; and a loamy subsoil |
| Goldsboro-Grady-Bonneau- Moderately well drained, sandy surface layer and loamy subsoil. Thick sandy subsurface layer and loamy subsoil |

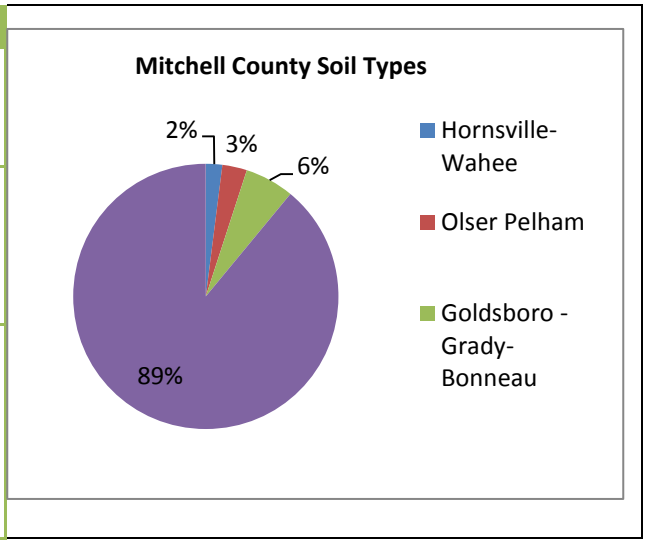
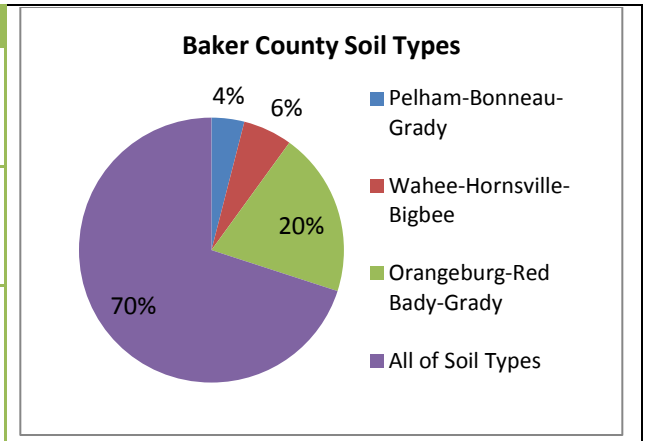
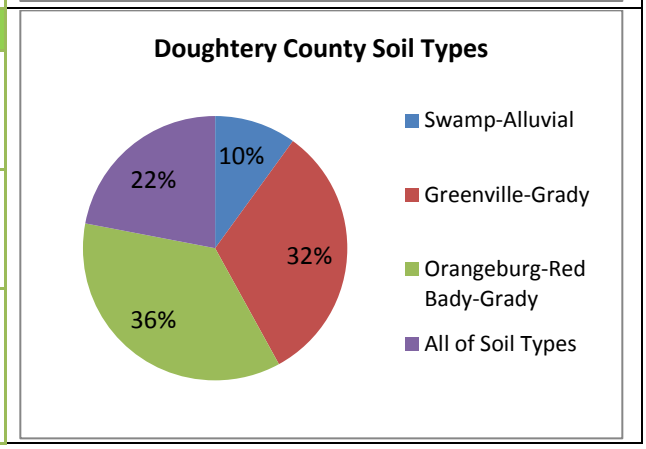



Table 5.1.3 Cooleewahee Creek Soil Associations

| Baker County Soil Associations |
|---|
| Pelham-Bonneau-Grady: Poorly drained to well drained soils that have a sandy surface layer; a thick sandy subsurface layer and loamy subsoil |
| Wahee-Hornsville-Bigbee: Somewhat poorly drained to moderately well drained soils that have a loamy surface layer and a clayey subsoil |
| Orangeburg-Red Bay-Grady: Well drained soils that have a sandy surface layer and a loamy subsoil on hillsides; poorly drained soils that have a loamy surface and a clayey subsoil |
| **Dougherty County Soil Associations** |
| Swamp- Alluvial- Very poorly drained loamy and sandy alluvial covered with water or wet most of the year |
| Greenville-Grady- Deep well drained soil, sandy clay on broad undulating uplands and poorly drained soils in depression |
| Orangeburg-Red-Bay-Grady- Deep well drained soil, sandy clay loam on broad undulating uplands and poorly drained soils in depression |



## 5.1.4 CLIMATE

Data from the National Oceanic and Atmospheric Administration (NOAA) shows that rainfall in Southwest Georgia from January 2000 to January 2012 decreased from an average rainfall of 41.75 inches per year to 39.24 inches per year. The average overall temperature for the same time period January of 2000 to January of 2012 showed an overall increase from 63.2 degrees to 64.6 degrees. The highest temperature changes being reflected in July and August, beginning in 2010 through 2012 (See Appendix D for NOAA temperature and rainfall data).

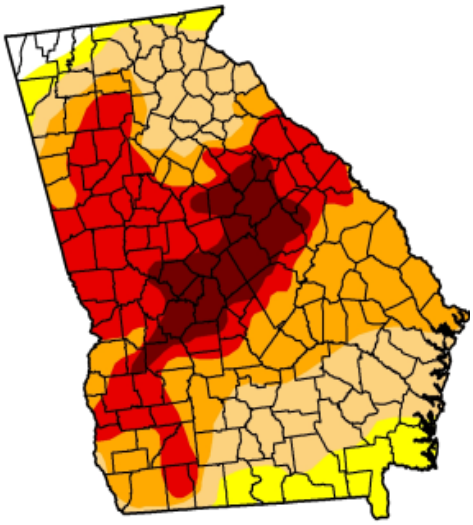
# U.S. Drought Monitor

**January 1, 2013**
Valid 7 a.m. EST

**Georgia**

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| Current | 1.63 | 98.37 | 89.49 | 64.87 | 36.96 | 10.25 |
| Last Week (12/25/2012 map) | 0.69 | 99.31 | 90.61 | 68.55 | 37.41 | 13.53 |
| 3 Months Ago (10/02/2012 map) | 42.42 | 57.58 | 47.77 | 38.67 | 21.78 | 9.03 |
| Start of Calendar Year (01/01/2013 map) | 1.63 | 98.37 | 89.49 | 64.87 | 36.96 | 10.25 |
| Start of Water Year (09/25/2012 map) | 37.30 | 62.70 | 52.44 | 42.66 | 34.04 | 17.18 |
| One Year Ago (12/27/2011 map) | 12.07 | 87.93 | 85.36 | 81.00 | 63.92 | 0.00 |



*Intensity:*

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**http://droughtmonitor.unl.edu**

USDA National Drought Mitigation Center

*Released Thursday, January 3, 2*
*Richard Heim, National Climatic Data Center, NO*

### 5.1.5 HABITAT

The Flint River Basin which includes Big Slough and Cooleewahee Creek lies within the Coastal Plains eco-regions and is considered to be the most diverse and abundant habit area in Georgia. Robust aquatic communities can be impaired when a water resource is adversely affected by human activities; this can include increased land use, degradation, loss, or alteration of the aquatic habitat due to physical degradation, riparian alteration, and channel modification. Changing the quantity of water flowing through a water body can also alter aquatic ecosystems so that they no longer support native species. Flow alterations also restrict water flow required for dilution of natural and human introduced pollutants.

Previous Watershed surveys and the original TMDL plan approved by EPD in 1998 show that there are federally threatened and endangered flora, fauna and aquatic life present (See Appendices D Page 64 for full listing of Species).

### 5.1.6 RECHARGE AREAS

The Watershed lies within the Floridan/Jacksonian aquifer system. The 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) this area lies within a “High” susceptibility zone for pollutants. Pollutants can enter the re-charge areas through septic systems, agricultural wastes, 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).

### 5.1.7 FLOOD PLAINS

Both Big Slough and Cooleewahee Creek contain flood plain areas. The flood plain for Big Slough is centralized to Grady County, and Cooleewahee Creek within Baker County. See Attachment N Big Slough, Attachment O Cooleewahee Creek for FEMA Flood Plain Map.

### 5.1.8 WETLANDS

Both Big Slough and Cooleewahee Creek contain wetland areas. Big Slough was mapped to west of Miller County with 868.23 acres as freshwater/forested shrub wetlands. Cooleewahee Creek was mapped north of Newton within Baker County with 86.31 acres as freshwater/forested shrub. See Attachment L Big Slough, Attachment M for Cooleewahee Creek USFWS Wetland Map.

## 5.2 LAND USE AND POPULATION CHARACTERISTICS

### 5.2.1 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 runoffs events.

Table 5.2.1 Land Cover

| Land Cover Classification | Big Slough Acreage | Cooleewahee Creek Acreage |
|---|---|---|
| Open Water | 96 | 1,496 |
| Low Intensity Residential | 742 | 0 |
| High Intensity Residential | 216 | 1,559 |
| Commercial/Ind/Trans | 308 | 346 |
| Barren Rock/Sand/Clay | 40 | 9 |
| Quarries/Mines and Transitional | 2,897 | 2,804 |
| Forest | 17,359 | 36,420 |
| Row Crops | 34,984 | 26,122 |
| Pasture/Hay | 10,106 | 10,363 |
| Urban/Recreational Grass | 229 | 313 |
| Woody Wetlands | 3,113 | 17,452 |
| Emergent Herbaceous Wetlands | 508 | 2,753 |
| Total | 70,598 | 99,637 |

Source USGS GAP Land Cover 2013

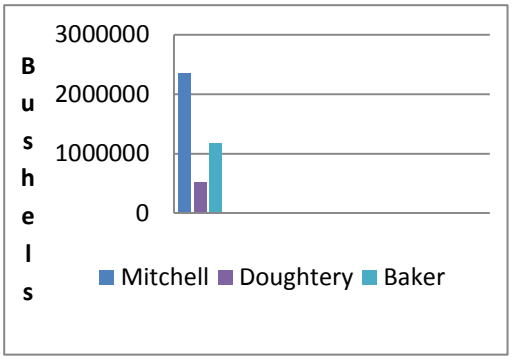
### 5.2.2 Land Use

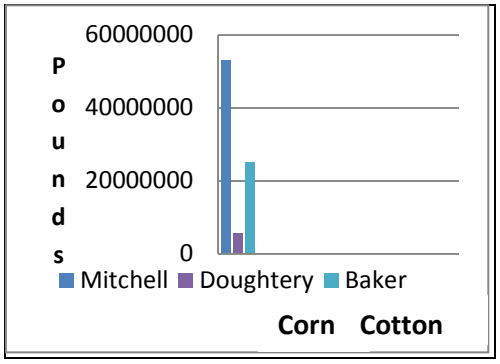
The larger Flint River Basin which includes Big Slough and Cooleewahee Creek has a combined acreage totaling over 365,000 acres which has been subjected to varying degrees of forest-cover alteration. This forest-cover alteration within Big Slough and Cooleewahee Creek is due to agricultural production which makes up 40% of the land use. The high percentage of agriculture use within the watershed is one of the major contributing factors of non-point source pollutants.

## 5.2.3 AGRICULTURE USE

Agriculture and Livestock run-off within the creeks was identified by the Watershed Partnership as one of the concerns of Non-Point Source pollutants entering the watershed. This information will be used to assist with the appropriate BMP recommendations, pollutant load reductions, and ensure measureable progress is being made (Table 5.2.3 shows the 3 major agriculture crops within the watershed complied from the *2009 Georgia Farm Gate Report by County and Crop).*

Table 5.2.3 Agriculture Production



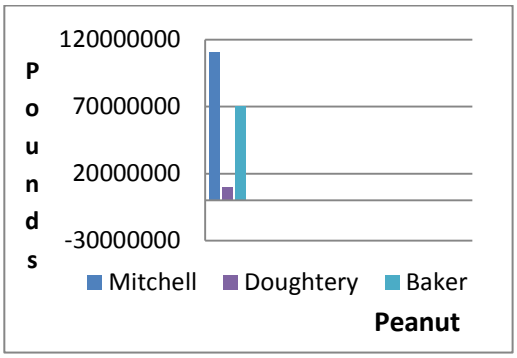




Table 5.2.4 Live Stock Farms

| Number of Live Stock Farms By County | | | |
|---|---|---|---|
| | Baker | Dougherty | Mitchell |
| Poultry | 14 | 5 | 52 |
| Cattle | 44 | 28 | 158 |
| Swine | 10 | 1 | 3 |

USDA 2007 CENSUS OF AGRICULTURE - COUNTY DATA

5.2.4 Permits

CAFO's

| NAME | COUNTY | TYPE | TOTAL NO OF ANIMALS |
|---|---|---|---|
| Aurora Dairy – Georgia LC | Mitchell | Dairy | 4250 |
| Camilla Floor | Mitchell | Swine | 1800 |
| Holton Floor | Mitchell | Swine | 2460 |
| Peacot Swine | Mitchell | Swine | 2400 |
| Pinecliff Farm | Mitchell | Swine | 2400 |
| Roger's Floor | Mitchell | Swine | 2080 |
| Westhaven Farm | Mitchell | Dairy | 600 |

Source: Permitting and Compliance Program, Environmental Protection Division, GA EPD, 2001

NPDES Wastewater Permit

| NPDES ID | PERMIT NAME | FACILITY TYPE DESC | CITY | COUNTY NAME |
|---|---|---|---|---|
| GAU020088 | CAMILLA (LAS) | MUNICIPAL or WATER DISTRICT | CAMILLA | MITCHELL |
| GAU020161 | PELHAM (LAS) | MUNICIPAL or WATER DISTRICT | PELHAM | MITCHELL |
| GA0038926 | SOUTHWEST GEORGIA ETHANOL LLC | PRIVATELY OWNED FACILITY | CAMILLA | MITCHELL |

Source Georgia EPD NPDES Permits 2008

NPDES Industrial Storm Water Permits

| NOI# | FACILITY NAME | CITY | COUNTY NAME |
|---|---|---|---|
| 03949 | EQUITY GROUP GEORGIA DIVISION LLC.PROCESSING PLANT | CAMILLA | MITCHELL |
| 02209 | CAMILLA R/M PLANT | CAMILLA | MITCHELL |
| 03950 | EQUITY GROUP GEORGIA DIVISION LLC - TRUCK SHOP | CAMILLA | MITCHELL |
| 03951 | EQUITY GROUP GEORGIA DIVISION LLC - FEED MILL | CAMILLA | MITCHELL |
| 03952 | EQUITY GROUP GEORGIA DIVISION, LLC - HATCHERY | CAMILLA | MITCHELL |
| 04975 | FIRST UNITED ETHANOL | PELHAM | MITCHELL |

Source Georgia EPD NPDES Permits 2011

5.2.5 Wildlife

The wide assortment of habitat types within Big Slough and Cooleewahee Creek along with the vast pine plantations and private hunting lands harbor a diverse wildlife population.

Fecal coliform bacteria usually lives in the intestines and feces of warm-blooded animals, including humans and animals whose manure is used as fertilizer

5.2.6 Urban

Big Slough

- East of Camilla and approved by GAEPD to handle the waste treatment for the City, there are two (2) large drain fields that have direct access into the creek.

5.2.4 DEMOGRAPHICS

Population size also plays an important role within the Watershed as population's increases; the effect of that increase can degrade, displace, or eliminate natural habitats. Watersheds with higher populations tend to exhibit greater impacts on waterways and habitats.

The populations within the five counties (Baker, Decatur, Dougherty, Grady and Mitchell) encompassing the Watershed according to the most recent US Census Bureau data as of July 2012 shows a steady decrease in overall populations for each county from 2010 to present with the exception of Grady County which has shown a small marked increase each year. This population decrease is due to the high unemployment rate in the area. Even though most counties have experienced a drop in their populations, large cities within Mitchell County containing the majority of the impaired area of Big Slough (Camilla, Pelham) and Newton containing the impaired area of Cooleewahee Creek in Baker County have remained fairly stable from 2010 to present according to the US Census Bureau data (See Attachment E for US Census Bureau County/City data).

East of Camilla and approved by GAEPD to handle the waste treatment for the City Camilla; there are 2 large drain fields that have direct access into Big Slough. Urban run-off will be evaluated as part of this Watershed Management Plan and Urban BMPs recommended as needed.

## 5.3 WATERBODY AND WATERSHED CONDITIONS

### 5.3.1 SUMMARY OF VISUAL SURVEY

A visual field survey was conducted for the TMDL Revision Contract requirement on February 9th, and August 8th 2012. The purpose of this survey was to validate and assess the land coverage for the area and to identify the possible sources of Point/Non-Point pollution. The total land coverage for the watershed is a HUC 10 covering in excess of 365,000 acres. Agricultural and livestock farms predominate, with private hunting lands, natural forested areas, and urban areas covering the remaining land.

Preliminary visual surveys in Big Slough and Cooleewahee Creek occurred in late January, 2012. From the data collected several locations were then chosen as potential monitoring sites. The potential sites for both locations were then surveyed in February 2012 via a vehicle survey and stream walk. Several places where surveyed for Big Slough but most areas did not contain any water. A final survey was done at the intersection of Stali Road and Highway 97. A stream walk was done from both sides of the bridge. Ample water was present and the site was chosen for future monitoring. The site for Cooleewahee Creek was chosen after ample water was found during stream walks on both sides of the bridge on Highway 91 in Newton.

After the initial monitoring began in 2012, it became apparent that there was not enough information being gathered from the two (2) sites chosen to properly identify the sources of the pollutants. Additional sites were then surveyed for Big Slough and Cooleewahee Creek. Six (6) additional sites were chosen in Big Slough and two (2) additional sites were chosen for Cooleewahee.

From the visual surveys and data collection by Golden Triangle RC&D, in our best professional judgment we concur with the 2004 TMDL plan findings for both creeks. The primary pollutants found within Big Slough are Fecal Coliform. Cooleewahee Creek pollutants are Fecal Coliform, Dissolved Oxygen and Sedimentation. A summary of monitoring results is provided in Table 5.3.4 Big Slough Water Monitoring Results Page 13 and Table 5.3.5 Cooleewahee Water Monitoring Results Page 14. Due to the drought conditions within Cooleewahee Creek samples were only available from February to June 2012.

## 5.3.2 WATER QUALITY STANDARDS

The Clean Water Act and EPA'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 5.3.2 below shows the recommended ranges approved by Georgia Environmental Protection Division (*391-3-6-.03 Water Use Classifications and Water Quality Standards)*

Table 5.3.2 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<br>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<br>aquatic life. | 200 col/100ml(May-Oct)<br>1000 col/100 ml(Nov - April)<br>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 |

## 5.3.3 WATER QUALITY DATA

### Fecal Coliform

A total of 33 samples were collected for Fecal Coliform bacteria from each monitoring site within Big Slough and Cooleewahee Creek beginning February to December 2012.

Big Slough

Based on the data collected Big Slough exceeded the standard reading each month with the exception of February (0 cfu/100ml), June (167 cfu/100ml), and August (0 cfu/100ml) being below normal and with the highest reading in May (2000 cfu/100ml), July (15,000 cfu/100ml), September (15,000 cfu/100ml) and November (15,000 cfu/100ml). The average Fecal Coliform reading for Big Slough during the monitoring period was 3400 cfu/100ml.

Cooleewahee

Cooleewahee Creek was below the normal range of 200 cfu/100ml for the 5 (five) month monitoring period from February to June 2012 with the exception of May 2012. May's reading was 900 cfu/100ml. The average Fecal Coliform reading for Cooleewahee Creek during the monitoring period was 266.80 cfu/100ml.

### Dissolved Oxygen

A total of 33 samples were collected for Dissolved Oxygen from each monitoring site within Big Slough and Cooleewahee Creek beginning February to December 2012.

Big Slough

The Dissolved Oxygen levels within Big Slough were fairly constant between 5 and 6 ppm. May and June of 2012 exceeded the optimum level of 5 ppm, with November dropping dangerous low to 1.8 ppm. The average reading for Dissolved Oxygen during the monitoring period for Big Slough was 6.8 ppm.

Cooleewahee Creek

The levels Dissolved Oxygen in Cooleewahee were below the standards of 5 ppm for the 5(five) months of monitoring from February to June of 2012, the lowest reading of 3.4 ppm in June 2012. The average reading for Cooleewahee Creek during the monitoring period was 5.08 ppm.

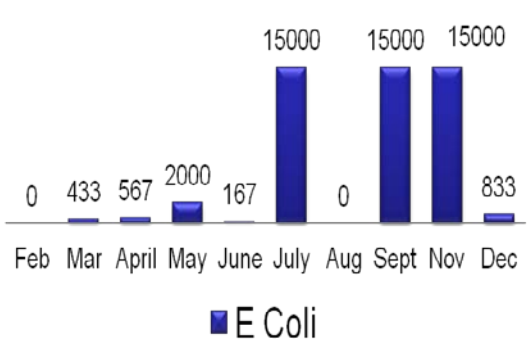
### Sediment -Stream Bank Erosion

Cooleewahee Creek

Cooleewahee Creek has six (6) sites with erosion sediment issues such as stream bank degradation from runoff activities associated with the agricultural fields.

Table 5.3.4 Summary Big Slough Water Monitoring Results

| Date and Time | 02/21/2012 | 03/21/2012 | 04/24/2012 | 05/24/2012 | 06/26/2012 | 07/23/2012 | 08/21/2012 | 09/28/2012 | 11/07/2012 | 12/20/2012 |
|---|---|---|---|---|---|---|---|---|---|---|
| Air Temp °C | 15 | 20 | 18 | 31 | 28 | 34 | 29 | 30 | 19 | 14 |
| Water Temp °C | 18 | 20 | 21 | 27 | 28 | 30.5 | 24 | 30 | 27 | 19 |
| pH | 6.5 | 8 | 7 | 7 | 9.8 | 6.8 | 7 | 6.75 | 6.5 | 6 |
| Dissolved Oxygen mg/L | 5 | 6.7 | 5.75 | 11.5 | 13 | 7.1 | 7.1 | 5.3 | 1.8 | 4.8 |
| DO % Saturation | 49.56 | 73.86 | 60.82 | 156.74 | 167.41 | 102.56 | 93.17 | 70.88 | 19.44 | 46.52 |
| Conductivity µs/cm | 100 | 155 | 150 | 235 | 90 | 50 | 130 | 110 | 80 | 100 |
| Nitrate-Nitrogen mg/L | 6.6 | 4.4 | 4.4 | 6.6 | 4.4 | 4.4 | 8.8 | 4.4 | 2.2 | 4.4 |
| Ortho-Phosphate mg/L | 0.4 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 | – | 0.1 | – | – |
| E Coli cfu/100mL | 0 | 433 | 567 | 2000 | 167 | 15000 | 0 | 15000 | 15000 | 833 |



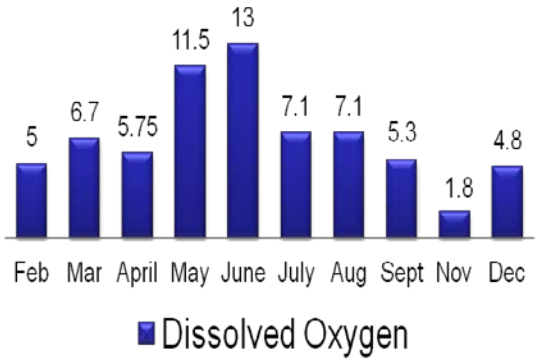
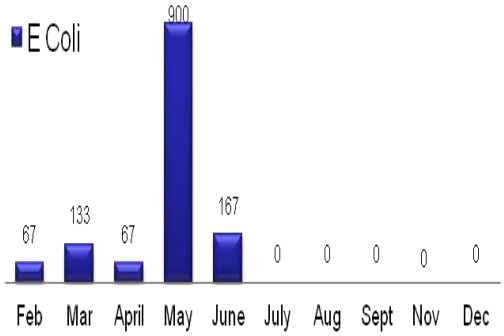
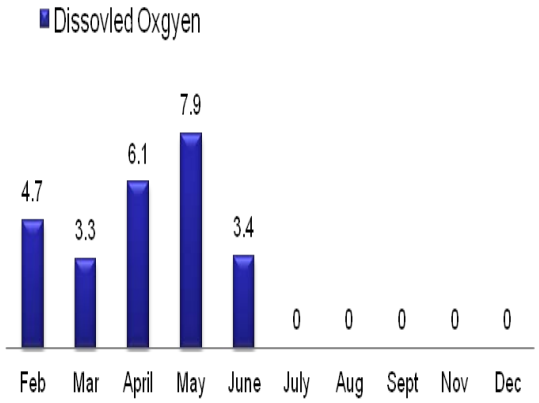



Table 5.3.5 Summary Cooleewahee Creek Water Monitoring Results

| Date and Time | 02/21/2012 | 03/21/2012 | 04/24/2012 | 05/24/2012 | 06/26/2012 | 07/23/2012 | 08/21/2012 | 09/28/2012 | 11/07/2012 | 12/20/2012 |
|---|---|---|---|---|---|---|---|---|---|---|
| Air Temp °C | 13 | 20 | 16 | 25 | 24 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| Water Temp °C | 19 | 22 | 19 | 27 | 31 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| pH | 7 | 7 | 7 | 7.5 | 7 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| Dissolved Oxygen mg/L | 4.7 | 3.3 | 6.1 | 7.9 | 3.4 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| DO % Saturation | 44.56 | 36.41 | 61.86 | 96.19 | 40.61 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| Conductivity µs/cm | 250 | 330 | 315 | 195 | 295 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| Nitrate-Nitrogen mg/L | 2.2 | 17.6 | 26.4 | 8.8 | 6.6 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| Ortho-Phosphate mg/L | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |
| E Coli cfu/100mL | 67 | 133 | 67 | 900 | 167 | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample | Creek bed dry no water to sample |



Ag Post BMP Monitoring

| **Date and Time** | 7/1/2017 | 8/21/2017 | 9/24/2017 |
|---|---|---|---|
| Air Temp °C | 29 | 25 | 25 |
| Water Temp °C | 31 | 28 | 28 |
| pH | 6.8 | 6.25 | 6.75 |
| Dissolved Oxygen mg/L | 6.2 | 6.7 | 6.8 |
| DO % Saturation | 81.25 | 81 | 73.56 |
| Conductivity µs/cm | 90 | 90 | 100 |
| Nitrate-Nitrogen mg/L | 4.4 | 0 | 0 |
| Ortho-Phosphate mg/L | 0 | | |
| E Coli cfu/100mL | 78 | 67 | 54 |

## 6.0 Recommended Best Management Practices/Strategies

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 which to improve the water quality of Big Slough and Cooleewahee Creek. These recommendations will be developed and implemented in two phases. The initial Phase 1 will be for a period of 3 years. The Phase 2 timeline will focus on longer term measurements and additional BMP installations to fully obtain maximum load reductions.

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 will focus on environmental, programmatic and social indicators in recommending the appropriate Best Management Practices for the critically impaired four mile (4) segment of Big Slough, and the sixteen miles (16) for Cooleewahee Creek addressing Fecal Coliform, Dissolved Oxygen, and Sedimentation.

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

## 6.1 Implementation of Best Management Practices (BMPs)

### 6.1.2 Structural BMPs

- Livestock exclusion - Address Fecal Coliform

  Livestock exclusion fencing will focus on removing livestock from sensitive areas within watershed. BMPs for livestock exclusion will include installing fencing to limit or eliminate livestock access to creeks, streams and wetland areas.

- Heavy use areas- Address Fecal Coliform/Dissolved Oxygen

  Proper installed heavy use areas can protect water quality by reducing sediment, nutrients, and runoff. BMPs for heavy use areas will include locations of water troughs, feeding areas and livestock concentration areas.

- Stream bank stability and stream bank protection – Address Sedimentation/Dissolved Oxygen

  Stream bank stabilization provides multiple benefits including erosion and land loss reduction, water flow, nutrient reductions, and habitat enhancements.

- Better Back Roads – Address Sedimentation

  Benefits include erosion and land loss reduction, water flow, nutrient reductions, and habitat enhancements.

### 6.1.3 Non-Structural BMPs

- Riparian Buffers- Address Sedimentation/Dissolved Oxygen

  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.

- Nutrient Management-Address Dissolved Oxygen/Fecal Coliform

  Reduces nutrient and pollutant loading to the surface water and improves and maintains soil conditions.

- Watershed debris and trash clean-up-Address habitat alteration

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

## 6.2 Load Reduction Methodology Region 5 Model

The Region 5 Model 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 five counties in the watershed there are four different soil erosive "R" values according to the RUSLE (Revised Universal Soil Loss Equation) values. Baker and Mitchell counties have an "R" value of 375, Dougherty has an "R" value of 350, Grady has an "R" value of 400 and Decatur has an R value of 425. An "R" value of 385 will be used during the load reduction calculations to represent an average "R" value.

- 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 0.25 to 0.40. An average "K" value of 0.25 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 5% slope will be used. This will be a "LS" factor value of 0.68.

- 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 0.31 within the five counties watershed. An average value of 0.25 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 five counties with the watershed have "P" factors that range from 0.95 to 1.00. A "P" value of 1.00 will be used to calculate load reductions.

- The Region 5 Model gives an estimated soil lost per year in ton/acre/yr. Each of the five counties within the watershed has different soil loss estimations according to the model. The five counties range from 2.56 to 13.87 tons/acre/yr for soil loss. A number of 5.33 will be used to calculate load reductions.

- For livestock exclusion calculations the model requires a number of livestock (as well as weight classes on some livestock such as cattle) to be excluded. The number will be estimated at 200 head per site since the exact number of livestock to be excluded is not known. It will be estimated that there will be 100 head of livestock at a design weight of 500 lbs. each and 100 head of livestock at a design weight of 1,400 lbs. each. The acreage affected by runoff will be estimated at 10 acres per site for a total of 80 acres. It is estimated that 500 feet of stream bank will be affected per BMP site.

- 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.

6.3 Recommended Best Management Strategies and Load Reductions Phase 1

The following table is an estimation of the BMPs that will be completed within Phase 1. 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 6.4 provides the type of BMP recommended and projected number for installation.

Table 6.4

| Pollutant | BMP Type | Number of BMPs Installed | Sediment Reduction (tons/year) | Phosphorous Reduction (lbs/year) | Nitrogen Reduction (lbs/year) |
|---|---|---|---|---|---|
| Fecal Coliform | Livestock Exclusion | 8 @ 200 head | N/A | 7,815 | 52,151 |
| Fecal Coliform/ Dissolved Oxygen | Heavy Use Area | 8 @ 0.25 acres per | N/A | 9,251 | N/A |
| Fecal Coliform/ Sediment | Filter Strips | 3 @ 1 acre per | 661 | 1025 | 1931 |
| Fecal Coliform/ Sediment | Stream Crossing | 3 (100ft x12ft per) | 8 | 6.8 | 13.4 |
| Sediment | Stream Crossing Stability | 3 (0.25 miles per) | 8 | 6.8 | 13.4 |
| Fecal Coliform/ Sediment | Row Crop Conversion to Pasture Land | 159 acres | 132 | 196 | 369 |
| Fecal Coliform/ Sediment | Critical Area Planting/Grassed Waterways | 25 acres @ 5 acres per | 107 | 158 | 297 |
| Habitat Alteration | Clean-out of Big Slough Channel | Approx. 1 miles | Data not available | Data not available | Data not available |
| Sedimentation | Better Back Roads | 6 | Data not available | Data not available | Data not available |

Estimated Cost

| BMP Type | Critical Number | Estimated Costs |
|---|---|---|
| Livestock Exclusion | 8 sites | $5,000.00 per site = $40,000.00 |
| Critical Area Planting/Grassed | 25 acres | $3,000.00 per acre = $75,000.00 |
| Heavy Use Areas | 8 sites | Avg. 0.25 acres each @ $900 ea site = $7,200 |
| Filter Strips | 3 acres | |
| Stream Crossing | 3 sites | $3,000.00 per site = $9,000.00 |
| Stream Crossing Stability | 3 | $3,000.00 per site = $9,000.00 |
| Row Crop Conversion to Pasture Land | 159 acres | $200.00 per acre = $31,800.00 |
| Clean-out of Big Slough | 1 miles | At $3,000.00 per mile = $3,000.00 |
| Better Back Roads | 6 | At $20,000 a piece= $120,000 |

| Pollutant | BMP Type | # of BMPs Installed | Sediment Reduction (tons/year) | Phosphorous Reduction (lbs/year) | Nitrogen Reduction (lbs/year) |
|---|---|---|---|---|---|
| Fecal Coliform | Livestock Exclusion | 2 @ 200 head | N/A | 7,815 | 52,151 |
| Fecal Coliform/ Dissolved Oxygen | Heavy Use Area | 1 @ 0.25 acres per | N/A | 9,251 | N/A |
| Sediment | Stream Stability/Dirt road | 3 (0.25 miles per) | 8 | 6.8 | 13.4 |
| Habitat Alteration Flooding | Clean-out of Channel | Approx. 1 mile | Data not available | Data not available | Data not available |
| Habitat Alteration Trash Debris | Clean-up | Approx. 1 mile | Data not available | Data not available | Data not available |

| BMP Type | Critical Number | Actual Costs |
|---|---|---|
| Livestock Exclusion | 2 sites | $7,061 |
| Heavy Use Areas | 1 sites | $1,178.63 |
| Better Back Roads | 3 | $205,378.84 |

Phase 1 Total BMP installations $213,617.97

Phase 1 Reductions

The project resulted in the implementation of 6 BMPs (3 agricultural and 3 Better Back Road), which resulted in modeled pollutant load reductions of 5.9 % for Nitrogen, 9.6% for phosphorus and 13.6% for sediment. These BMPs included heavy use area, exclusion fencing, watering trough and pipeline, along with Better Back Road installations. The original TDML recommendations for reductions were stated at 33% for DO and FC at 5% for Big Slough and 43% for Cooleewahee Creek.

## 7.0 Working with the 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, homeowners, Stakeholders, 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 Awareness | Landowners, homeowners |
| Volunteering | All |

1) Strategy:

The main strategy of the Big Slough Cooleewahee Creek Management Plan is to improve the water quality in the impaired sections of the watershed and protect the water quality in the remaining part of the watershed in order for the entire watershed to be fully supporting. This would allow the watershed to be removed from the EPA's 305/ (b) 303 (d) lists. The education and outreach will be designed to:

a) Increase the public awareness of BMPs and how they are used to protect and improve water quality within the Big Slough/ Cooleewahee Creek Watershed

b) Increase the public awareness of the ecological significance of the Big Slough/ Cooleewahee Creek Watershed

c) Increase the public awareness of how farming/land use practices effect the watershed.

d) Increase the public awareness of the endangered and protected species located with the Big Slough Cooleewahee Creek Watershed.

2) Implementation:

The following plan outlines what actions will be taken in order to implement the education and outreach strategies. Many of the programs within the NRCS such as EQIP and WHIP (Wildlife Habitat Incentive Program) use the same or similar BMP strategies that the Big Slough Cooleewahee Creek Watershed Program will use. Therefore, the Big Slough Cooleewahee Creek Watershed Program Manager will work closely with NRCS, Georgia Soil and Water, and USFWS personnel to implement the education plan. The following strategies will be implemented:

a) Promoting the implementation of BMPs concerning type, cost, and effectiveness

b) Erosion and sediment control workshops

c) Educating a wide range of ages and audiences concerning water quality

d) Educating individuals about the vast amount of land that is irrigated within the watershed and how farming practices affect the watershed.

e) Erecting signs educating the public about the watershed and about water protection.

f) Educating the public on how septic tanks affect the Big Slough Cooleewahee Creek watershed's water quality.

The Big Slough/Cooleewahee Creek Watershed Program will implement these strategies by using the following plan for educational and outreach activities in the watershed community.

Nine (9) Big Slough/ Cooleewahee Creek Partnership meetings will be held. These meeting will be rotated between the counties involved in order to get more participation from each county. During these meeting 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 3 (three) 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 to promote activities and events related to the watershed.

c) Partner with school Science Teachers, County extension offices, and other organizations, such as church RA's, GA's, Girl and Boy Scout groups to bring awareness, education and the importance of the watershed to the community.

d) Erect four (4) watershed education signs will be posted on the major highways and roads entering the Big Slough Cooleewahee Creek Watershed area. See Figure 6.0 for a picture of the watershed signs and see Figure 6.1 for a map and location of watershed sign.

e) Conduct three (3) Adopt-A-Stream training workshops

f) Conduct three (3) Rivers Alive clean-up events.

g) Creation of brochure on Septic Tanks for homeowners

Figure 6.0 Watershed Boundary Sign

YOU ARE ENTERING THE BIG SLOUGH
COOLEEWAHEE 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.

Figure 6.1 Watershed Sign Location Map


Proposed Watershed Boundary Sign Location

| Map Number from Figure 6.1 | Description of Location |
|---|---|
| #1 Baker County Newton | Piney woods to Newton |
| #2 Mitchell County Camilla | Highway 19 Bridge |
| #3 Mitchell County | Highway 37 east of 19 |
| #4 Mitchell County | Near Pelham |

WMP Updated 7/26/2018- Installed Location Signs

| Map Number from Figure 6.1 | Description of Location |
|---|---|
| #1 and #2 Baker County | Colquitt Ford Road @ bridge north and south |
| #3 and 4 Mitchell County Camilla | Quail Crossing north and south end of road |

## 8.0 Long Term Monitoring Plan

Golden Triangle RC&D and the Watershed Partnership recommend the creation of a long term monitoring strategy. The long term monitoring will be conducted by Golden Triangle RC&D personnel with QA/QC certification from Georgia Adopt-A-Stream.

Cooleewahee Creek

A water quality monitoring plan was developed, submitted, and approved by GAEPD with the TMDL Revision Plan in 2012. Due to the drought conditions within the watershed only 5 months of data February to June of 2012 was available for Cooleewahee Creek. Golden Triangle RC&D and Watershed Partnership recommend additional monitoring within specific sites for Cooleewahee Creek to ensure the data is reflective of the current conditions.

## 9.0 Implementation Milestones, Evaluation and Revision

### 9.1 Other Funding Needs and Sources

The approval of the Watershed Management Plan by GAEPD will provide Golden Triangle RC&D with opportunities to obtain 319 (h) grant money covering 60% of the implementation costs. Additional funding sources will still need to be acquired; this will be done through the varying cost sharing programs provided by NRCS and FSA, and individual Landowner cost share participation. Evaluation of each land owners request is recommended to find the most beneficial program to improve the water quality and reduce pollutants within the creeks. Listed below are descriptions of some of the programs available through NRCS that would fit the needs of the project.

Conservation Reserve Program (CRP) This program was established as a conservation provision of the Farm Bill to encourage and assist producers who are willing to set aside environmentally sensitive land (highly erodible, riparian) for conservation benefits. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and develop wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years, and Landowner may receive a maximum of $50,000 annually in payments.

Environmental Quality Incentives Program (EQIP): The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length.

These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities

to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet Federal, State, Tribal and local environmental regulations. Landowner may receive a maximum of $50,000 annually in payments.

Wildlife Habitat Incentive Program (WHIP) The Wildlife Habitat Incentive Program (WHIP) is a voluntary program for conservation-minded Landowner who wants to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.

The Food, Conservation, and Energy Act of 2008 reauthorized WHIP as a voluntary approach to improving wildlife habitat in our Nation. The Natural Resources Conservation Service administers WHIP to provide both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat.

WHIP cost-share agreements between NRCS and the participant generally last from one year after the last conservation practice is implemented but not more than 10 years from the date the agreement is signed.

The NRCS will oversee the BMP projects to be certain that they are completed using the NRCS certified guidelines. A NRCS representative will provide a final approval form after projects are completed.

9.2 Schedule and Milestones for Implementing Management Strategies Phase 1

Table 9.2: Project Activities 2014-2017 Phase 1

| Activity | Responsible Entity | Schedule | | | |
|---|---|---|---|---|---|
| Planned Year | | 2014 | 2015 | 2016 | 2017 |
| Identify high risk priority areas for BMPS | Watershed Stakeholder Partnership/GTRCD/ NRCS/USFWS/Local Cities/Counties | 10/13 | 10/14 | 10/15 | 10/16 |
| Contract with Landowner for installation of BMPs | Watershed Stakeholder Partnership/GTRCD | 10/13 | 10/14 | 10/15 | 10/16 |
| Install BMPs | Watershed Stakeholder Partnership/GTRCD | 11/13 | 11/14 | 11/15 | 11/16 |
| Hold quarterly Big Slough Cooleewahee Creek Watershed Partnership/Stake holder meetings | GTRCD | 11/13 | 2/14,5/14, 8/14,10/14 | 11/15 | 2/16,5/16 8/16,10/16 |
| Update on an on-going basis activities within the watershed on the Golden Triangle BSCCWP website | GTRCD | 11/13 | 9/14 | 11/15 | 9/16 |
| Conduct three BMP field days | Watershed Stakeholder Partnership/GTRCD/ NRCS/USFWS/Local City/Counties | 11/13 | 11/14 | 11/15 | 11/16 |
| Partner with school groups/organizations | Watershed Stakeholder Partnership/GTRCD/ NRCS/USFWS/Local City/Counties | 11/13 | 3/14 | 11/15 | 3/16 |
| Conduct water sampling | GTRCD | 10/13 11/13 12/13 | 2/14, 5/14,8/14 10/14 | 10/15 11/15 12/15 | 2/16, 5/16,8/16 10/16 |
| Calculate load reductions BMP | GTRCD | 10/13 | 9/14 | 10/15 | 9/16 |
| Hold Adopt-A-Stream trainings courses | GTRCD/Georgia Adopt-A-Stream | 10/13 | 2/14 | 10/15 | 2/16 |

9.2.1 Milestones Phase 1

| MILESTONE | RESPONSBILE ENTITY | STARTING DATES | COMPLETION DATES |
|---|---|---|---|
| Negotiate with Landowner to implement BMPs | Watershed Stakeholder Partnership/GTRCD | 10/13 | 9/16 |
| Conduct Public Education and Outreach | Watershed Stakeholder Partnership/GTRCD/ NRCS/USFWS/ Local City and Counties | 10/13 | 9/16 |
| Develop BMP conservation plans | Watershed Stakeholder Partnership/GTRCD/ NRCS/USFWS | 10/13 | 9/16 |
| Install BMPs | Watershed Stakeholder Partnership/GTRCD/Local and County governments | 10/13 | 11/15 |
| Update WMP after installing BMPs | GTRCD | 11/13 | 11/15 |
| Conduct Water Quality and Other Monitoring | GTRCD | 10/13 | 9/16 |
| Analyze Water Quality Data to Track Effectiveness | GTRCD | 12/14 | 9/16 |
| Obtain GAEPD's and Other Water Quality Data | GTRCD | 12/14 | 9/16 |
| Report Load Reductions | GTRCD | 12/14 | 9/16 |
| Evaluate Progress of Management Measures | Watershed Stakeholder Partnership/GTRCD | 9/14 | 9/16 |

## 9.3 Evaluation and Assessment of Progress

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

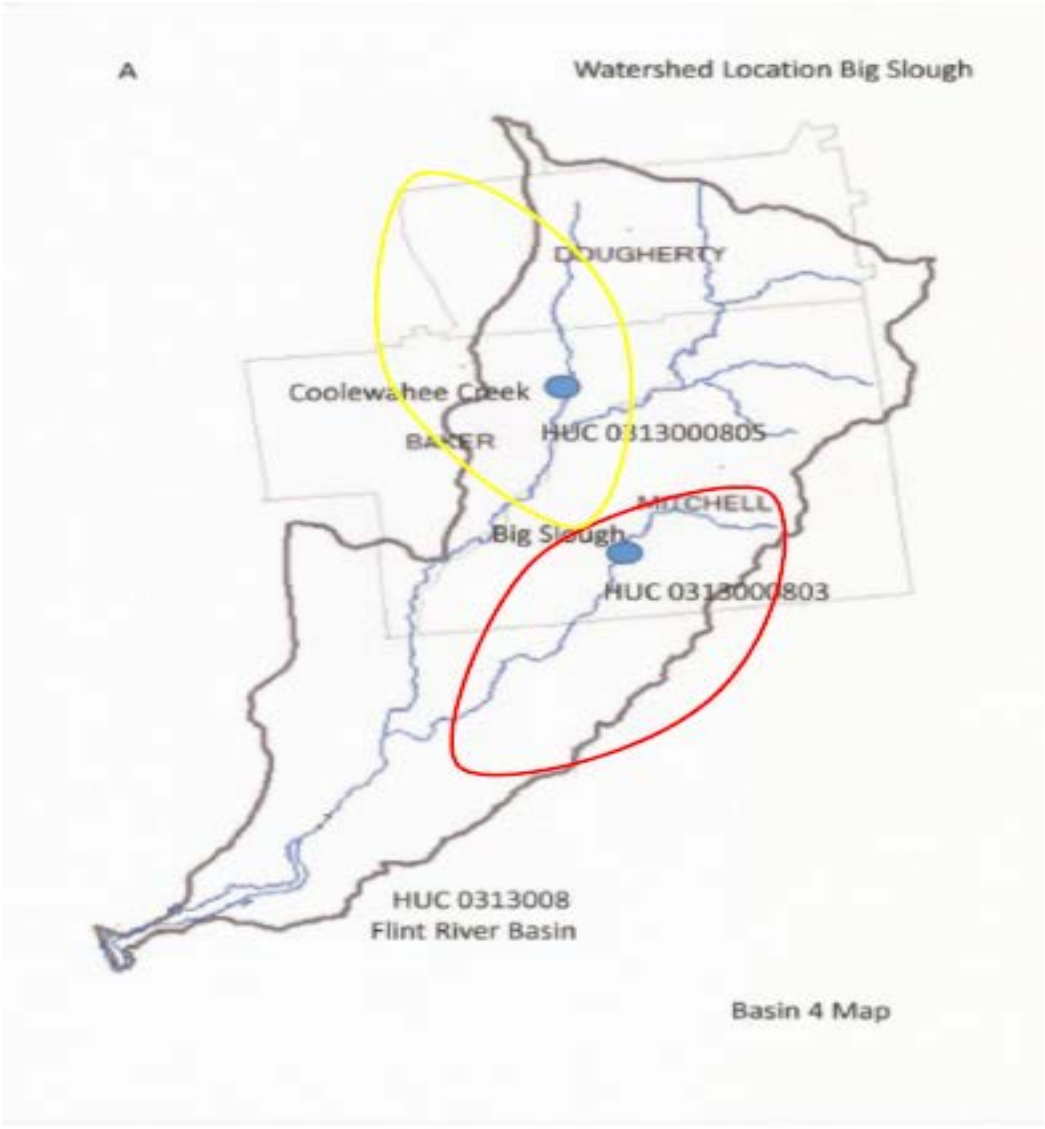
| Qualitative Measures | Quantitative Measures |
|---|---|
| • Individual/Group Participation<br>• Partnership Meeting<br>• Workshops<br>• BMP Field Days<br>• Adopt-A-Stream Training<br>• Clean-up Events<br>• Education and Outreach Effectiveness<br>• Pre-Post Surveys | • Watershed Monitoring Results<br>• Adopt-A-Stream testing (including US Fish and Wildlife biological monitoring/chemical testing)<br>• Load Reduction Reporting(monitoring for BMP effectiveness |

The Big Slough/ Cooleewahee Creek Program Manager will administer and track the progress of the recommended management measures, monitor the effectiveness of BMPs and associated load reductions, and completion of the tasks and milestones. The Program Manager, Stakeholders and the BSCC Watershed Partnership Committee will make recommendations for Phase 2 will be made from the final Phase 1 three (3) year data figures. Progress will be reported to GAEPD in semi-annual reports, which will be submitted each February and September. For each BMP load reduction calculations for sediment, phosphorus and nitrogen reports will be generated as required by GAEPD. Local reduction data will be made available to the Big Slough/ Cooleewahee Creek Watershed Partnership. 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. If the numbers of acreage for each BMP type is changed then the estimated load reduction numbers will be accordingly adjusted. Any changes to the BMP implementation schedule will be reported to GAEPD, and the Big Slough/ Cooleewahee Creek Watershed Partnership.

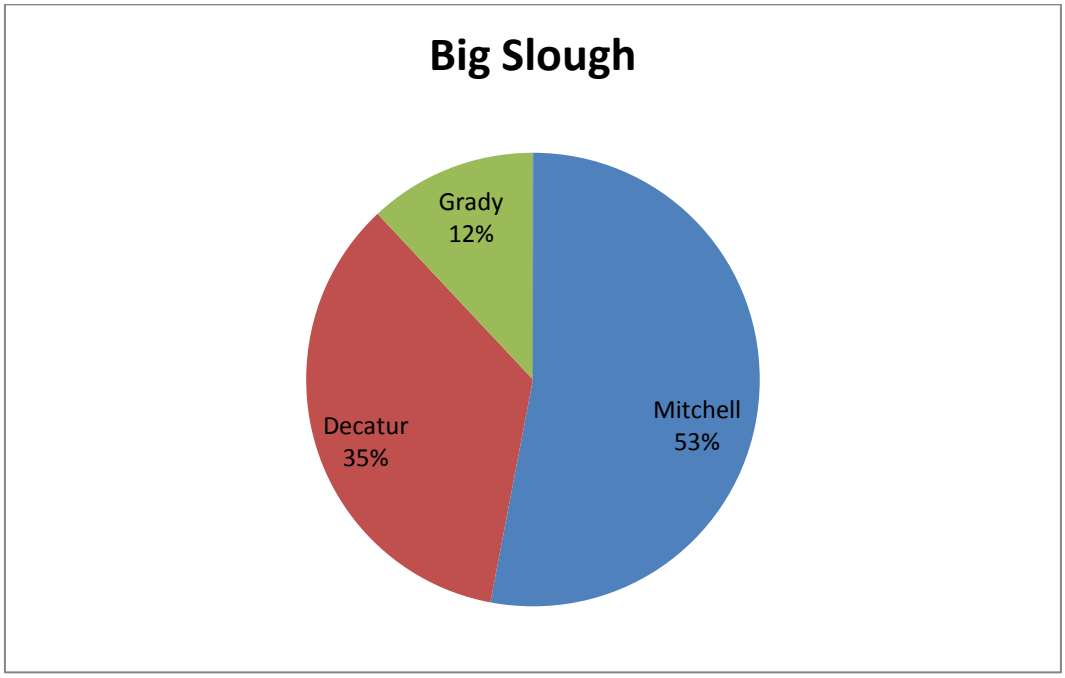
WMP Update Future Recommendations- 7/26/2018

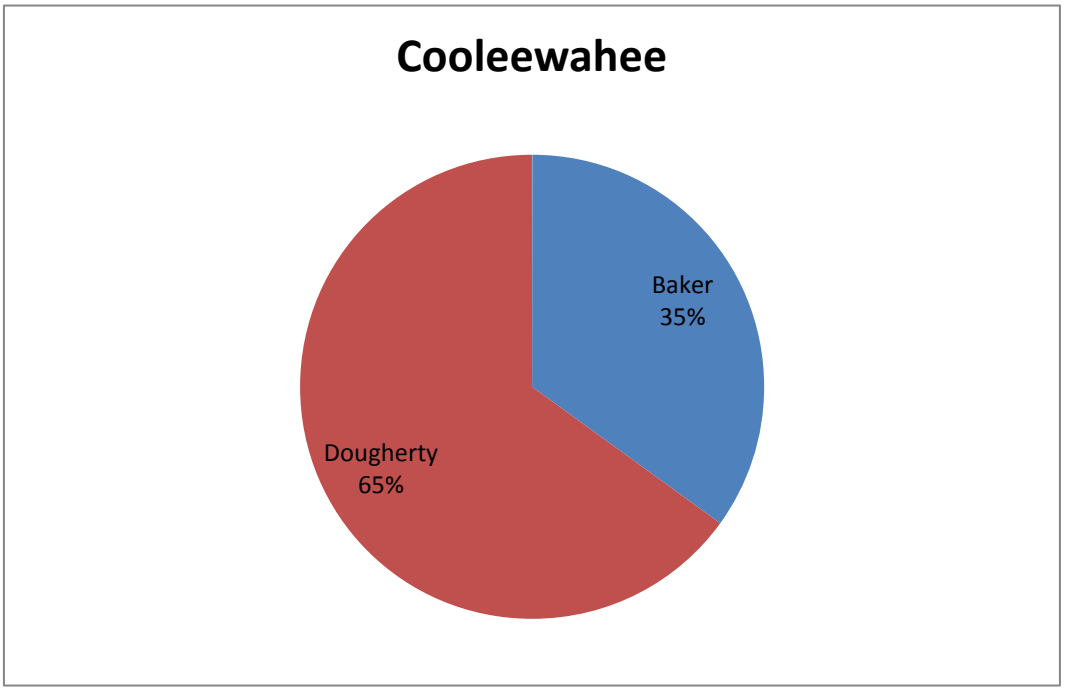
The Program Manager, Stakeholders and the BSCC Watershed Partnership Committee made recommendations from the Close-out of the implementation project in April of 2018 that additional funding for a Phase 2 implementation for Better Back Road improvements be made on Red Bud Lane, Ball Field Road, and Mt Pleasant Church road to elevate the sedimentation load into Big Slough.

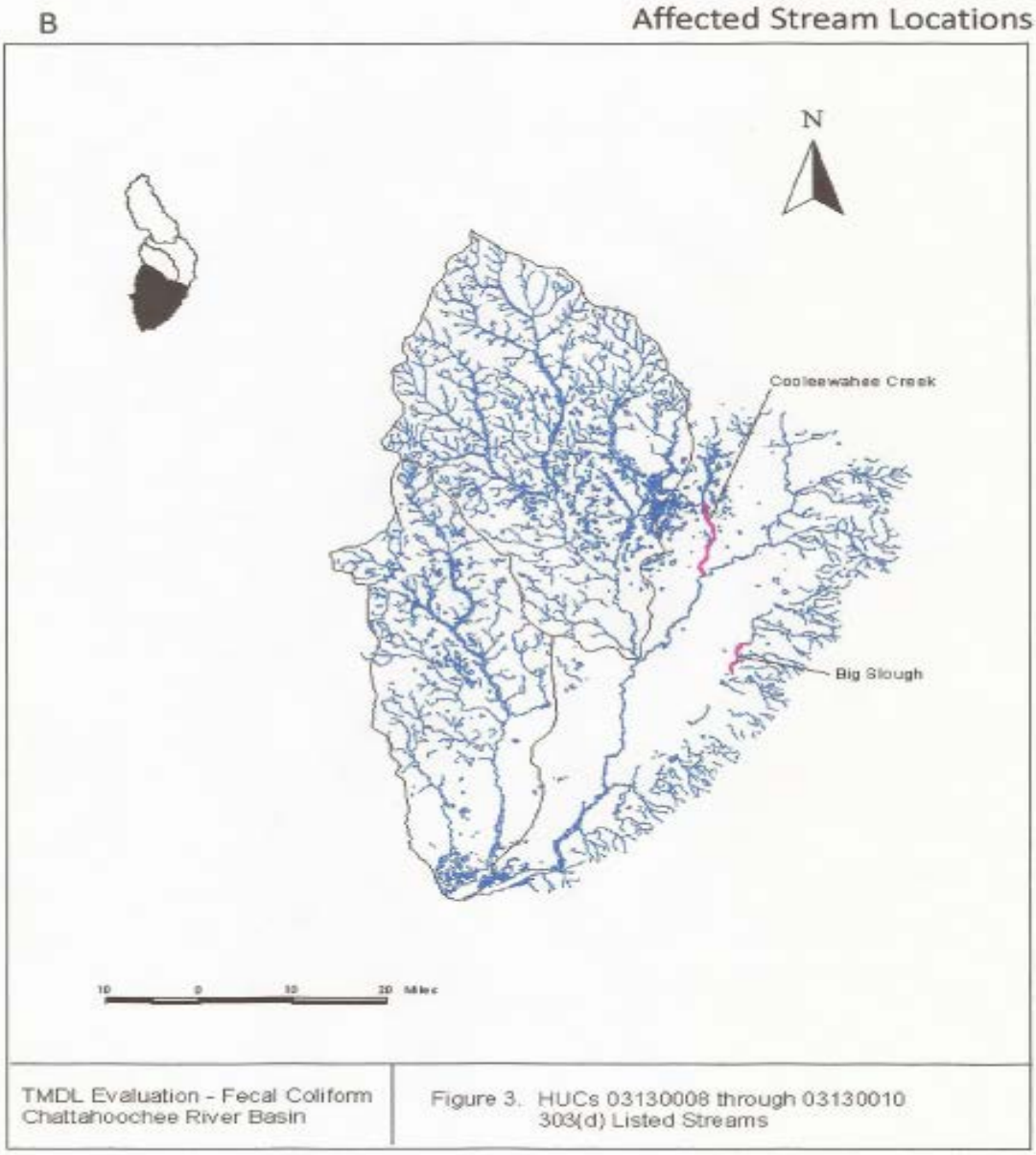
Appendix A Big Slough/ Cooleewahee Creek Watershed Boundaries



Attachment B Land Area Percentages by County






TMDL Evaluation - Fecal Coliform
Chattahoochee River Basin

Figure 3. HUCs 03130008 through 03130010
303(d) Listed Streams

Appendix D Threatened and Endangered Plant and Animal Species in Big Slough/ Cooleewahee Creek Watershed

| Threatened (T) and Endangered (E) Plants and Animals in the Big Slough and Cooleewahee Creek Watershed (Mitchell, Baker, Decatur, Grady, and Dougherty Counties, including Flint River) | | | | |
|---|---|---|---|---|
| Species | Federal Status | State Status | Habitat | Threats |
| Bird | | | | |
| Wood Stork *Mycteria americana* | 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 *Picoides borealis* | 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 *Gopherus polyphemus* | 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. |
| Southern Hognose Snake *Heterodon simus* | No Federal Status | T | Well drained, xeric, sandy soils where longleaf pine and/or scrub oaks (especially turkey oak) | Destruction and alteration of longleaf pine-wiregrass |

| | | | | |
|---|---|---|---|---|
| Alligator Snapping Turtle *Macrochelys temminckii* | No Federal Status | T | Rivers, lakes, large ponds near stream swamps | Destruction and modification of habitat |
| Amphibians | | | | |
| Reticulated flatwoods salamander *Ambystoma bishopi* | E | E | Breeding habitats are isolated pond cypress depressions often with a smaller component of blackgum or slash pine. These ponds are isolated within pine forests. | Habitat destruction, deterioration, and fragmentation. |
| Fish | | | | |
| Spotted bullhead *Ameiurus serracanthus* | No Federal Status | T | Prefers deep holes of small to medium rivers with slow to swift currents and rock substrates or sand bottoms; it also occurs over mud bottoms, typically near stumps, in impoundments | Due to present or threatened destruction, modification, or reduction of a habitat or range. |
| Invertebrate | | | | |
| Oval Pigtoe *(Pleurobema pyriforme)* | 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. |
| Purple bankclimber *(Elliptoideus sloatianus)* | 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 |
| Gulf moccasinshell (Medionidus penicillatus) | 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 |

| | | | | |
|---|---|---|---|---|
| Invertebrate | | | | |
| Shinyrayed pocketbook *(Lampsilis subangulata*) | E | E | Rivers and streams; usually found in sand, sand mixed with mud, or gravel substrates in moderate currents. | Habitat modification, Sedimentation, and water quality degradation |
| Plant | | | | |
| Relict Trillium *Trillium reliquum* | E | E | Hardwood forests, found in either rich ravines or adjacent terraces with other springs flowering herbs | Logging, road construction, agricultural conversion, mining, residential/industrial development, and encroachment by Japanese Honeysuckle and Kudzu. |
| Plant | | | | |
| Cooley's meadowrue Thalictrum cooleyi | E | E | Fine sandy loam in open, seasonally wet mixed pine-hardwoods and in adjacent wet savannahs; restricted to roadsides and right-of-ways | Most extirpated populations were eliminated by fire suppression and/or silvi cultural or agricultural development. |
| Pondberry *(Lindera melissifolia)* | E | E | Shallow depression ponds of sand hills, margins of cypress ponds, and in seasonally wet low areas among bottomland hardwoods | Drainage ditching and subsequent conversion of habitat to other uses; domestic hogs, cattle grazing, and timber harvesting; and apparent lack of seedling production |
| American chaffseed *(Schwalbea americana)* | E | E | Fire-maintained wet savannahs in the Coastal Plain (with grass pinks, colic root, huckleberry and gall berry); grassy openings and swales of relict longleaf pine woods in the Piedmont | Fire suppression, habitat conversion, and incompatible agriculture and forestry practices |

Appendix E

Population of Counties within Big Slough/ Cooleewahee Creek Watershed

Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2012
US Census Bureau

| Geography | April 1, 2010 Census | Population Estimate (as of July 1) | | | Percent Change |
|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | |
| Baker County | 3,451 | 3,437 | 3,326 | 3,366 | -2.53 |
| Decatur County | 27,842 | 27,823 | 27,675 | 27,509 | -1.21 |
| Dougherty County | 94,565 | 94,755 | 94,647 | 94,501 | -0.07 |
| Grady County | 25,011 | 25,062 | 25,217 | 25,440 | 1.69 |
| Mitchell County | 23,498 | 23,522 | 23,452 | 23,144 | -1.53 |

Appendix F Temperature and Precipitation Data

Date unavailable till Government re-opens

Appendix G Stakeholder and Partnership Listing

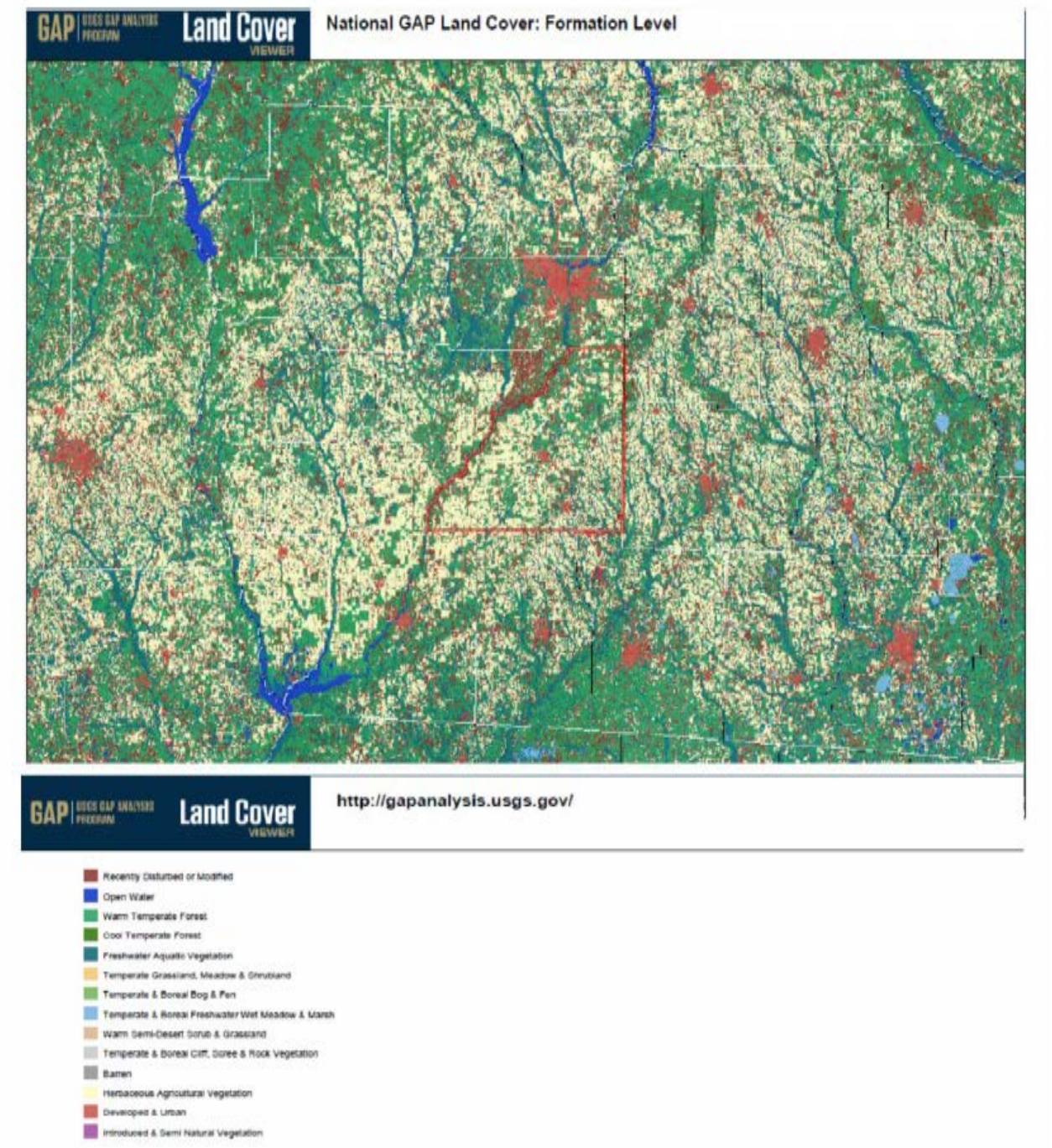
| **Organization** | **Responsibilities** |
|---|---|
| Golden Triangle RC&D Council Inc.<br><br>(Lead Organization) | • Serve as the lead organization/grant administrator for the project<br>• Executes grant contract with GAEPD.<br>• Provide 40% of project costs in matching funds or in-kind services<br>• Hire a full-time project manager<br>• Track all grant funds expended and all match values provided in accordance with the implementation schedule<br>• Track all project activities in accordance with the implementation schedule<br>• Submit requests for payment to GAEPD<br>• Completes monthly progress reports<br>• Submit final project close-out report to GAEPD/USEPA.<br>• Oversee the development of WMP that meet EPA's Nine Key Elements for Watershed Planning.<br>• Update maps and other documentation as required<br>• Hold 9 Partnership meetings<br>• Conduct 3 Adopt-A-Stream training events<br>• Conduct 3 Rivers-Alive Clean-up events<br>• Conduct 3 workshop/field day events<br>• Conduct public outreach PSA announcements, meetings and website page.<br>• Expands watershed Stakeholder Partnership/alliance. |
| GA Environmental Protection Division | • Provide 60% of Federal funds for project<br>• Provides technical assistance through project review.<br>• Approves project deliverables.<br>• Provide guidance on watershed planning.<br>• Track implementation of the approved project work plan. |
| Big Slough Cooleewahee Creek Watershed Partnership | • Serves on Partnership/Advisory Committee<br>• Assist with field days/workshops, outreach activities.<br>• Render in-kind service match as possible |

| | |
|---|---|
| USDA Natural Resources Conservation Service (NRCS) | • Provide technical assistance on BMPs implementation to ensure accurate installations.<br>• Serves on Partnership/Advisory Committee<br>• Contributes in-kind services match<br>• Assist with field days/workshops, outreach activities<br>• Render in-kind service match as possible |
| U.S. Fish and Wildlife Service | • Provide technical assistance on endangered species within the watershed.<br>• Provide technical assistance for identification of threat areas(unpaved roads)<br>• Provides technical assistance for Habitat Conservations Plans<br>• Serves on project advisory committee.<br>• Participate in field days/workshops, outreach activities<br>• Render in-kind service match as possible |
| Department of Forestry | • Provide technical assistance with implementation of BMP<br>• Participate in field days/workshops, outreach activities<br>• Render in-kind service match as possible |
| Lower Flint/Ochlockonee Water Council | • Provides opportunities for leveraging efforts from other funding sources<br>• Serve on project advisory committee |
| Georgia Soil and Water Conservation Commission | • Provide technical assistance with implementation of BMP<br>• Assist with comprehensive Nutrient Management Plan if needed<br>• Participate in field days/workshops, outreach activities<br>• Render in-kind service matches as possible |
| Georgia Water Planning and Policy Center at Albany State University(GWPPC) | • Provided technical assistance with creation of WMP by providing irrigated acres<br>• Provide technical assistance with implementation of BMP<br>• Serve on project advisory committee.<br>• Render in-kind service matches as possible |

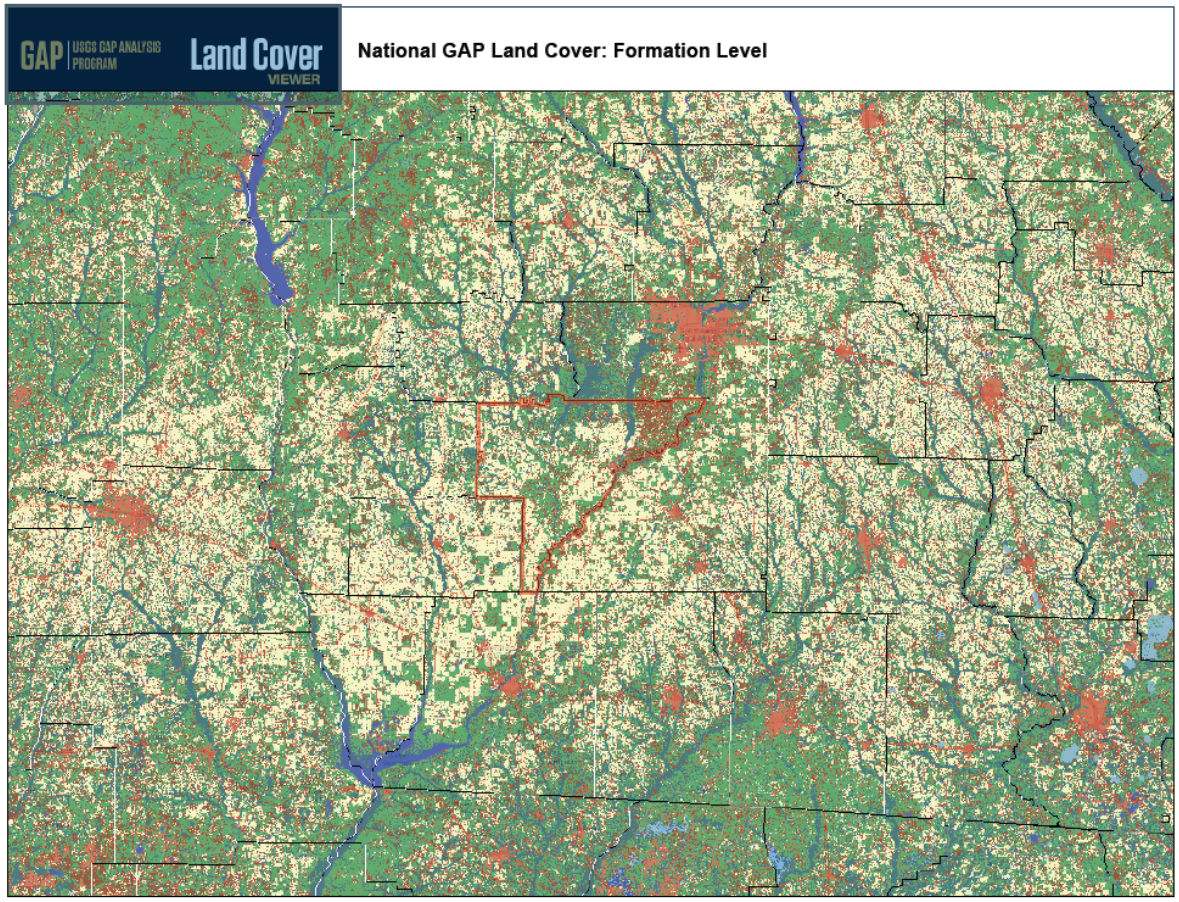
| | |
|---|---|
| Mitchell County | • Assist with promotion of the WMP project.<br>• Provide support to project manager.<br>• Render in-kind service matches as possible |
| Baker County | • Assist with promotion of the WMP project.<br>• Provide support to project manager.<br>• Render in-kind service matches as possible |
| Dougherty County | • Assist with promotion of the WMP project.<br>• Provide support to project manager.<br>• Render in-kind service matches as possible |

| | |
|---|---|
| Technical Committee | Identifies target areas within the watershed based on water quality data, and suggests reasonable on-the-ground BMPs to address impairments. |
| Public Education and Outreach Committee | Collaborates on education components to target various age groups, provides suggestions for successful workshops to educate watershed community members, and organizes meetings with potential Partners for BMP coordination. |
| Resource Committee | Provides historical information and past impairments to Big Slough and Cooleewahee Creek. |

Attachment H Big Slough Land Cover

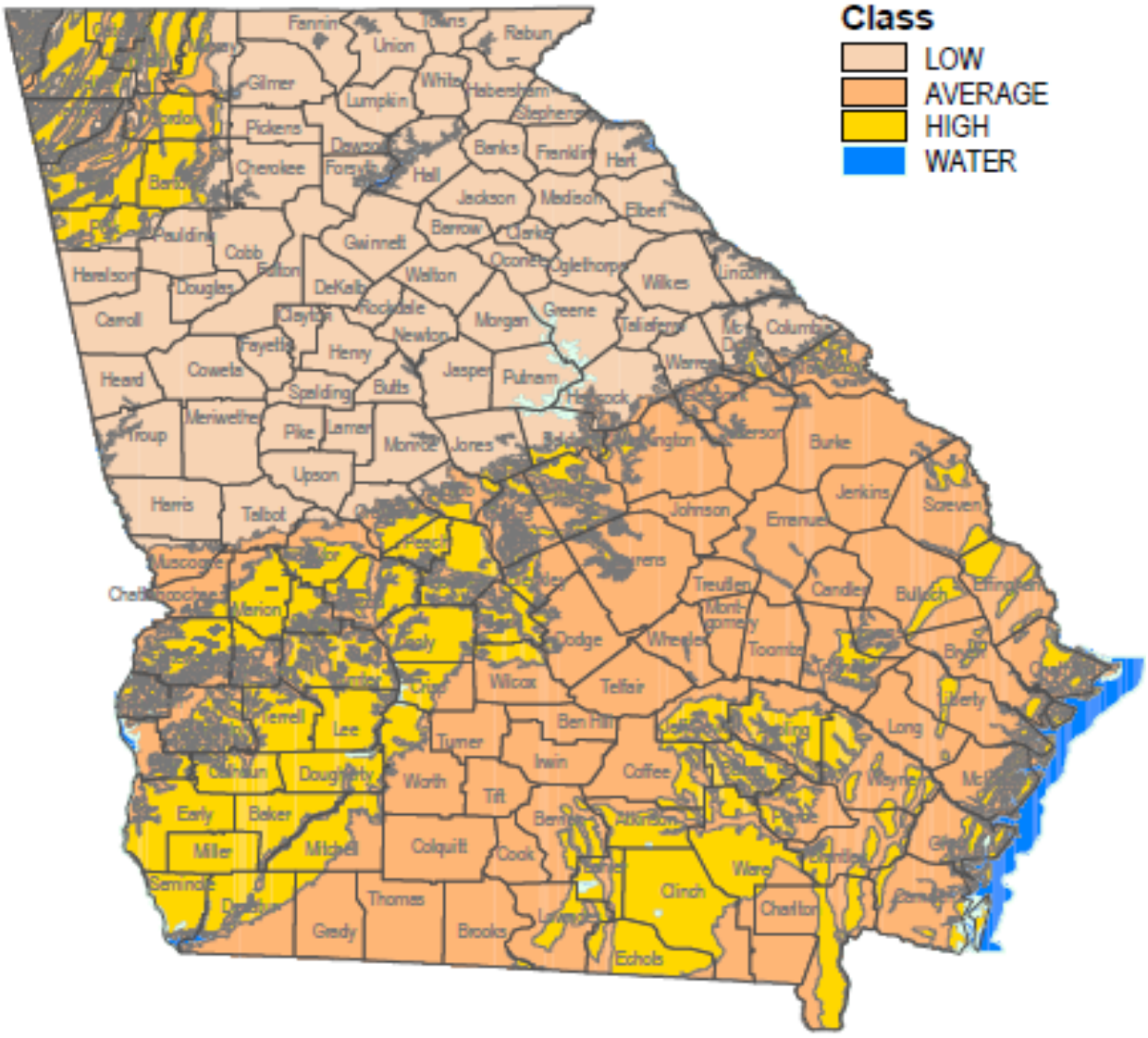


Attachment I  Cooleewahee Creek Land Cover



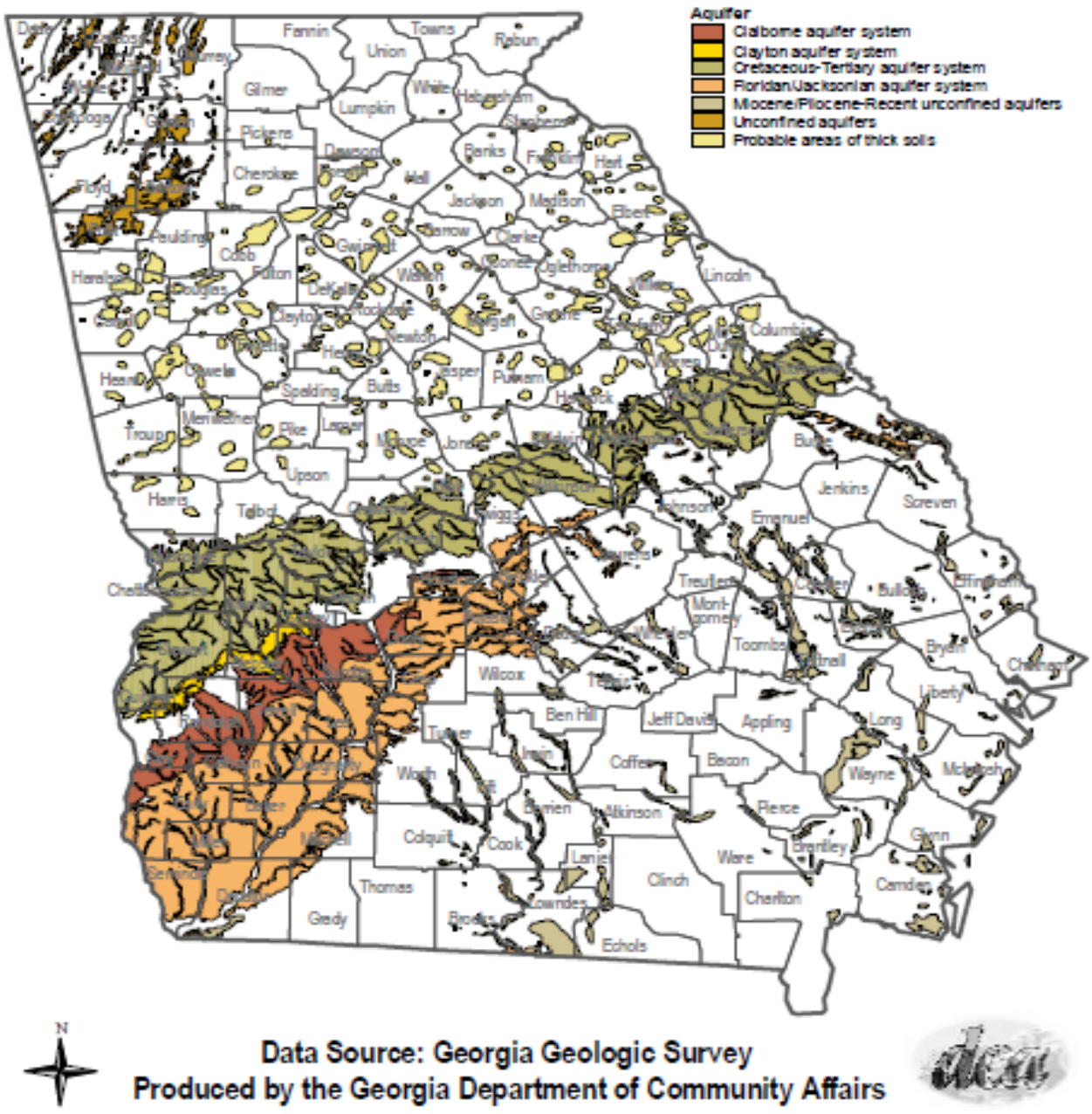

Attachment J Groundwater Map

# Groundwater Pollution Susceptibility



Attachmnt K Ground Water Recharge Areas

# Georgia's Groundwater Recharge Areas



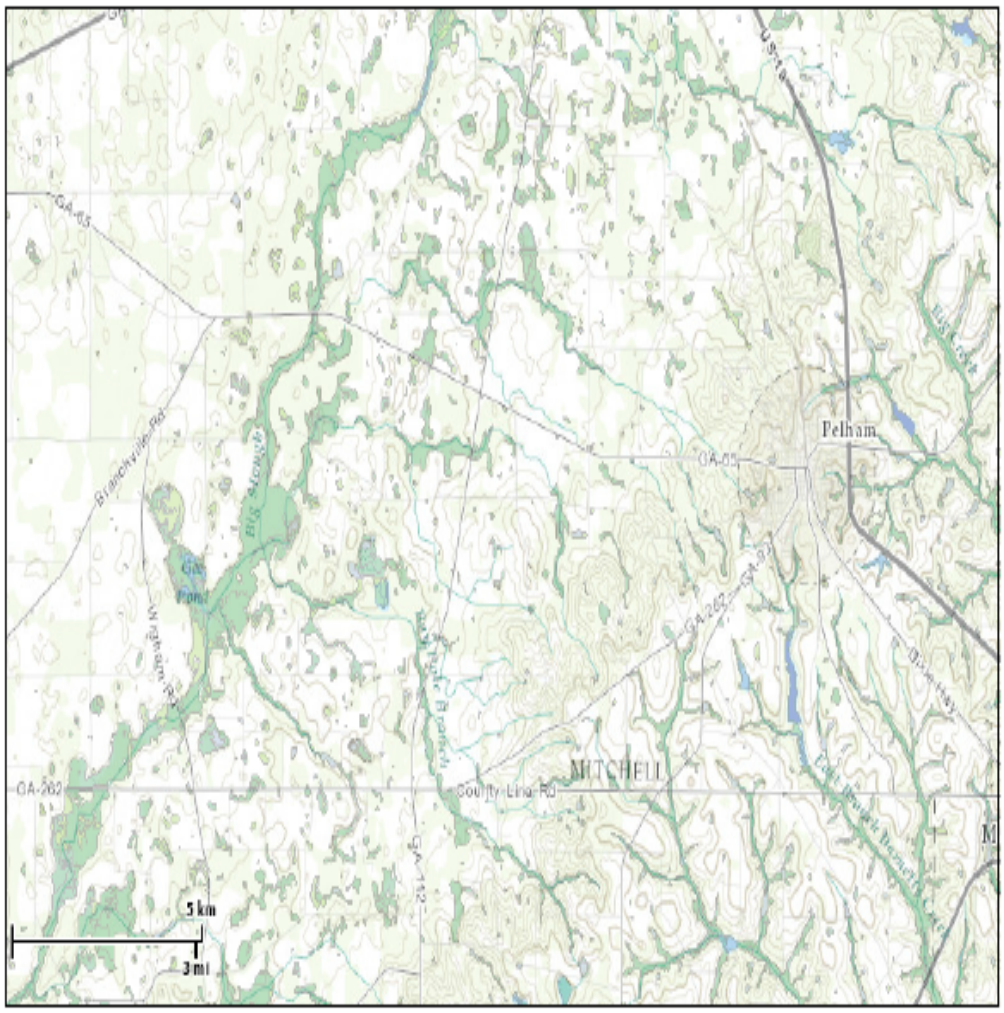
Attachment L  Big Slough Wetland Maps

U.S. Fish and Wildlife Service

National Wetlands Inventor

Mitchell County
Wetland Map

Sep 5, 2013




## Wetlands

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

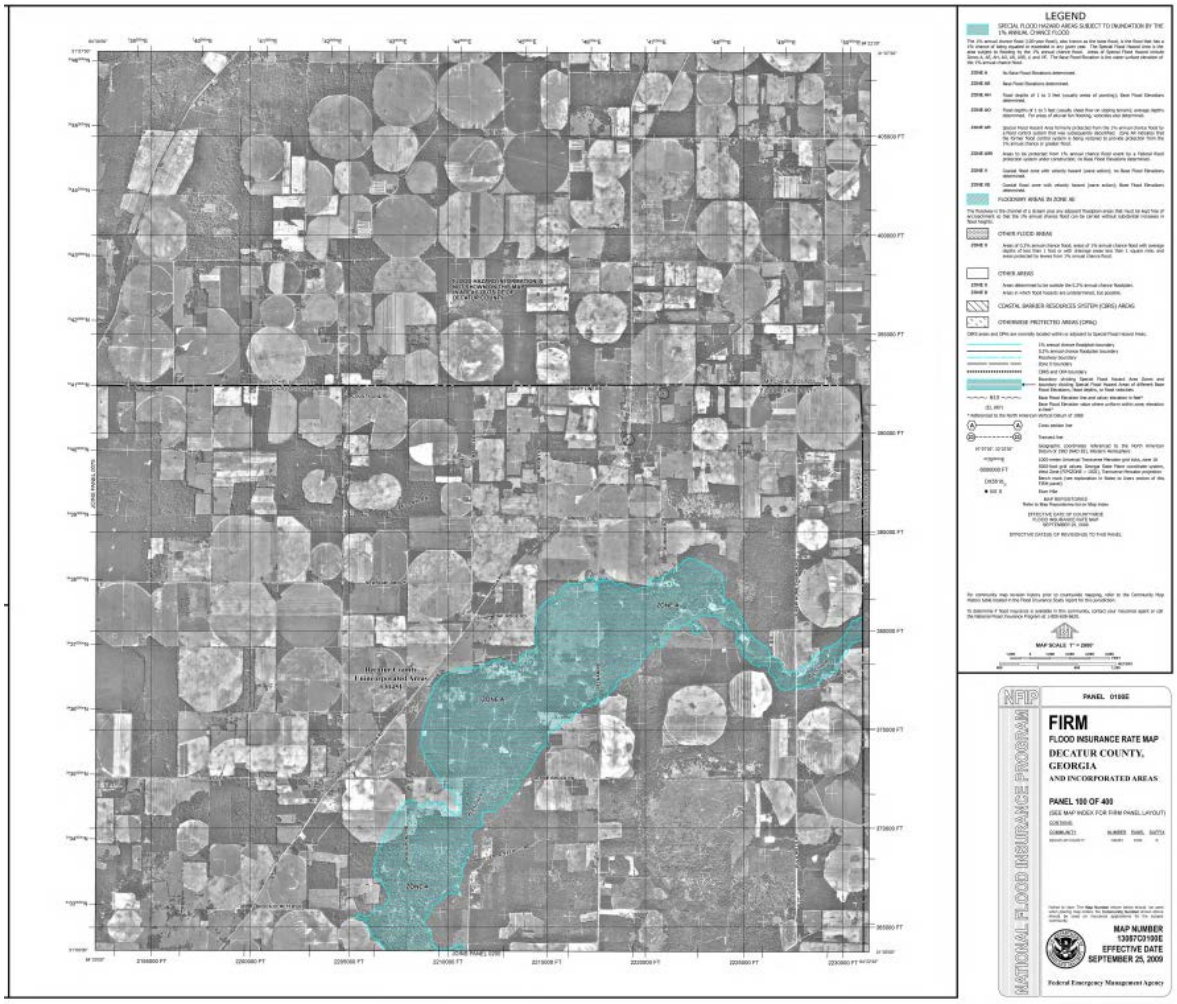
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

**User Remarks:**

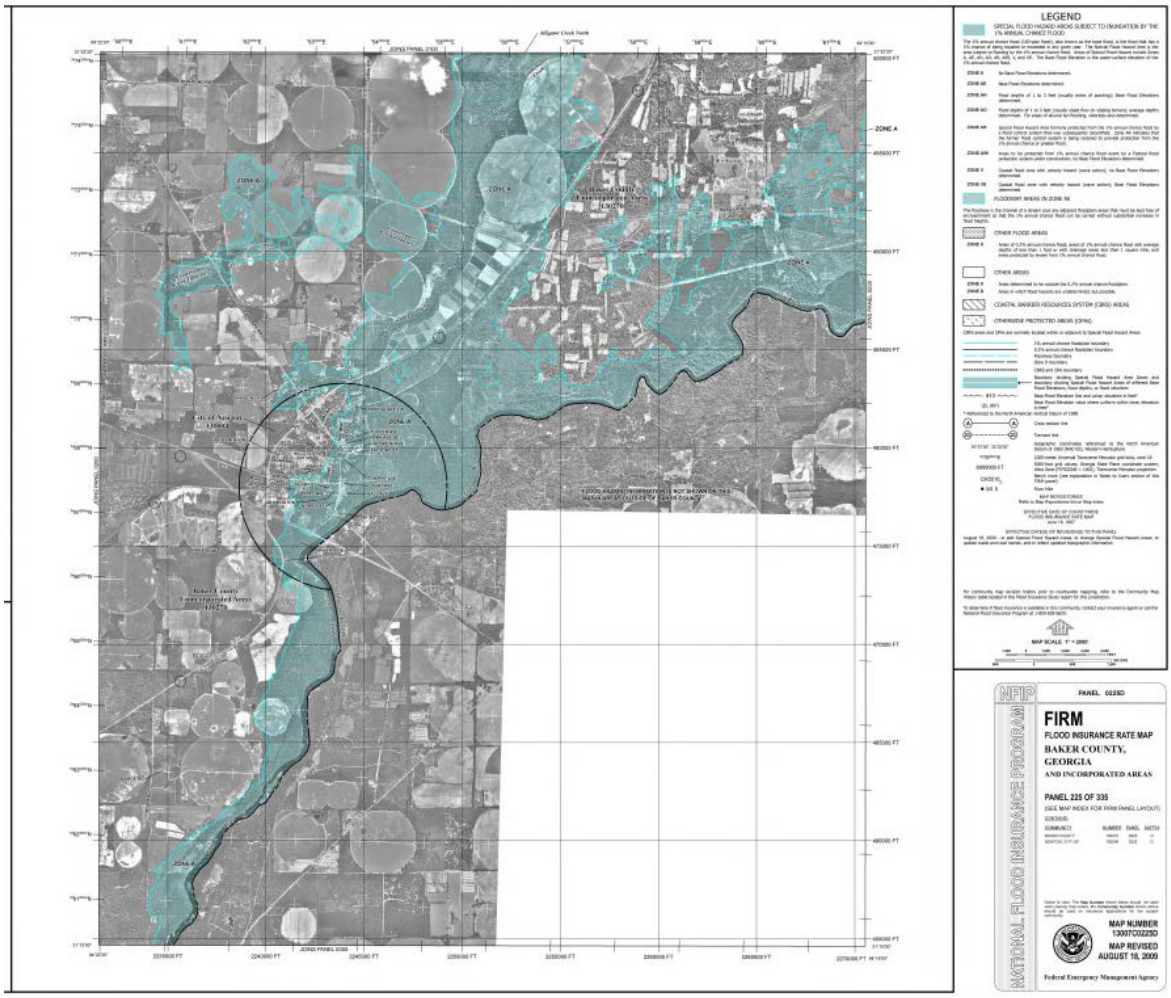
Big Slough

Attachment M  Cooleewahee Creek Wetland Map

Attachment N  FEMA Map Big Slough

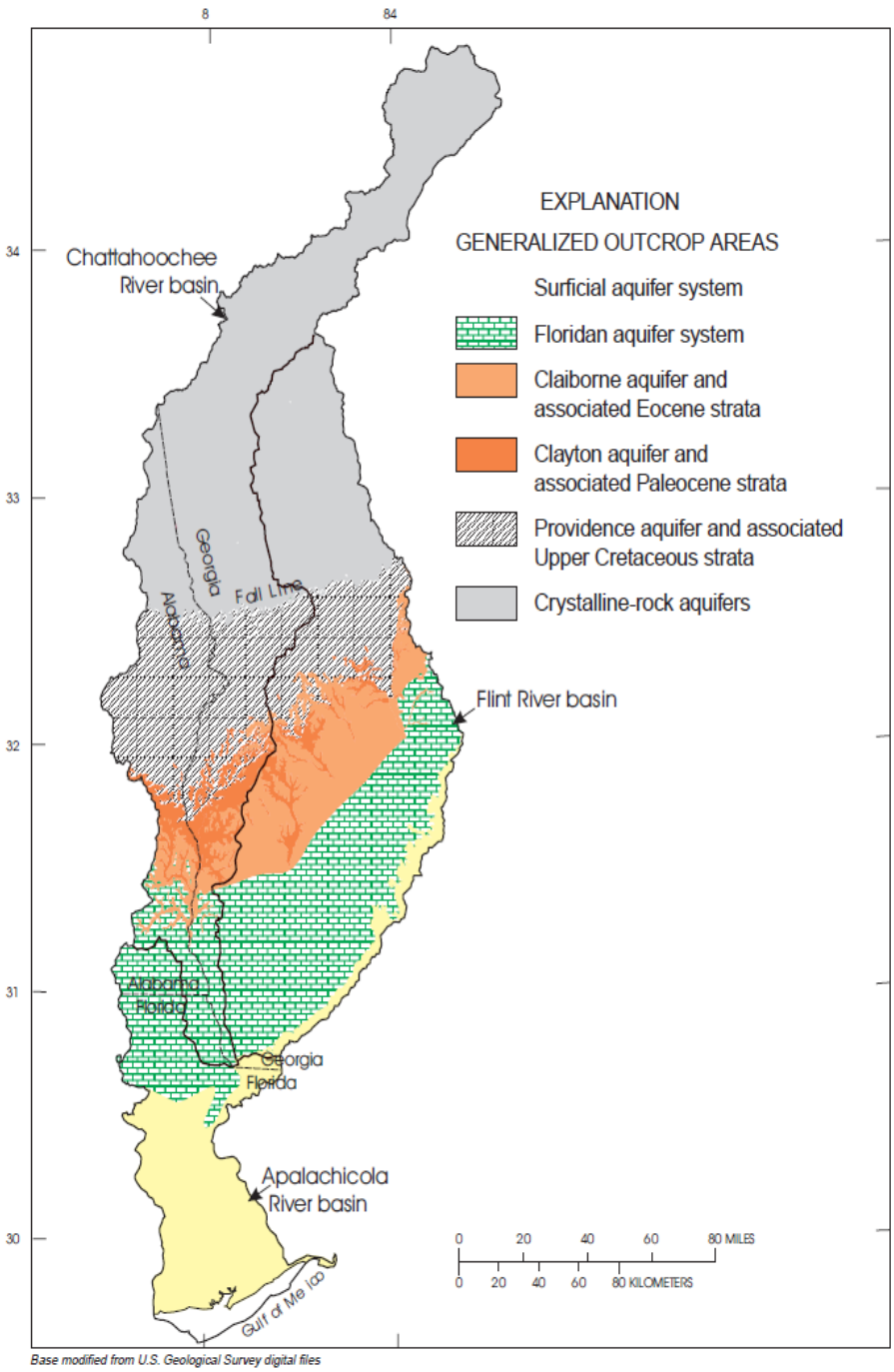


Attachment O FEMA Map Cooleewahee



Attachment P Flint River Basin Outcrop Area






Base modified from U.S. Geological Survey digital files

**Figure 2-12. Hydrogeologic Units Underlying the Apalachicola-Chattahoochee-Flint River Basin (modified from Couch et al., 1996)**

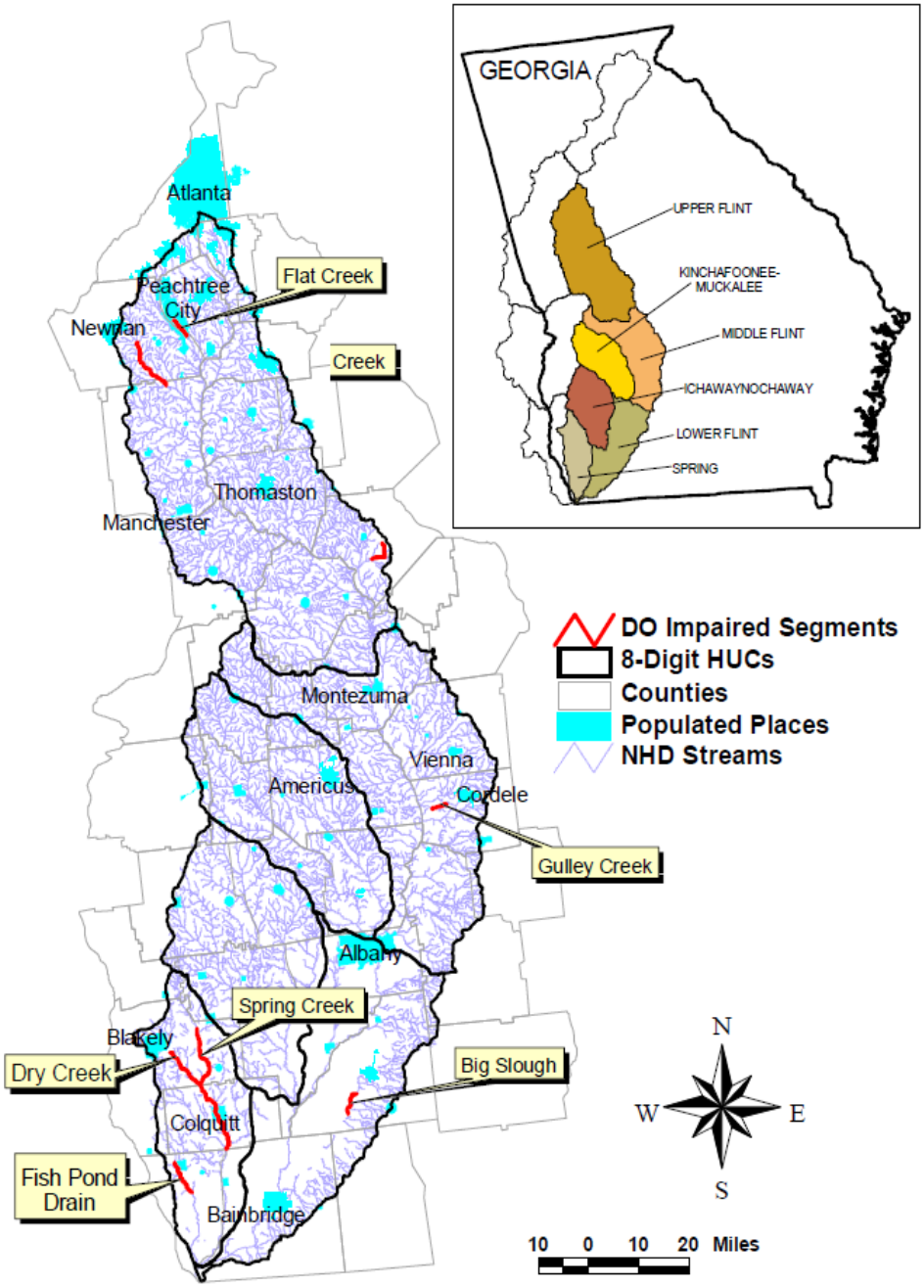



Figure 1-2 303(d) Listed Segments for Dissolved Oxygen in the Flint River Basin

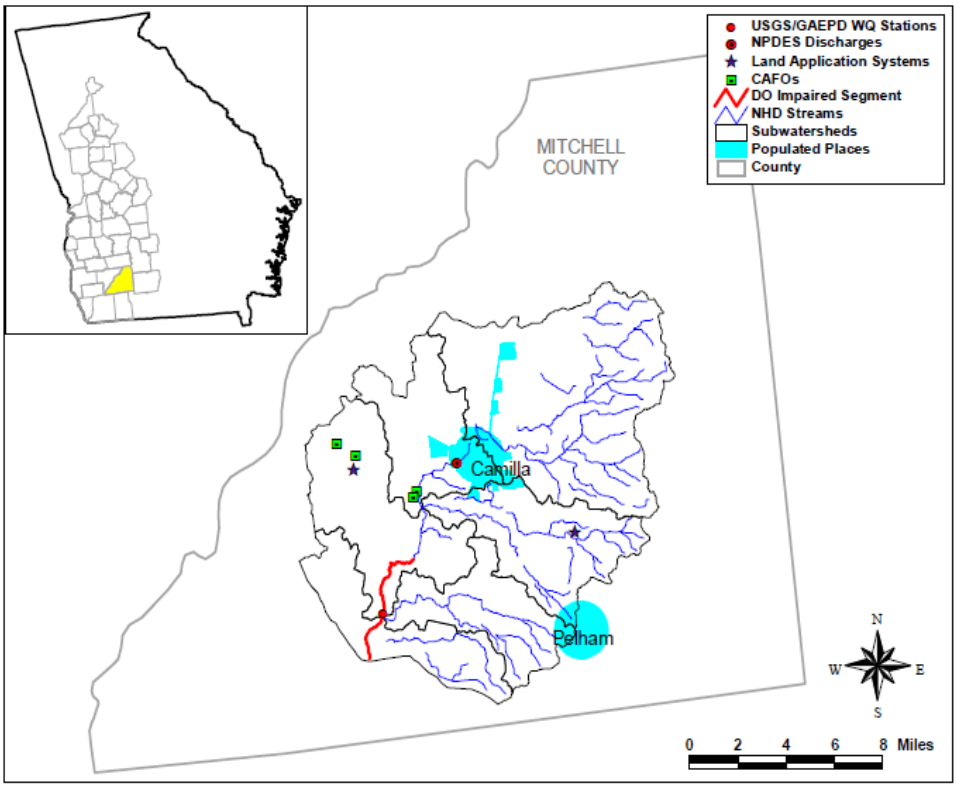



Figure A-1 Location of Point Sources and Data Stations in the Contributing Big Slough Watershed

Table A-1 Summary of Source Assessment for the Big Slough Watershed

Impaired Segment: Big Slough
Miles of Impairment: 4 miles
8-Digit HUC: 03130008
12-Digit HUC: 031300080505, 031300080506B
County: Mitchell
Cities: near Pelham
Reason for Listing: 2000 WQ Data
USGS/GAEPD WQ Station ID: River Basin 95 and 11107501
DO Violations (Year of data): 1 of 5 (2000)
USGS Station ID: near 02353400 (Pachitla Creek near Edison, GA), DA = 188 sq. miles
NPDES Facilities: GA0020362 - Camilla WPCP
Landfills: 101-004D(SL) - Mitchell County SR 3A
101-002D(SL) - Mitchell County S1643
CAFOs: Holton Floor
Pinecliff Farm
Roger's Floor
Peacot Swine - North
Peacot Swine - South
Land Applications: GAU020088 - Camilla LAS
GAU030740 - Mitchell Co Board of Commissioners
Water Withdrawals: none
Area of Watershed (sq. miles): 25
Area of Watershed (acres): 16,004

| Land Use | sq. meters | acres | % of Total |
|---|---|---|---|
| Open Water | 765,000 | 189.04 | 0.17% |
| Low Intensity Residential | 3,724,200 | 920.27 | 0.85% |
| High Intensity Residential | 1,041,300 | 257.31 | 0.24% |
| High Intensity Commercial/Industrial/Transportation | 1,643,400 | 406.09 | 0.37% |
| Bare Rock/Sand/Clay | 226,800 | 56.04 | 0.05% |
| Quarries/Strip Mines/Gravel Pits | 6,300 | 1.56 | 0.00% |
| Transitional | 17,604,900 | 4,350.27 | 4.01% |
| Deciduous Forest | 17,309,700 | 4,277.32 | 3.95% |
| Evergreen Forest | 70,706,700 | 17,472.01 | 16.12% |
| Mixed Forest | 19,593,900 | 4,841.76 | 4.47% |
| Pasture/Hay | 64,765,800 | 16,003.98 | 14.76% |
| Row Crops | 213,620,400 | 52,786.75 | 48.70% |
| Other Grasses (Urban/recreational; e.g. parks, lawns) | 1,103,400 | 272.66 | 0.25% |
| Woody Wetlands | 22,825,800 | 5,640.38 | 5.20% |
| Emergent Herbaceous Wetlands | 3,743,100 | 924.94 | 0.85% |
| Totals = | 438,680,700 | 108,400.36 | 100% |



Table B-1 2000 Water Quality Data Collected in Big Slough

| Date | Time | $BOD_5$ (mg/L) | DO (mg/L) | % Saturation | Gage Height (feet) | $NH_3$ (mg/L) | $NO_2$-$NO_3$ (mg/L) | pH | TP (mg/L) | Water Temp (deg C) | TOC (mg/L) | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02/17/00 | 9:05 | 2.2 | 4.3 | 42 | 3.59 | 0.08 | 0.37 | 6.5 | 0.39 | 15.4 | 13 | 59 |
| 03/30/00 | 8:25 | 2 | 4.24 | 46 | 1.01 | 0.05 | <0.02 | 6.93 | 0.39 | 19.1 | 17 | 9.9 |
| 07/27/00 | 7:45 | | 1.76 | 21 | 0.98 | | | 6.35 | | 24.9 | | |
| 08/03/00 | 8:00 | | 4.5 | 53 | 0.47 | | | 6.15 | | 23.9 | | |
| 12/07/00 | 9:15 | 3.2 | 6.7 | 53 | 0.15 | 0.03 | <0.02 | 6.58 | 0.09 | 6 | 6.7 | 8.2 |

References

USFWS 2004 Threatened and Endangered Species Mitchell, Grady, Decatur, Doughtery, Baker Counties

Georgia Department of Natural Resources Rare Species Mitchell, Grady, Decatur, Doughtery, Baker Counties

USDA 2009 and 2010 Farmers Bureau Crop Report

USDA Soil Report Mitchell, Grady, Decatur, Doughtery, Baker Counties

2001 DNR Georgia Ecoregion Descriptions

GEPD Watershed Protection Plan Development Guidebook

National Oceanic and Atmospheric Administration (NOAA) Climate Data