# *Wacissa River and Wacissa Spring Group Basin Management Action Plan*

**Division of Environmental Assessment and Restoration**
**Water Quality Restoration Program**
**Florida Department of Environmental Protection**

with participation from the
**Wacissa River Basin Stakeholders**

**June 2018**

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# Acknowledgments

The Florida Department of Environmental Protection adopted the *Wacissa River and Wacissa Spring Group Basin Management Action Plan* by Secretarial Order as part of its statewide watershed management approach to restore and protect Florida's water quality. The plan was developed in coordination with stakeholders, identified below, with participation from affected local, regional, and state governmental interests; elected officials and citizens; and private interests.

**Florida Department of Environmental Protection**
Noah Valenstein, Secretary

**Table A-1. Wacissa River and Wacissa Springs Group Basin stakeholders**

| Type of Entity | Name |
|---|---|
| **Responsible Stakeholders** | Agricultural producers<br><br>Counties:<br>Jefferson<br>Madison<br><br>Cities:<br>Monticello<br><br>Florida Department of Transportation |
| **Responsible Agencies** | Florida Department of Agriculture and Consumer Services<br>Florida Department of Environmental Protection<br>Florida Department of Health<br>Florida Fish and Wildlife Conservation Commission<br>Northwest Florida Water Management District<br>Suwannee River Water Management District |
| **Other Interested Stakeholders** | Homeowners/Citizens<br>Florida Farm Bureau Federation<br>Florida Onsite Wastewater Association<br>University of Florida Institute of Food and Agricultural Sciences |

**Appendix A** contains links to important sources referenced in this document. For additional information on the watershed management approach for the Wacissa River and Wacissa Spring Group, contact:

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# List of Acronyms and Abbreviations

| | |
|---|---|
| ac | Acre |
| AWT | Advanced Wastewater Treatment |
| ATU | Aerobic Treatment Unit |
| BAF | Biochemical Attenuation Factor |
| BMAP | Basin Management Action Plan |
| BMPs | Best Management Practices |
| CASTNET | Clean Air Status and Trends Network |
| CMAQ | Community Multiscale Air Quality |
| CRF | Controlled Release Fertilizer |
| DEP | Florida Department of Environmental Protection |
| DMR | Discharge Monthly Report |
| DO | Dissolved Oxygen |
| EPA | Environmental Protection Agency (U.S.) |
| F.A.C. | Florida Administrative Code |
| F.A.R. | Florida Administrative Register |
| FDACS | Florida Department of Agriculture and Consumer Services |
| FDOH | Florida Department of Health |
| FF | Farm Fertilizer |
| FGS | Florida Geological Survey |
| FLU | Future Land Use |
| FLUCCS | Florida Land Use Cover and Forms Classification System |
| FOWA | Florida Onsite Wastewater Association |
| FSAID | Florida Statewide Agricultural Irrigation Demand |
| F.S. | Florida Statutes |
| FWC | Florida Fish and Wildlife Commission |
| FWMI | Florida Water Management Inventory |
| FYN | Florida Yards and Neighborhoods |
| GIS | Geographic Information System |
| gpd | Gallons Per Day |
| HA | Habitat Assessment |
| IA | Implementation Assurance |
| IV | Implementation Verification |
| in/yr | Inch Per Year |
| lb-N/yr | Pounds of Nitrogen Per Year |
| LVS | Linear Vegetation Survey |
| LW | Livestock Waste |
| MFL | Minimum Flow and Level |
| mgd | Million Gallons Per Day |
| mg/L | Milligrams Per Liter |
| N | Nitrogen |
| NA | Not Applicable |

| | |
|---|---|
| NADP | National Atmospheric Deposition Program |
| NELAC | National Environmental Accreditation Conference |
| NELAP | National Environmental Accreditation Program |
| NNC | Numeric Nutrient Criteria |
| NOI | Notice of Intent |
| NSF | NSF International (formerly National Sanitation Foundation) |
| NSILT | Nitrogen Source Inventory Loading Tool |
| NTN | National Trends Network |
| NWFWMD | Northwest Florida Water Management District |
| OAWP | Office of Agricultural Water Policy (FDACS) |
| OFS | Outstanding Florida Spring |
| OSTDS | Onsite Sewage Treatment and Disposal System |
| PBTS | Performance-based Treatment System |
| PFA | Priority Focus Area |
| PSA | Public Service Announcement |
| QA/QC | Quality Assurance/Quality Control |
| RIB | Rapid Infiltration Basin |
| RPS | Rapid Periphyton Survey |
| SBIO | DEP Statewide Biological Database |
| SCI | Stream Condition Index |
| SOP | Standard Operating Procedure |
| SRWMD | Suwannee River Water Management District |
| SWFWMD | Southwest Florida Water Management District |
| STF | Sports Turfgrass Fertilizer |
| STORET | Florida Storage and Retrieval System |
| SWIM | Surface Water Improvement and Management |
| TDEP | Total Atmospheric Deposition Model |
| TMDL | Total Maximum Daily Load |
| TN | Total Nitrogen |
| TP | Total Phosphorus |
| TSS | Total Suspended Solids |
| UFA | Upper Floridan Aquifer |
| UF–IFAS | University of Florida Institute of Food and Agricultural Sciences |
| USDA | U.S. Department of Agriculture |
| USGS | U.S. Geological Survey |
| UTF | Urban Turfgrass Fertilizer |
| WAFR | Wastewater Facility Regulation (Database) |
| WBID | Waterbody Identification (Number) |
| WIN | Florida Watershed Information Network (Database) |
| WMD | Water Management District |
| WWTF | Wastewater Treatment Facility |

# Executive Summary

## Wacissa River Basin

The Florida Springs and Aquifer Protection Act (Chapter 373, Part VIII, Florida Statutes [F.S.]), provides for the protection and restoration of Outstanding Florida Springs (OFS), which comprise 24 first magnitude springs, 6 additional named springs, and their associated spring runs. The Florida Department of Environmental Protection (DEP) has assessed water quality in each OFS and determined that 24 of the 30 OFS are impaired for the nitrate form of nitrogen. One spring in the Wacissa River Basin is an impaired OFS: Wacissa Spring Group.

The Wacissa River and Wacissa Spring Group Basin Management Action Plan (BMAP) area (**Figure ES-1)** comprises about 850,000 acres in Madison and Jefferson counties.

## Wacissa Spring Group Priority Focus Areas (PFAs)

This BMAP delineates one PFA in the BMAP area: the Wacissa PFA, which covers 217,188 acres in Jefferson County.

## Nitrogen Source Identification, Required Reductions, and Options to Achieve Reductions

DEP set nitrate water quality restoration targets of 0.20 milligrams per liter (mg/L) for the Wacissa River and 0.24 mg/L for the Wacissa Springs Group.

In the Wacissa BMAP area, farm fertilizer (FF) represents 60 %, livestock waste (LW) represents 12 %, and dairy waste 5 % of the total nitrogen loading to groundwater, based on the results of the Nitrogen Source Inventory Loading Tool (NSILT) developed by DEP.

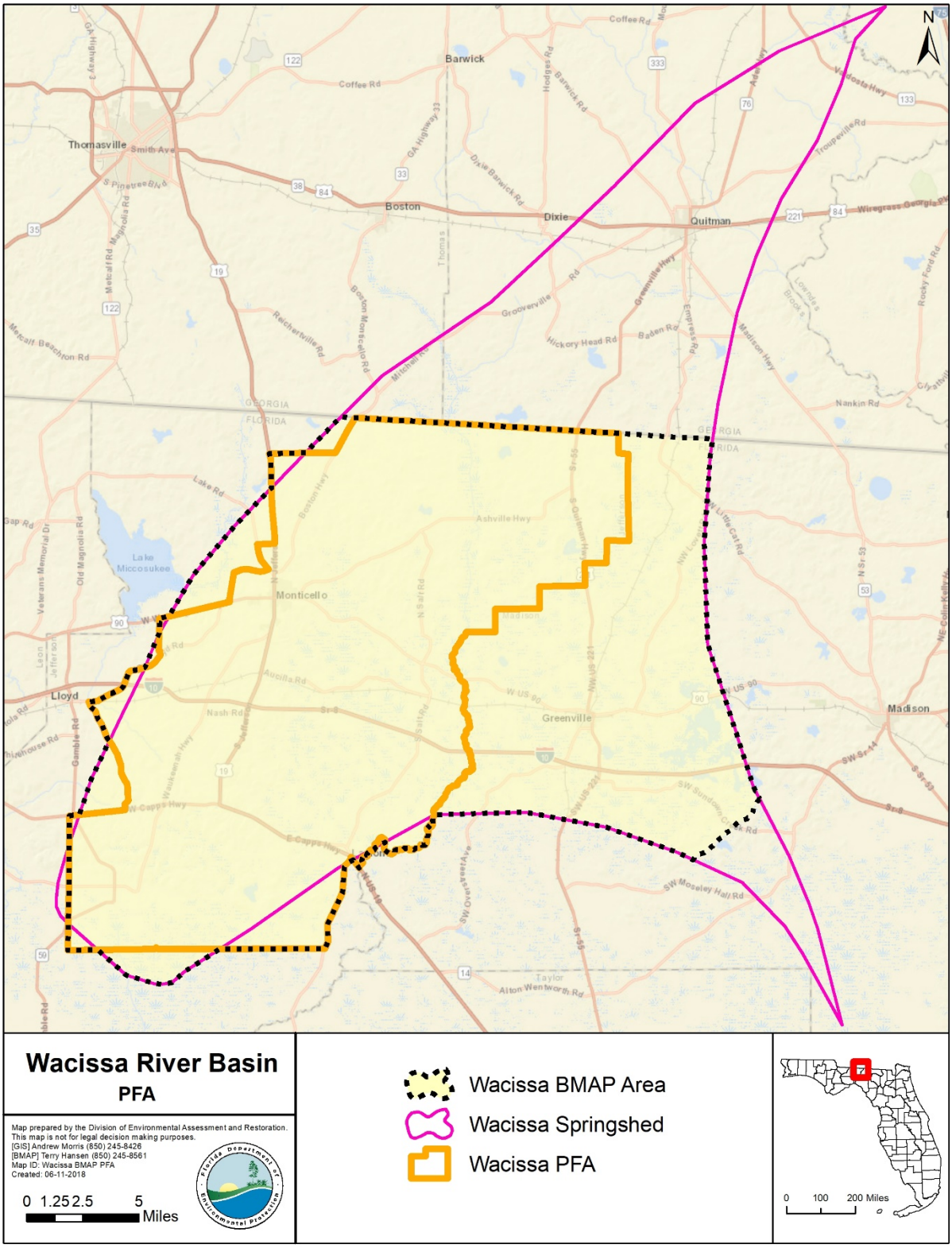


**Figure ES-1. Wacissa River BMAP and PFA boundaries**

The total load reduction required to meet the total maximum daily loads (TMDLs) at the spring vents is 78,469 pounds of nitrogen per year (lb-N/yr). To measure progress towards achieving the necessary load reduction, DEP has established the following milestones:

- Initial reduction of 23,540 lb-N/yr (30 %) within 5 years.
- An additional 39,234 lb-N/yr (50 %) within 10 years.
- The remaining 15,694 lb-N/yr (20 %) within 15 years.
- For a total of 78,469 lb-N/yr within 20 years.

The policies and submitted projects included within this BMAP are estimated to achieve a reduction of 99,566 to 236,845 lb-N/yr to groundwater. While reductions to groundwater will benefit the spring, it is uncertain to know with precision how those reductions will impact the necessary reductions at the spring. DEP will continue to monitor the spring to evaluate those reductions as projects are implemented against the required load reductions above. The BMAP is designed to achieve 80 % of the load reductions needed for the spring vent within 10 years of adoption and 100 % within 15 years. Projects and strategies are designed to achieve nitrogen reductions in the Wacissa River and Wacissa Spring Group but are expected to provide benefits to all springs vents within the springshed/contributing area. DEP will evaluate progress towards these milestones and will report to the Governor and Florida Legislature. DEP will adjust management strategies to ensure the target concentrations are achieved.

For the list of projects to improve water quality, see **Appendix B**. Possible load reductions include projects resulting from policies for owner-implemented best management practices (BMPs) for FF, dairy waste, and other LW; wastewater treatment facility (WWTF) upgrades; policies to reduce urban turfgrass fertilizer (UTF) application; and voluntary onsite sewage treatment and disposal system (OSTDS) enhancements or conversions to sewer.

Successful BMAP implementation requires commitment, dedicated state funding, and follow-up. Stakeholders have expressed their intention to carry out the plan, monitor its effects, and continue to coordinate within and across jurisdictions to achieve nutrient reduction goals. As the TMDLs must be achieved within 20 years, DEP, water management districts (WMDs), Florida Department of Health (FDOH), and Florida Department of Agriculture and Consumer Services (FDACS) will implement management strategies using the annual Legacy Florida appropriation from the legislature of at least $50 million to reduce nitrogen in impaired OFS. DEP, working with the coordinating agencies, will continue to invest existing funds and explore other opportunities and potential funding sources for springs restoration efforts.

## Restoration Approaches

Load reduction to the aquifer is needed to achieve the load reductions requirements at the spring vent. To ensure that load reductions are achieved at the spring vent, the following restorations

actions are being established. These actions are designed to reduce the amount of nutrients to the aquifer, which will reduce the load at the vent and ultimately achieve the necessary reductions. Monitoring of the vent during implementation will be implemented to monitor progress.

- **New OSTDS** – Upon BMAP adoption, the OSTDS remediation plan prohibits new systems on lots of less than 1 acre within the PFAs, unless the system includes enhanced treatment of nitrogen as defined by the OSTDS remediation plan, or unless the OSTDS permit applicant demonstrates that sewer connections will be available within 5 years. The OSTDS remediation plan is incorporated as **Appendix D**.

- **WWTFs** − The effluent standards listed in **Table ES-1** will apply to all new and existing WWTFs in the BMAP (inside and outside the PFA).

**Table ES-1. WWTF effluent standards**

gpd = Gallons per day

| 95% of the Permitted Capacity (gallons per day [gpd]) | Nitrogen Concentration Limits for Rapid Infiltration Basins (RIBs) and Absorption Fields (mg/L) | Nitrogen Concentration Limits for All Other Land Disposal Methods, Including Reuse (mg/L) |
|---|---|---|
| **Greater than 100,000** | 3 | 3 |
| **20,000 to 100,000** | 3 | 6 |
| **Less than 20,000** | 6 | 6 |

- **UTF** – UTF sources can receive up to 6 % credit for the DEP-approved suite of public education and source control ordinances. Entities have the option to collect and provide monitoring data to quantify reduction credits for additional measures.

- **Sports Turfgrass Fertilizer (STF) –** STF sources include golf courses and other sporting facilities. Golf courses can receive up to 10 % credit for implementing the Golf Course BMP Manual. Other sports fields can receive up to 6 % credit for managing their fertilizer applications to minimize transport to groundwater.

- **FF** – All FF sources are required to implement BMPs or perform monitoring to demonstrate compliance with the TMDL. A 15 % reduction to groundwater is estimated for owner-implemented BMPs. Additional credits could be achieved through better documentation of reductions achieved through BMP implementation or the implementation of additional agricultural projects and practices, such as precision irrigation, soil moisture probes, controlled release fertilizer, and cover crops.

- **LW** – All LW sources are required to implement BMPs or perform monitoring. A 10 % reduction to groundwater is estimated for owner-implemented BMPs. Additional credits could be achieved through better documentation of reductions achieved through BMP implementation.

- **Dairies –** Permitted dairies with an approved nutrient management plan receive a 15 % reduction to groundwater for owner-implemented BMPs. Additional credits could be achieved through better documentation of reductions achieved through BMP implementation.

# Section 1: Background

## 1.1 Legislation

Chapter 373, Part VIII, Florida Statutes (F.S.), the Florida Springs and Aquifer Protection Act, provides for the protection and restoration of Outstanding Florida Springs (OFS), which comprise 24 first magnitude springs, 6 additional named springs, and their associated spring runs. The Florida Department of Environmental Protection (DEP) has assessed water quality in each OFS and determined that 24 of the 30 OFS are impaired for the nitrate form of nitrogen. One spring in the Wacissa River Basin is an impaired OFS: the Wacissa Spring Group. Development of the basin management action plan (BMAP) to meet the new requirements of the Florida Springs and Aquifer Protection Act for the Wacissa River and Wacissa Spring Group was initiated in 2018.

## 1.2 Water Quality Standards and Total Maximum Daily Loads (TMDLs)

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality criteria. The Wacissa River and Wacissa Spring Group impaired springs addressed in this BMAP are Class III waterbodies with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. These waters are impaired by nitrate nitrogen, which in excess has been demonstrated to adversely affect flora or fauna through the excessive growth of algae. Excessive algal growth results in ecological imbalances in the springs and river and can produce human health problems, foul beaches, inhibit navigation, and reduce the aesthetic value of the resources.

DEP adopted nutrient TMDLs for the Wacissa River and Wacissa Spring Group in 2017 (**Table 1**). The TMDLs established a monthly average nitrate target of 0.20 milligrams per liter (mg/L) of nitrate to be protective of the aquatic flora or fauna in the Wacissa River and a nitrate target of 0.24 mg/L for the Wacissa Spring Group. The period of record for water quality data evaluated for the TMDLs was 2005 through 2015.

**Table 1** lists the nitrate (as nitrogen) restoration targets. The TMDL targets are listed as monthly averages instead of daily values because changes in aquatic vegetation biomass do not respond instantaneously to changes in nutrient concentrations. A yearly average was not appropriate because algal growth responds to seasonal changes. The percent reductions are the load reductions needed to attain the numeric nutrient criteria (NNC) through the implementation of this BMAP.

**Table 1. Restoration targets for the impaired river and OFS**

| Waterbody or Spring Name | Waterbody Identification (WBID) Number | Parameter | TMDL (mg/L) |
|---|---|---|---|
| **Wacissa River** | 3424 | Nitrate, monthly average | 0.20 |

| Waterbody or Spring Name | Waterbody Identification (WBID) Number | Parameter | TMDL (mg/L) |
|---|---|---|---|
| **Wacissa Spring Group** | 3424Z | Nitrate, monthly average | 0.24 |

## 1.3 BMAP Requirements

Section 403.067(7), F.S., provides DEP the statutory authority for the BMAP Program. A BMAP is a comprehensive set of strategies to achieve the required pollutant load reductions. In addition to specifying BMAP statutory authority, the Florida Springs and Aquifer Protection Act (Part VIII of Chapter 373, F.S.) describes additional requirements for the 30 OFS.

## 1.4 BMAP Area

The Wacissa River and Wacissa Spring Group BMAP area (**Figure 1)** comprises about 850,000 acres in Madison and Jefferson counties.

The BMAP area contains one impaired OFS: the Wacissa Spring Group. This area includes the surface water basin as well as the groundwater contributing areas for the springs (or springsheds). The springshed for the OFS was delineated or reviewed by Northwest Florida Water Management District (NWFWMD) and the Suwannee River Water Management District (SRWMD) with input from the Florida Geological Survey (FGS). A springshed is the area of land that contributes water to a spring or group of springs, mainly via groundwater flow.

## 1.5 Priority Focus Area (PFA)

In compliance with the Florida Springs and Aquifer Protection Act, this BMAP delineates one PFA in the Wacissa River BMAP area: the Wacissa PFA. A PFA is defined as the area(s) of a basin where the Floridan aquifer is generally most vulnerable to pollutant inputs and where there is a known connectivity between groundwater pathways and an OFS. The PFA provides a guide for focusing restoration strategies where science suggests these efforts will most benefit the springs. The document that describes the delineation process for the PFA is posted on the DEP website. The link to the PFA document is provided in **Appendix C.**

### *1.5.1 Description*

Nitrogen sources are more likely to influence groundwater quality under certain conditions. For example, where soils are sandy and well drained, less nitrogen is converted to gas and released into the atmosphere or taken up by plants, compared with other soil types. Therefore, local soils play a role in how much nitrogen travels from the land surface to groundwater in a specific springshed. Also, the underlying geologic material influences the vulnerability of the underlying aquifers and the rate of lateral movement within the Floridan aquifer toward the springs and river. These conditions, and others, were considered in the delineation of the Wacissa PFA (see **Appendix C**).

Following BMAP adoption, DEP will ensure that the geographic information system (GIS) files associated with the PFA boundary are available to the public on the DEP Map Direct webpage.

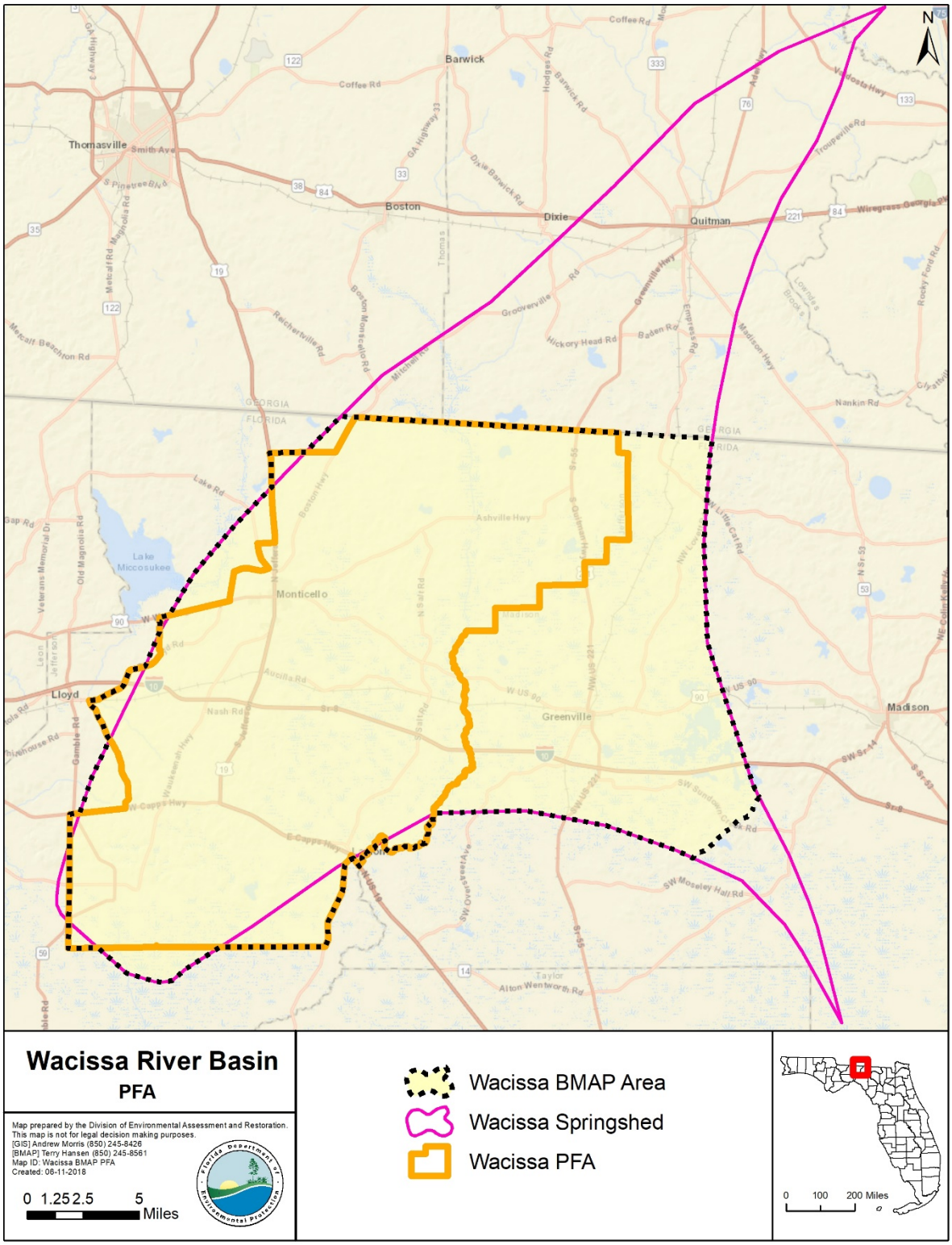


**Figure 1. Wacissa River and Wacissa Spring Group BMAP area and PFA boundary**

### *1.5.2 Additional Requirements*

In accordance with Section 373.811, F.S., the following activities are prohibited in each PFA in the Wacissa River BMAP:

- New domestic wastewater disposal facilities, including rapid infiltration basins (RIBs), with permitted capacities of 100,000 gpd or more, except for those facilities that meet an advanced wastewater treatment (AWT) standard of no more than 3 mg/L total nitrogen (TN) on an annual permitted basis.

- New onsite sewage treatment and disposal systems (OSTDS or septic systems, the terms are used interchangeably through this document) on lots of less than one acre inside the PFAs unless additional nitrogen treatment is provided, as specified in the OSTDS remediation plan (see **Appendix D** for details).

- New facilities for the disposal of hazardous waste.

- The land application of Class A or Class B domestic wastewater biosolids not in accordance with a DEP-approved nutrient management plan establishing the rate at which all biosolids, soil amendments, and sources of nutrients at the land application site can be applied to the land for crop production, while minimizing the amount of pollutants and nutrients discharged to groundwater or waters of the state.

- New agricultural operations that do not implement best management practices (BMPs), measures necessary to achieve pollution reduction levels established by DEP, or groundwater monitoring plans approved by a water management district (WMD) or DEP.

#### 1.5.2.1 Biosolids and Septage Application Practices

In the PFA, the aquifer contributing to the springs is highly vulnerable to contamination by nitrogen sources and soils have a high to moderate tendency to leach applied nitrogen. DEP previously documented elevated nitrate concentrations in groundwater beneath septage application zones in spring areas. To assure that nitrogen losses to groundwater are minimized from permitted application of biosolids and septage in the PFA, the following requirements apply to newly-permitted application sites and existing application sites upon permit renewal.

All permitted biosolids application sites that are agricultural operations must be enrolled in the FDACS BMP Program or be within an agricultural operation enrolled in the FDACS BMP Program for the applicable crop type. Implementation of applicable BMPs will be verified by FDACS in accordance with Chapter 5M-1, Florida Administrative Code (F.A.C.). Permitted biosolids application sites that are new agricultural operations must also comply with Subsection 373.811(5), F.S. Biosolids application sites must be certified as viable agricultural operations by an acknowledged agricultural professional such as an agricultural consultant or agricultural extension agent. Effective nutrient management practices must be ongoing at the application

zones in the permit. Plant uptake and harvesting are vital components of the nutrient management plan to remove nitrogen and prevent it from leaching to groundwater. If DEP determines that the site is not a viable agricultural site implementing a nutrient management plan, corrective action will be required.

Groundwater monitoring for nitrate is required for all biosolids and septage land application sites in the PFA to assure compliance with nutrient management objectives in this BMAP. However, groundwater monitoring is not required if the site nutrient management plan limits biosolids application rates of TN with no adjustment for available nitrogen normally allowed by subsections 62-640.500(5) and (6), F.A.C. (e.g. for a recommended fertilizer rate of 160 pounds of nitrogen per acre, only 160 pounds of TN per acre shall be applied). For septage application, groundwater monitoring is not required if the site nutrient management plan limits application rates to 30,000 gallons per acre for sites accepting mixtures of septage and grease (food establishment sludge) or to 40,000 gallons per acre for sites accepting septage without grease. The permit renewal application will include a trend analysis for nitrate in groundwater monitoring wells during the previous permit cycle, and an evaluation of the potential for the facility to cause or contribute to exceedance of the TMDL.

## 1.6 Other Scientific and Historical Information

In preparing this BMAP, DEP collected and evaluated credible scientific information on the effect of nutrients, particularly forms of nitrogen, on springs and springs systems. Some of the information collected is specific to the Wacissa River Basin, while other references provided information on related knowledge for restoring springs, such as nitrogen-reducing technologies, the treatment performance of OSTDS, and runoff following fertilizer applications.

## 1.7 Stakeholder Involvement

Stakeholder involvement is critical to develop, gain support for, and secure commitments in a BMAP. The BMAP process engages stakeholders and promotes coordination and collaboration to address the pollutant load reductions necessary to achieve the TMDLs. DEP invites stakeholders to participate in the BMAP development process and encourages public participation and consensus to the greatest practicable extent. **Table A-1** lists the stakeholders who participated in the development of this BMAP.

During the development of the Wacissa River and Wacissa Spring Group BMAP, DEP held meetings involving stakeholders and the general public. The purpose of these meetings was to consult with stakeholders to gather information, evaluate the best available science, develop an OSTDS remediation plan (including a public education plan), define management strategies and milestones, and establish monitoring requirements. All meetings were open to the public and noticed in the *Florida Administrative Register* (F.A.R.). Additionally, a public meeting on the current BMAP was held on May 30, 2018, and was noticed in the F.A.R. and in local newspapers.

Upon BMAP adoption, DEP intends to facilitate annual meetings with stakeholders to review progress towards achieving the TMDLs.

## 1.8 Description of BMPs Adopted by Rule

**Table 2** lists the adopted BMPs and BMP manuals relevant to this BMAP.

**Table 2. BMPs and BMP manuals adopted by rule as of June 2017**

| Agency | F.A.C. Chapter | Chapter Title |
|---|---|---|
| **FDACS Office of Agricultural Water Policy (OAWP)** | 5M-6 | Florida Container Nursery BMP Guide |
| **FDACS OAWP** | 5M-8 | BMPs for Florida Vegetable and Agronomic Crops |
| **FDACS OAWP** | 5M-9 | BMPs for Florida Sod |
| **FDACS OAWP** | 5M-11 | BMPs for Florida Cow/Calf Operations |
| **FDACS OAWP** | 5M-12 | Conservation Plans for Specified Agricultural Operations |
| **FDACS OAWP** | 5M-13 | BMPs for Florida Specialty Fruit and Nut Crop Operations |
| **FDACS OAWP** | 5M-14 | BMPs for Florida Equine Operations |
| **FDACS OAWP** | 5M-16 | BMPs for Florida Citrus |
| **FDACS OAWP** | 5M-17 | BMPs for Florida Dairies |
| **FDACS OAWP** | 5M-18 | Florida Agriculture Wildlife BMPs |
| **FDACS OAWP** | 5M-19 | BMPs for Florida Poultry |
| **FDACS Division of Agricultural Environmental Services** | 5E-1 | Fertilizer |
| **FDACS Division of Aquaculture** | 5L-3 | Aquaculture BMPs |
| **FDACS Florida Forest Service** | 5I-6 | BMPs for Silviculture |
| **FDACS Florida Forest Service** | 5I-8 | Florida Forestry Wildlife BMPs for State Imperiled Species |
| **DEP** | 62-330 | Environmental Resource Permitting |

# Section 2: Implementation to Achieve the TMDLs

## 2.1 Allocation of Pollutant Loads

DEP collected and evaluated credible scientific information on the effect of nutrients, particularly forms of nitrogen, on the seven OFS, described below.

### *2.1.1 Nutrients in the Springs and Spring Systems*

DEP developed the Nitrogen Source Inventory Loading Tool (NSILT) to provide information on the major sources of nitrogen in the groundwater contributing area for the OFS. In addition, this tool is used to estimate nitrogen loads to groundwater from these sources in the spring contributing area. The NSILT is a GIS- and spreadsheet-based tool that provides spatial estimates of the relative contribution of nitrogen from major nitrogen sources and accounts for the transport pathways and processes affecting the various forms of nitrogen as they move from the land surface through the soil and geologic strata.

The first major factor to consider in estimating the loading to groundwater in the NSILT is the attenuation of nitrogen as it moves from its source through the environment, before it reaches the Upper Floridan aquifer (UFA). The movement of nitrogen from the land surface to groundwater is controlled by biological and chemical processes that occur as part of the nitrogen cycle, as well as hydrogeological processes. Many of these processes attenuate (impede or remove) the amount of nitrogen transported to groundwater. An understanding of how water moves through the subsurface and the processes that transform the different forms of nitrogen is essential for estimating nitrogen loading to groundwater from various sources.

A second major factor to consider in estimating the loading to groundwater is the geologic features in the springshed and the related "recharge rate." Water movement between the shallow groundwater (surficial aquifer, where present) and the deeper aquifer (UFA) is slowed by a low permeability layer of clay, silt, and fine sand that retards the vertical movement of infiltrating water from the surface. The UFA occurs in limestone that can be prone to dissolving, and, over geologic time, the development of numerous karst features (sinkholes, caves, and conduits). These features allow water from the land surface to move directly and relatively rapidly into the aquifer and in some areas for groundwater in the aquifer to move rapidly to the springs.

Potential recharge rates from the surface to the UFA are affected by variations in the geologic materials and the presence of karst features. DEP estimated the recharge rate ranges and grouped them into three rate categories, which were applied in the NSILT:

- Low recharge (0 to 3 inches per year [in/yr]).
- Medium recharge (3.01 to 10 in/yr).
- High recharge (greater than 10 in/yr).

In the NSILTs, DEP applied different attenuation factors to different types of sources, so that various biological, chemical, and hydrogeological effects could be estimated. The attenuation that was applied means that the amount of nitrogen leaving a source (such as a livestock operation or a newly fertilized yard) reduces the amount of nitrogen predicted to reach the aquifer. In the Wacissa NSILT estimates, the attenuation rates ranged from 90 % (for atmospheric deposition) to 25 % (for wastewater disposal in a RIB). This means that, for these examples, only 10 % of nitrogen from atmospheric deposition is expected to reach the aquifer, while 75 % of nitrogen from a RIB is expected to reach groundwater, because the remainder is attenuated by various chemical and biological processes.

### *2.1.2 Estimated Nitrogen Loads*

**Table 3** lists the estimated nitrogen loads to groundwater by source in the springshed. Note that urban stormwater loads are included in urban turfgrass fertilizer (UTF) estimates, while agricultural stormwater loads are included in farm fertilizer (FF) and livestock waste (LW) estimates. Nitrogen loading to surface water will be reduced through the activities and strategies for the sources identified in this chapter for groundwater loading.

**Table 3. Estimated nitrogen load to groundwater by source in the Wacissa Springshed**

| Nitrogen Source | Total Nitrogen Load to Groundwater in Pounds of Nitrogen per Year (lb-N/yr) | % Contribution |
|---|---|---|
| **OSTDS** | 22,280 | 4 |
| **UTF** | 3,836 | <1 |
| **Atmospheric Deposition** | 101,093 | 18 |
| **FF** | 343,197 | 60 |
| **Sports Turfgrass Fertilizer (STF)** | 302 | <1 |
| **Permitted Dairies** | 30,945 | 5 |
| **LW** | 68,425 | 12 |
| **Wastewater Treatment Facilities (WWTF)** | 2,567 | <1 |
| **Total** | **572,646** | **100** |

### *2.1.3 Assumptions and Considerations*

The NSILT estimates are based on the following assumptions and considerations:

- **NSILT Nitrogen Inputs** – The methods used to estimate nitrogen inputs for each pollutant source were based on a detailed synthesis of information, including direct water quality measurements, census data, surveys, WWTF permits, published scientific studies and reports, and information obtained in meetings with agricultural producers. For some pollutant source categories, nitrogen inputs were obtained using assumptions and extrapolations, and as a result, these inputs

could be subject to further refinement if more detailed information becomes available.

- **OSTDS Load Contribution –** A per capita contribution to an OSTDS of 9.012 lb-N/yr was used to calculate loading from OSTDS. The average household contribution was estimated based on 2010 U.S. Census Bureau data on the weighted average number of people per household for the counties in the area and additional information on the time spent away from home by the school-age population and labor force.

- **Nitrogen Attenuation Factors –**To estimate the amount of nitrogen loading to the aquifer, DEP applied two nitrogen attenuation factors. Biological and chemical processes that occur as part of the nitrogen cycle, as well as hydrogeological processes, control the movement of nitrogen from the land surface to groundwater. Biochemical attenuation accounts for biochemical processes that convert or transform the different forms of nitrogen, while hydrogeological attenuation accounts for spatial variations that affect the rate of water infiltrating through geological media to recharge the UFA. Given the relatively large range of literature-reported values of biochemical nitrogen attenuation for each source category, DEP used an average biochemical attenuation factor for each source based on land use practices and hydrogeological (i.e., recharge) conditions in the contributing areas.

Other assumptions and considerations for BMAP implementation include the following:

- **Unquantified Project Benefits** – Nitrogen reductions for some of the projects and activities listed in this BMAP cannot currently be quantified. However, because of their positive impact, it is assumed that these actions will help reduce pollutant loads, and estimated loading reductions may be determined at a later date and assigned to these activities.

- **Atmospheric Deposition** – Atmospheric sources of nitrogen are local, national, and international. .Atmospheric sources are generally of low nitrogen concentration compared with other sources and are further diminished through additional biological and chemical processes before they reach groundwater. Atmospheric deposition sources and trends will need to be re-evaluated periodically.

- **OSTDS Inventory and Loading Calculations** – The total number of OSTDS in the basin is estimated based on local information and FDOH data. Future BMAPs and the associated OSTDS loading calculations may be adjusted based on improved data on the number, location, and type (conventional and enhanced nitrogen reducing) of existing septic systems, and may include additional OSTDS installed since BMAP adoption.

- **PFA** – The PFA provides a guide for focusing strategies where science suggests efforts will best benefit the springs. The PFA boundaries may be adjusted in the future if additional relevant information becomes available.

- **Project Collection Period –** The BMAP project collection period is limited to projects after a certain date, based on the data used to calculate the reductions needed. Reductions from older projects are already accounted for in the baseline loading. The period of record for water quality data evaluated for the TMDLs was 2005 through 2015, so projects completed in the springshed after 2004 were considered for inclusion in this BMAP.

- **Legacy Sources** – Land uses or management practices not currently active in the basin may still be affecting the nitrate concentration of the springs. The movement of water from the land surface through the soil column to the UFA and through the UFA to the spring system varies both spatially and temporally and is influenced by local soil and aquifer conditions. As a result, there may be a delay between when nitrogen input to the UFA occurs and when that load ultimately arrives at an OFS. The impact of this delay is not fully known.

- **Implementation Schedule** – BMAP implementation is a 20-year process. This plan defines nitrogen reduction milestones for 5-year (30 %), 10-year (50 %), and 15-year (20 %) implementation, so that the TMDLs will be met no later than the 20-year goal (see **Section 2.1.6** for further details). Further, the total reductions and project credits may be adjusted under the adaptive management approach used for the BMAP. This approach requires regular follow-up to ensure that management strategies are carried out and that their incremental effects are assessed. This process acknowledges that there is some uncertainty associated with the outcomes of proposed management strategies and the estimated response of concentration at the springs. As more information is gathered and progress towards each 5-year milestone is reviewed, additional management strategies to achieve the TMDLs will be developed or existing strategies refined to better address the sources of nitrogen loading.

- **Changes in Spring Flows** – The role of this BMAP is specifically to promote the implementation of projects that reduce the nitrogen load to groundwater, while the minimum flows and levels (MFLs) established for specific springs address water flows and levels. To maximize efforts between the two programs, spring protection projects should provide both water quality and quantity benefits.

### *2.1.4 Loading by Source*

Based on the NSILT estimates, the pie chart in **Figure 2** depicts the estimated percentage of nitrogen loading to groundwater by source in the springshed. FF and LW (mainly from dairies and beef cattle cow-calf operations) are responsible for the majority of the nitrogen sources in

each springshed. Stormwater loading to groundwater is incorporated into the various source categories.

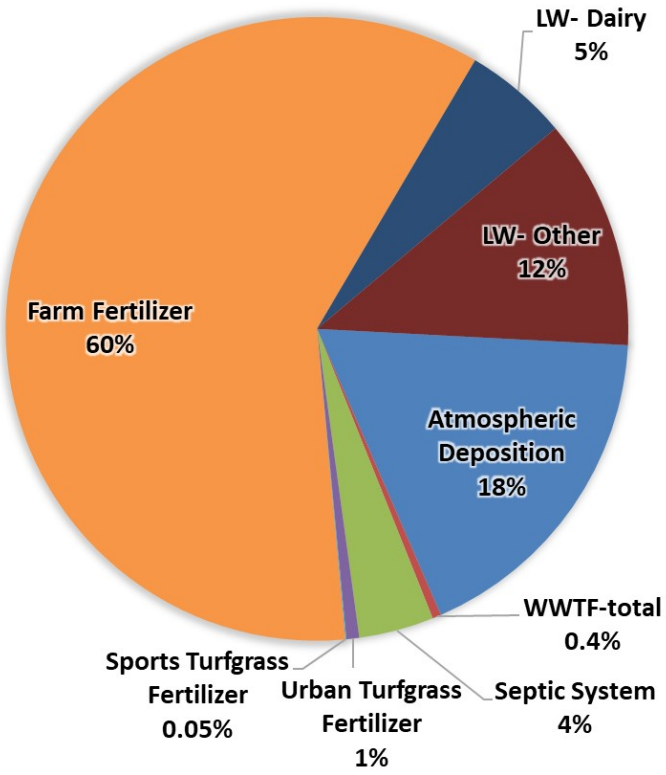


**Figure 2. Loading to groundwater by source in the Wacissa BMAP area**

### *2.1.5 Loading Allocation*

The nitrogen source reductions are based on the measured nitrate concentrations and flows at the vent, along with the TMDL target nitrate concentration. **Table 4** lists the measured nitrate (as nitrogen) loads at the spring vents compared with the TMDL loading based on a target nitrate concentration of 0.20 mg/L in the Wacissa River and 0.24 mg/L in the Wacissa Spring Group. The difference between the spring vent loading and the TMDL loading estimates is the required reduction to meet the TMDLs. The total load that is required to be reduced in the basin is being allocated to the entire basin and actions defined by the BMAP to reduce loading to the aquifer are needed to implement this allocated load.

**Table 4. Total reduction required to meet the TMDLs**

| Area | Nitrogen (Nitrate as N) Loads (lb-N/yr) | Notes Regarding Data Used |
|---|---|---|
| **Total Load at Spring Vent** | 193,149 | Upper 95 % confidence intervals of flow and nitrate data from years 2012 to 2018. |
| **TMDL Load** | 114,680 | Wacissa Spring Group TMDL target is 0.24 mg/L using the same flow data from years 2012 to 2018. |

| Area | Nitrogen (Nitrate as N) Loads (lb-N/yr) | Notes Regarding Data Used |
|---|---|---|
| **Required Reduction** | **78,469** | |

### *2.1.6 Description of 5-, 10-, and 15-year Milestones/Reduction Schedule*

The overall load reduction targets are 30 % of the total within 5 years, 80 % of the total within 10 years, and 100 % of the total within 15 years. DEP will evaluate progress towards these milestones and will report to the Governor and Florida Legislature. DEP will adjust management strategies that reduce loading to the aquifer to ensure the target concentrations are achieved.

**Table 5** lists the estimated nitrogen reduction schedule, by milestone. Progress will be tracked yearly and adjustments made as needed. At the 5-year milestone, progress will be assessed and load reductions adjusted as necessary. Entities have flexibility in the types and locations of projects as long as they achieve the overall required load reductions. The monitoring of existing groundwater and springs sampling locations is essential. **Section 2.3** describes detailed source reduction strategies.

**Table 5. Nitrogen reduction schedule (lb-N/yr)**

| 5-Year Milestone (30% of Total) | 10-Year Milestone (50% of Total) | 15-Year Milestone (20% of Total) | Total Nitrogen Reduction (100%) |
|---|---|---|---|
| 23,540 | 39,234 | 15,694 | 78,469 |

## 2.2 Prioritization of Management Strategies

The management strategies listed in **Appendix B** are ranked with a priority of high, medium, or low. In 2016, the Florida Legislature amended the Watershed Restoration Act (Section 403.067, F.S.), creating additional requirements for all new or revised BMAPs. BMAPs must now include planning-level details for each listed project, along with their priority ranking.

Project status was selected as the most appropriate indicator of a project's priority ranking based primarily on need for funding. Projects with a "completed" status were assigned a low priority. Projects classified as "underway" were assigned a medium priority because some resources have been allocated to these projects, but additional assistance may be needed for the project to be completed. High priority was assigned to projects listed with the project status "planned" as well as certain "completed" projects that are ongoing each year (any project with one of these project types: "street sweeping," "catch basin inserts/inlet filter cleanout," "public education efforts," "fertilizer cessation," "fertilizer reduction," or "aquatic vegetation harvesting"), and select projects that are elevated because substantial, subsequent project(s) are reliant on their completion.

## 2.3 Load Reduction Strategy

A precise total load reduction to groundwater needed to meet the TMDL is unknown and dependent on a number of complex factors. Ultimately there must be a reduction at the spring vent of at least 78,469 lb-N/yr. Based on the totals of all the credits from BMAP actions and policies, the range of total reductions to groundwater is between 99,566 and 236,845 lb-N/yr (see **Table 6**). However, due to the proximity of these reductions to the spring and the uncertainties of fate and transport in the karst geology, additional actions may be necessary to ensure that the loading at the vent is achieved within the timeline of the BMAP.

To achieve reductions outside the scope of the policies listed, additional project options are available to local entities but have not been planned. Other efforts could be pursued to further reduce the nitrogen load to groundwater in the Wacissa River Basin.

**Table 6. Summary of potential credits for the Wacissa River BMAP to meet the TMDL**

Note: No reductions are estimated for atmospheric deposition sources.

| Nitrogen Source | Credits to Load to Groundwater Based on Project Tables (lb-N/yr) | Description |
|---|---|---|
| **OSTDS** | 0 | Credits identified for stakeholder OSTDS projects (enhancement or sewer). |
| **UTF** | 11,632 | DEP approved credits (6%) for public education activities as well as credits identified for stakeholder stormwater projects. |
| **FF** | 51,480 | 15% BMP credit on farm fertilizer load to groundwater, assuming 100% owner-implemented and verified BMPs on all fertilized lands. |
| **Permitted Dairies** | 4,642 | 15% BMP credit on permitted dairy load to groundwater, assuming 100% owner-implemented and verified BMPs at permitted dairies. |
| **LW** | 6,843 | 10% BMP credit on load to groundwater, assuming 100% owner-implemented and verified BMPs at all livestock facilities. |
| **STF** | 26 | 6% BMP credit for sports fields and 10% BMP credit for golf courses on STF load to groundwater, assuming 100% BMP implementation on golf courses and sports fields. |
| **WWTF** | 2,026 | Achieved by BMAP WWTF policy (achieving 3 or 6 mg/L). |
| **Total Credits from BMAP Policies and Submitted Projects** | **76,668** | |
| **Advanced Agricultural Practices and Procedures** | 34,320 – 171,599 | Includes 10%-50% reduction from 100% of fertilized acres with a change in practice. |
| **Total Credits** | **99,566 - 236,845** | **Load reduction to meet the TMDL at the spring vent is 78,469 lb-N/yr** |

## 2.4 OSTDS Management Strategies

Overall, there are currently more than 200 OSTDS in the PFAs on lots less than one acre, based on FDOH estimates. This BMAP lists 0 specific projects (**Appendix B**) that reduce nitrogen loading from existing OSTDS on variably sized parcels for a total of 0 lb-N/yr. **Figure 3** shows the locations of the OSTDS in the BMAP area.

DEP assessed the overall OSTDS loading compared with other nitrogen sources in the PFAs, as well as the relative loading in the wider BMAP area. Based on these assessments, DEP has determined that for the Wacissa BMAP area, OSTDS contribute less than 20 % of nonpoint source nitrogen pollution to the OFS. Per the Wacissa NSILT, septic systems contribute 4 % of the nitrogen loading in the Wasissa BMAP area. Irrespective of the percent contribution, nitrogen loading from OSTDS contribute to the significant degradation of the groundwater, and DEP has determined that an OSTDS remediation plan is necessary to achieve the TMDLs and to limit the increase in nitrogen loads from future growth. Accordingly, the OSTDS remediation plan prohibits the installation of new conventional systems on lots less than 1 acre within the PFA. The OSTDS remediation plan is incorporated as **Appendix D**.

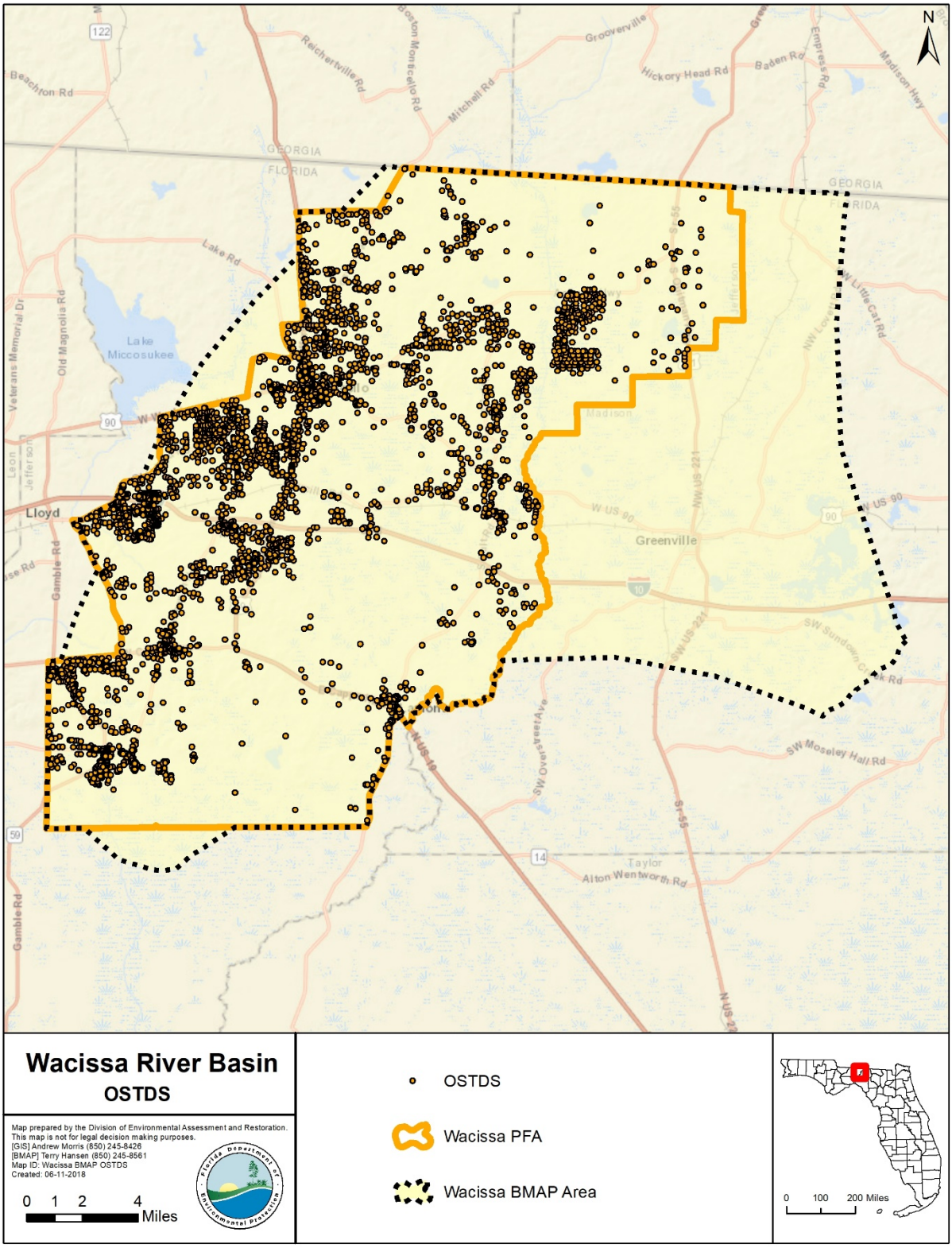


**Figure 3. OSTDS locations in the Wacissa River and Wacissa Spring Group BMAP area**

## 2.5 UTF Management Strategies

UTF consists of fertilizers applied to the turfgrass typically found in residential and urban areas (including residential lawns and public green spaces). It is applied by either the homeowner or a lawn service company on residential properties, while on nonresidential properties, it may be applied by contractors or maintenance staff.

### *2.5.1 Fertilizer Ordinance Adoption*

As required by the Florida Legislature, as described in Subsection 373.807(2), F.S., local governments with jurisdictional boundaries that include an OFS or any part of a springshed or the delineated PFA of an OFS, are required to develop, enact, and implement a fertilizer ordinance by July 1, 2017. The statutes require any ordinance to be based, at a minimum, on the DEP model ordinance for Florida-friendly fertilizer use on urban landscapes.

### *2.5.2 Prioritized Management Strategies and Milestones*

Based on the fertilizer ordinances required by statute, the associated credits for UTF reductions to groundwater are 19 lb-N/yr (see **Table 7**). Additional environmental benefits could be credited if the counties and municipalities implement other public education efforts and source control ordinances as described in **Appendix G.** Local stormwater projects that treat urban runoff, including nitrogen from urban fertilizer, are also eligible for credit; currently, there is 1 stormwater project listed in **Appendix B** for a credit of 11,422 lb-N/yr.

**Table 7. Current project credits to reduce UTF loading to groundwater**

| Project Category | Project Credits Based on Management Actions in Appendix B (lb-N/yr) |
|---|---|
| **Fertilizer Ordinances (all entities)** | 19 |
| **Stormwater Improvements** | 11,422 |
| **Total Project Credits** | **11,441** |

Since there is uncertainty about the data used in the NSILT estimates to calculate the UTF loading to groundwater, DEP will work toward collecting better data by documenting reductions with the stakeholders. Also, DEP will work with the stakeholders to develop additional measures to reduce fertilizer application.

### *2.5.3 Additional UTF Reduction Options*

The anticipated reduction from UTF sources is currently limited to 6 % of the estimated load to groundwater. This reduction can be achieved through a 6 % total credit if each local government has an applicable fertilizer ordinance, landscape ordinance, irrigation ordinance, and pet waste ordinance; carries out public education activities; and implements the Florida Yards and Neighborhood (FYN) Program (**Table 8**).

**Table 8. Maximum UTF load reductions based on existing public education credit policies**

| UTF Source Control Measures | Credit, Based on Estimated Load to Groundwater (%) | Possible Nitrogen Credits (lb-N/yr) |
|---|---|---|
| **Fertilizer Ordinance** | 0.50 | 19 |
| **Pet Waste Ordinance** | 0.50 | 19 |
| **Landscape Ordinance** | 0.50 | 19 |
| **Irrigation Ordinance** | 0.50 | 19 |
| **FYN Program** | 3.00 | 115 |
| **Public Education Program** | 1.00 | 38 |
| **Total Possible Credits** | **6.00** | **230** |

If all the local governments were to implement the full suite of public education measures, a 230 lb-N/yr reduction could be achieved. Currently, it is assumed that all local governments have or will adopt the required fertilizer ordinance for a reduction credit of 19 lb-N/yr. Thus, an additional 211 lb-N/yr reduction could be achieved through public education and source control efforts.

## 2.6 Agricultural Sources Management Strategies and Additional Reduction Options

Based on data including Florida Statewide Agricultural Irrigation Demand (FSAID) IV geodatabase land use, FDACS identified agricultural acreage within the BMAP. An estimated 50,737 acres of land in the springshed area are considered agricultural, of which 16,494 are fertilizer croplands, 4,169 acres are livestock lands, and 30,074 acres are identified as both fertilizer croplands and livestock lands.

### *2.6.1 FF Loading*

Nitrogen in agricultural fertilizer is applied at varying rates, depending on the crop and individual farm practices. The NSILT estimated total nitrogen load to groundwater from FF is 343,197 lb-N/year, approximately 60 % of the total nitrogen load to groundwater in the Wacissa BMAP area. FF includes commercial inorganic fertilizer applied to row crops, field crops, pasture, and hay fields. Some of the FF application sites are associated with dairies.

### *2.6.2 LW Loading*

Agricultural practices specific to LW management were obtained through meetings with University of Florida Institute of Food and Agricultural Sciences (UF-IFAS) extension staff, FDACS field representatives, agricultural producers, and stakeholders. The NSILT estimated total nitrogen load to groundwater from LW is 68,425 lb-N/year, or 12 % of the total nitrogen load to groundwater in the Wacissa BMAP area.

### *2.6.3 Permitted Dairies*

The loading from LW at DEP-permitted dairies was estimated separately from other LW because specific permit information was available to account for loads, waste management practices, and nutrient management plans. The NSILT estimated total nitrogen load to groundwater from animal waste at permitted dairies in the Wacissa BMAP area is 30,945 lb-N/yr, or 5 % of the total nitrogen load to groundwater in the BMAP area. Commercial fertilizer applied to hay and silage at dairies is accounted for in the FF category.

### *2.6.4 Prioritized Management Strategies and Milestones*

Subsection 403.067, F.S., requires agricultural nonpoint sources in a BMAP area either to implement the applicable FDACS-adopted BMPs, which provides a presumption of compliance with water quality standards, or conduct water quality monitoring prescribed by DEP, NWFWMD, or SRWMD that demonstrates compliance with water quality standards. Further, based on the Florida Springs and Aquifer Protection Act, Subsection 373.811(5), F.S., prohibits any new agricultural operations within the PFA that do not implement applicable FDACS BMPs, measures necessary to achieve pollution reduction levels established by DEP, or groundwater monitoring plans approved by a WMD or DEP. Failure implement BMPs or conduct water quality monitoring that demonstrates compliance with pollutant reductions may result in enforcement action by DEP (s. 403.067(7)(b), F.S.).

FDACS will work with applicable producers within the BMAP area to implement BMPs. As of December 31, 2017, NOIs covered 34,066 agricultural acres in the Wacissa BMAP area. No producers are conducting water quality monitoring in lieu of implementing BMPs at this time. **Appendix B** lists project information. **Appendix F** provides detailed information on BMPs and agricultural practices in the BMAP area.

With crop-specific BMP enrollment or monitoring for FF areas, an estimated 51,480 lb-N/yr reduction to groundwater can be achieved, based on an average reduction of 15 % in the nitrogen load to groundwater. While DEP has listed larger percentage reductions in nitrogen from agricultural BMPs in estimating benefits to surface waters, the best data available on benefits to groundwater from BMPs indicate a 15 % reduction in the load to groundwater where owner-implemented BMPs are in place. This number could increase as more data are collected on the impact of BMPs to groundwater.

For DEP-permitted dairies, the estimated load reductions from owner-implemented BMPs are 15 % in the nitrogen load to groundwater, or 4,642 lb-N/yr, assuming 100 % BMP implementation at these dairies.

For all livestock operations not included in the DEP-permitted dairies category, owner-implemented BMPs are expected to achieve a reduction of 6,843 lb-N/yr, using an estimated 10 % reduction in the load to groundwater from owner-implemented BMPs at livestock operations.

Summarizing the reductions discussed above, the total reduction from BMP implementation of all agricultural sources is 62,964 lb-N/yr.

### *2.6.5 Additional Agricultural Reduction Options*

Further reductions may be achieved through implementing additional agricultural projects or practices, including land acquisition and conservation easements. SRWMD and NWFWMD are implementing projects to encourage low input agriculture and water quality improvement technologies. Examples of these projects include providing incentives for producers to transition to less intensive cropping systems, change land use to fallow or native landscape, or change the type of cropping system. Other reductions associated with the implementation and modification of BMPs may be realized through ongoing studies and data collection. Basin-specific studies are underway to evaluate and demonstrate the effectiveness of BMPs on a site-specific basis.

**Table 9** identifies possible projects and practices with the estimated load reductions. FDACS used the FSAID IV to identify crop types and acreages were projects and practices could potentially be implemented.

**Table 9. Estimated acreages for additional agricultural projects and practices**

| Action | Acreage |
|---|---|
| **Precision Irrigation** | 2,807 |
| **Soil Moisture Probes** | 3,808 |
| **Precision Fertilization** | 1,979 |
| **Controlled Release Fertilizer** | 657 |
| **Cover Crops** | 2,202 |
| **Banders** | 2,015 |
| **Peanut Hay Mix Pasture Systems** | 22,042 |

The projects and practices listed in **Table 10** are a component of the reductions to groundwater that could be achieved through changes in practices (**Table 9**). For example, a 75 % reduction of fertilizer loss to groundwater on 25 % of the fertilized lands would result in an estimated reduction of 64,349 lb-N/yr. Note that these estimates are averaged over the entire basin, and the recharge characteristics of a specific site and the fertilization practices for specific crops may change the estimated reduction for specific acres with a conservation easement or change in fertilization.

**Table 10. Potential for additional load reductions to groundwater**

| % of Fertilized Acres with a Change in Practice | Number of Fertilized Acres with a Change in Practice | 100% Reduction in Load to Groundwater (lb-N/yr reduced) | 75% Reduction in Load to Groundwater (lb-N/yr reduced) | 50% Reduction in Load to Groundwater (lb-N/yr reduced) | 25% Reduction in Load to Groundwater (lb-N/yr reduced) | 10% Reduction in Load to Groundwater (lb-N/yr reduced) |
|---|---|---|---|---|---|---|
| **100** | 22,532 | 343,197 | 257,398 | 171,599 | 85,799 | 34,320 |
| **75** | 16,899 | 257,398 | 193,048 | 128,699 | 64,349 | 25,740 |
| **50** | 11,266 | 171,599 | 128,699 | 85,799 | 42,900 | 17,160 |
| **25** | 5,633 | 85,799 | 64,349 | 42,900 | 21,450 | 8,580 |
| **10** | 2,253 | 34,320 | 25,740 | 17,160 | 8,580 | 3,432 |

Beyond enrolling producers in the FDACS BMP Program and verifying implementation, FDACS will work with DEP to improve the data used to estimate agricultural land uses in the springshed. FDACS will also work with producers to implement a suite of agricultural projects and research agricultural technologies on properties where they are deemed technically feasible and if funding is made available. The acreages provided by FDACS are preliminary estimates of the maximum acreages and will be evaluated and refined over time. As presented here, these projects are based on planning-level information. Actual implementation would require funding as well as more detailed designs based on specific information, such as actual applicable acreages and willing landowners.

## 2.7 STF Management Strategies

STF areas fall into two main categories that are evaluated separately: golf courses and sporting facilities (such as baseball, football, soccer, and other fields). There is 1 identified golf course in the BMAP area occupying an estimated 124 acres with other types of sports fields totaling 330 acres.

### *2.7.1 Prioritized Management Strategies and Milestones*

DEP will work with sports field managers and the golf course superintendent to ensure relevant BMP implementation and to estimate reductions associated with these efforts. To improve the golf course loading estimate over a literature-based approach, DEP will also confer with golf course superintendents to identify the actual rate of fertilizer application to update the estimate of the golf course load to groundwater. Golf courses are expected to implement the BMPs described in DEP's BMP manual, *Best Management Practices for the Enhancement of Environmental Quality on Florida Golf Courses*, for an estimated 10 % reduction in loads to groundwater.

Managers of sports fields can assist by reducing fertilizer use, using products that reduce leaching, and more efficiently irrigating their sports turf. The estimated credit for better management of nongolf sports turfgrass is 6 % of the starting load to groundwater. Based on these approaches, the initial calculation of reductions from STF sources is 26 lb-N/yr, as listed in **Table 11**.

**Table 11. Maximum load reductions from STF improvements based on existing credit policies**

| STF Source Control Measures | Credit Based on Estimated Load to Groundwater (%) | Possible Nitrogen Credits (lb-N/yr) |
|---|---|---|
| **Golf Course BMP Implementation** | 10 | 19 |
| **Sports Fields BMPs** | 6 | 7 |
| **Total Possible Credits** | | **26** |

## 2.8 WWTF Management Strategies

In the Wacissa River BMAP area, treated effluent containing nitrogen is discharged to sprayfields, RIBs, and percolation ponds, and is reused for irrigation water. The estimated nitrogen load from WWTFs is 2,567 lb-N/yr. The discharge location (such as proximity to the spring, highly permeable soils, etc.) and level of wastewater treatment are important factors to consider when addressing loadings to groundwater. Additionally, addressing the nitrogen loading from OSTDS could increase the volume of effluent treated and disposed of by WWTFs.

### *2.8.1 Summary of Facilities*

There are several WWTFs located in the Wacissa River BMAP area, including 0 domestic WWTFs permitted to discharge more than 100,000 gallons of treated effluent per day (or 0.1 million gallons per day [mgd]). **Figure 4** shows the locations of domestic WWTFs in the Wacissa River and Spring Group area with discharges greater than 0.1 mgd and discharges less than 0.1 mgd.

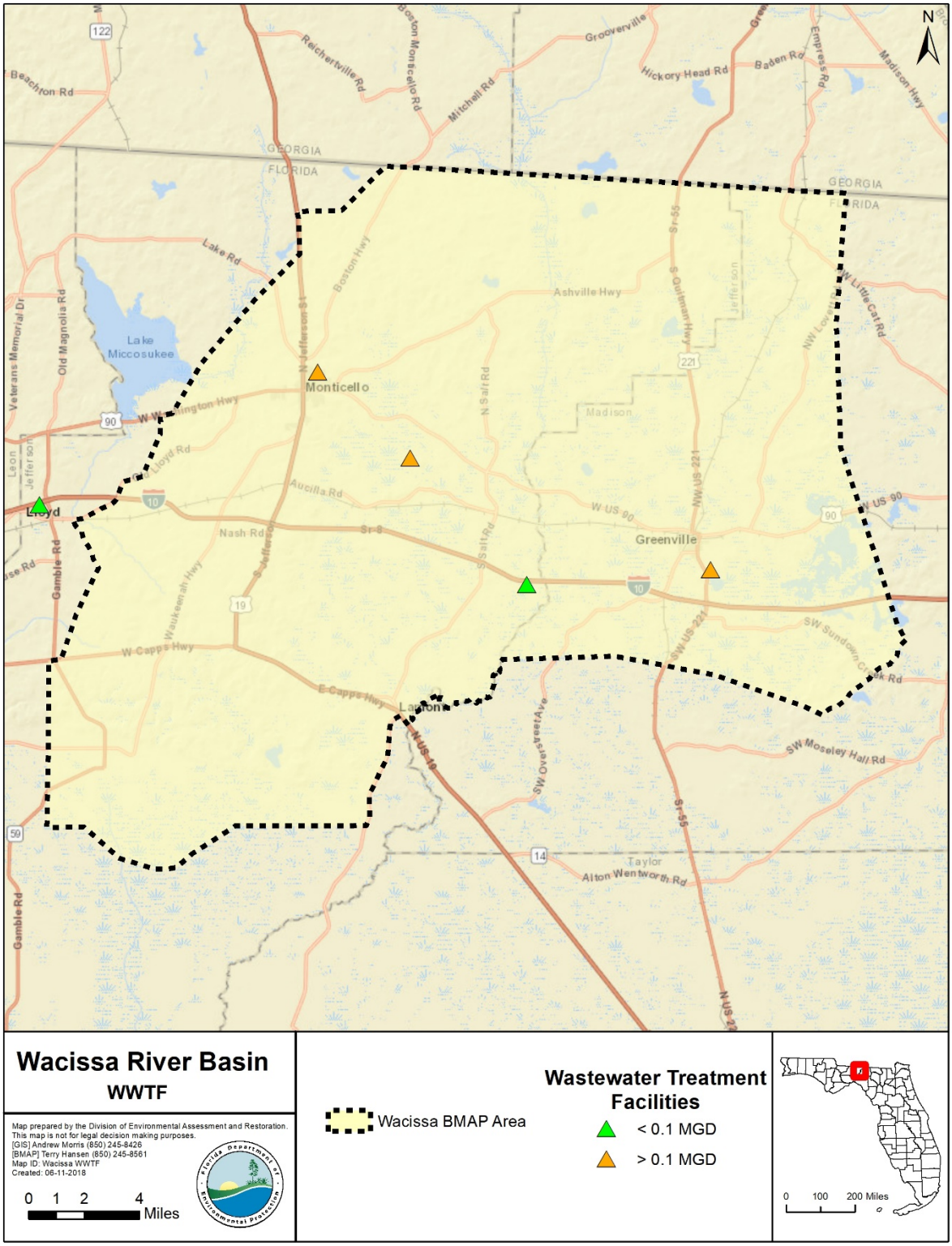


**Figure 4. Locations of domestic WWTFs in the Wacissa River and Wacissa Spring Group BMAP area**

### *2.8.2 Wastewater Management Standards and Reuse Management*

The Florida Springs and Aquifer Protection Act prohibits new domestic wastewater disposal facilities in the PFAs, including RIBs, with permitted capacities of 100,000 gpd or more, except for those facilities that provide AWT that reduces total nitrogen in the effluent to 3 mg/L or lower, on an annual permitted basis.

DEP requires the nitrogen effluent limits listed below in any new or existing wastewater permit in the BMAP area, unless the utility/entity can demonstrate reasonable assurance that the reuse or land application of effluent would not cause or contribute to an exceedance of the nitrate concentrations established by the Wacissa River and Wacissa Spring Group TMDLs. To demonstrate reasonable assurance, the utility/entity shall provide relevant water quality data, physical circumstances, or other site-specific credible information needed to show their facility would not cause a nitrate concentration that would be greater than 0.24 mg/L at the spring vents or 0.20 mg/L at the Wacissa River. This demonstration may include factors such as dilution, site-specific geological conditions, research/studies, including dye tracer tests, and groundwater transport modeling. Should DEP concur with the reasonable assurance demonstration request, the TN effluent requirements established here may be modified for the applicant or waived.

The nitrogen effluent limits listed in **Table 12** will be applied as an annual average to all new and existing WWTFs with a DEP-permitted discharge. New effluent standards will take effect at the time of permit renewal or no later than five years after BMAP adoption, whichever is sooner.

**Table 12. Wastewater effluent standards for the BMAP area**

| 95% of the Permitted Capacity (gpd) | TN Concentration Limits for RIBs and Absorption Fields (mg/L) | TN Concentration Limits for All Other Land Disposal Methods, Including Reuse (mg/L) |
|---|---|---|
| **Greater than 100,000** | 3 | 3 |
| **20,000 to 100,000** | 3 | 6 |
| **Less than 20,000** | 6 | 6 |

Additionally, new or existing wastewater permits in the BMAP area must require at least quarterly sampling of the effluent discharge for TN and report these sampling results in the discharge monitoring reports (DMRs) submitted to DEP.

DEP encourages the reuse of treated wastewater for irrigation as a water conservation measure. The expansion of reuse water for irrigation can reduce reliance on the Floridan aquifer for water supply. The nitrogen load to groundwater from reuse water is expected to be reduced through these WWTF policies, as improvements in reuse water quality will both reduce loads from this source and limit future increases in loading from reuse because of higher treatment levels.

### *2.8.3 Prioritized Management Strategies and Milestones*

Based on the current volumes of discharge and effluent concentrations, the estimated reductions to be achieved through the implementation of these revised wastewater standards are 2,026 lb-N/yr.

## 2.9 Atmospheric Deposition Management Strategies

### *2.9.1 Summary of Loading*

Atmospheric deposition is largely a diffuse, albeit continual, source of nitrogen. Nitrogen species and other chemical constituents are measured in wet and dry deposition at discrete locations around the U.S. In 2014, Schwede and Lear published a hybrid model for estimating the total atmospheric deposition of nitrogen and sulfur for the entire U.S., referred to as the total atmospheric deposition model or "TDEP." Deposition data from several monitoring networks—including Clean Air Status and Trends Network (CASTNET), the National Atmospheric Deposition Program (NADP) Ammonia Monitoring Network, the Southeastern Aerosol Research and Characterization Network, and modeled data from the Community Multiscale Air Quality (CMAQ) Modeling System—are combined in a multistep process with National Trends Network (NTN) wet deposition values to model total deposition. The TDEP model run used for the NSILT included data from 2011 to 2013.

### *2.9.2 Description of Approach*

Atmospheric sources of nitrogen are local, national, and international. Atmospheric sources are generally of low nitrogen concentration compared with other sources and are further diminished through additional biological and chemical processes before they reach groundwater. Atmospheric deposition sources and trends will be re-evaluated periodically.

## 2.10 Future Growth Management Strategies

New development primarily falls into to two general source categories: new urban development and new agriculture. Nutrient impacts from new development are addressed through a variety of mechanisms outlined in this BMAP as well as other provisions of Florida law. For instance, wastewater from all new and existing urban development is treated through either domestic WWTFs or OSTDS. New WWTFs must meet the stringent nitrogen limitations set forth in this BMAP. Existing WWTFs also must be upgraded to meet these same BMAP requirements. Florida law requires new development to connect to WWTFs where sewer lines are available. Where sewer is not available within the PFA, this BMAP still prohibits the installation of new OSTDS on lots of less than one-acre unless the system includes enhanced treatment of nitrogen, as described in **Appendix D**. Likewise, all new agricultural operations must implement FDACS-adopted BMPs and potentially other additional measures (**Section 2.6**), or must conduct water quality monitoring that demonstrates compliance with water quality standards.

Other laws such as local land development regulations, comprehensive plans, ordinances, incentives, environmental resource permit requirements, and consumptive use permit requirements, all provide additional mechanisms for protecting water resources and reducing the

impact of new development and other land use changes as they occur (see **Appendix G**). Through this array of laws and the requirements in this BMAP, new development must undertake nitrogen-reduction measures before the development is complete.

## 2.11 Protection of Surface Water and Groundwater Resources through Land Conservation

Maintaining land at lower intensity uses through land purchases or easements for conservation and recreational use is one strategy that can help reduce water quality impacts in the Wacissa River and Wacissa Spring Group BMAP area. **Table 13** identifies conservation lands and conservation easements in the Wacissa BMAP area as of April 2017.

**Table 13. Conservation lands in the BMAP area**

| Managing Entity | Name of Conservation Easement or Acquisition | Acreage | Acquisition Status |
|---|---|---|---|
| **Florida Fish and Wildlife Commission (FWC)** | Aucilla Wildlife Management Area | 60,178 | Complete |
| **SRWMD** | Dixie Plantation Conservation Easement | 8,901 | Complete |
| **Tall Timbers Research, Inc.** | Pinckney Hill Plantation Conservation Easement | 7,260 | Complete |
| **Tall Timbers Research, Inc.** | Hickney Head Plantation Conservation Easement | 437 | Complete |
| **Tall Timbers Research, Inc.** | Merrily Plantation Conservation Easement | 2,695 | Complete |
| **SRWMD** | Upper Aucilla Conservation Area | 2,788 | Complete |
| **SRWMD** | Ragan's Conservation Easement | 755 | Complete |
| **SRWMD** | Middle Aucilla Conservation Area | 8,959 | Complete |
| **The Nature Conservancy** | Turkey Scratch Plantation Conservation Easement | 2,250 | Complete |
| **Tall Timbers Research, Inc.** | Three Creeks Ranch Conservation Easement | 1,018 | Complete |
| **The Nature Conservancy** | Avalon Plantation Conservation Easement | 8,075 | Complete |
| **Total** | | **103,316** | |

## 2.12 Commitment to Implementation

Successful BMAP implementation requires commitment, dedicated state funding, and follow-up. Stakeholders have expressed their intention to carry out the plan, monitor its effects, and continue to coordinate within and across jurisdictions to achieve nutrient reduction goals. As the TMDLs must be achieved within 20 years, DEP, WMDs, FDOH, and FDACS will implement management strategies using the annual Legacy Florida appropriation from the legislature of at least $50 million to reduce nitrogen in impaired OFS. DEP, working with the coordinating

agencies, will continue to invest existing funds and explore other opportunities and potential funding sources for springs restoration efforts.

# Section 3: Monitoring and Reporting

## 3.1 Methods for Evaluating Progress

DEP will work with stakeholders to track project implementation and organize the monitoring data collected each year. The project and monitoring information will be presented in an annual update. Stakeholders have agreed to meet annually after the adoption of the BMAP to follow up on plan implementation, share new information, and continue to coordinate on TMDL restoration-related issues. The following activities may occur at annual meetings:

**Implementation data and reporting:**

- Collect project implementation information from stakeholders, including FDACS agricultural BMP enrollment and FDOH-issued permits, and compare with the BMAP schedule.
- Discuss the data collection process, including any concerns and possible improvements to the process.
- Review the monitoring plan implementation, as detailed in **Section 3.3**.

**Sharing new information:**

- Report on results from water quality monitoring and trend information.
- Provide updates on new management strategies in the basin that will help reduce nutrient loading.
- Identify and review new scientific developments on addressing nutrient loads and incorporate any new information into annual progress reports.

**Coordinating on TMDL restoration–related issues:**

- Provide updates from DEP on the basin assessment cycle and activities related to any impairments, TMDLs, and BMAP.
- Obtain reports from other basins where tools or other information may be applicable to the Wacissa River and Wacissa Spring Group TMDLs.

## 3.2 Adaptive Management Measures

Adaptive management involves making adjustments in the BMAP when circumstances change or monitoring indicates the need for additional or more effective restoration strategies. Adaptive management measures may include the following:

- Implementing procedures to determine whether additional cooperative strategies are needed.

- Using criteria/processes for determining whether and when plan components need revision because of changes in costs, project effectiveness, social effects, watershed conditions, or other factors.

- Revising descriptions of stakeholders' roles during BMAP implementation and after BMAP completion.

- Updating information on corrective actions (and any supporting documentation) being implemented as data are gathered to refine project implementation schedules and performance expectations.

Key components of adaptive management are to share information and expertise include tracking plan implementation, monitoring water quality and pollutant loads, and holding periodic meetings.

## 3.3 Water Quality and Biological Monitoring

### *3.3.1 Objectives*

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. Since the BMAP implementation involves an iterative process, the monitoring efforts are related to primary and secondary objectives. The primary objectives focus on achieving water quality targets, while the secondary objectives focus on water quality parameters that can be used to provide information for future refinements of the BMAP. The monitoring strategy may be updated as necessary.

**Primary objectives:**

- Measure the water quality and biological response in the impaired springs, river, and/or groundwater at the beginning of the BMAP period and during implementation.

- Document nutrient trends in the Wacissa River Basin. Wacissa Spring Group, and associated springs and groundwater.

- Focus BMP efforts by using water quality results combined with appropriate project information and land use in conjunction with statistical and spatial analysis tools.

**Secondary objectives:**

- Identify areas where groundwater data and modeling might help in understanding the hydrodynamics of the system.

- Confirm and refine nutrient removal efficiencies of agricultural and/or urban BMPs.
- Develop an advanced BMP implementation plan.
- Identify and implement more effective nutrient reduction strategies.
- Use nitrogen isotope and tracer sampling for evaluating nitrogen contributions from organic and inorganic sources.

### *3.3.2 Water Quality Parameters, Frequency, and Network*

To achieve the objectives listed above, the monitoring strategy focuses on two types of indicators to track improvements in water quality: core and supplemental (**Table 14** and **Table 15,** respectively). The core indicators are directly related to the parameters causing impairment in the river or associated springs. Supplemental indicators are monitored primarily to support the interpretation of core water quality parameters. The monitoring network is established for a variety of purposes.

For this BMAP, nitrate is considered to be the key core parameter measured, to track progress in decreasing nitrogen concentrations in groundwater and the water surfacing at the spring vent. The other parameters are considered supplementary parameters for the BMAP, as they build information about groundwater and the spring but are not direct measurements of impairment.

At a minimum, the core parameters will be tracked to determine the progress that has been made towards meeting the TMDLs and/or achieving the NNC. Resource responses to BMAP implementation may also be tracked. A significant amount of time may be needed for changes in water chemistry to be observed.

**Table 14. Core water quality indicators**

| Core Parameters |
|---|
| Chloride |
| Sulfate |
| Potassium |
| Ammonia as Nitrogen |
| Total Kjeldahl Nitrogen |
| Nitrate/Nitrite as Nitrogen |

**Table 15. Supplemental water quality indicators and field parameters**

| Supplemental Parameters |
|---|
| Specific Conductance |
| Dissolved Oxygen (DO) |
| pH |
| Temperature |

| Supplemental Parameters |
|---|
| Total Suspended Solids (TSS) |
| Nitrate and Oxygen Isotopes |

Initially, data from the ongoing sampling effort being conducted by SRWMD and NWFWMD will be used to determine progress towards the primary objectives. Surface water and groundwater monitoring network locations were selected to track changes in water quality and allow the annual evaluation of progress toward achieving the TMDL. **Figure 5** shows the locations of the river and spring stations currently being sampled that will be used for the BMAP monitoring in the Wacissa River Basin and the Wacissa Spring Group.

### *3.3.3 Biological Monitoring*

Biological resource responses represent improvements in the overall ecological health of the Wacissa River Basin and Wacissa Spring Group (see **Table 16**).

**Table 16. Biological response measures for spring runs**

| Biological Response Measures |
|---|
| Chlorophyll *a* |
| Stream Condition Index (SCI) score |
| Linear Vegetation Survey (LVS) score |
| Rapid Periphyton Survey (RPS) score |
| Key fish populations |

An RPS will be conducted to assess the abundance and variety of algae in the river. An LVS will be conducted to assess the types and density of vegetation present in the river and to identify the native versus non-native species. An SCI will be conducted to measure the number of different organisms present in the river. In addition, habitat assessments (HAs) will be conducted to assess the river conditions and habitat present to support the SCI evaluation. Water quality samples will also be collected with the biological monitoring.

### *3.3.4 Data Management and Assessment*

As of June 30, 2017, water quality data in Florida are entered by the entity collecting the data into the Florida Watershed Information Network (WIN) Database, which has replaced the Florida Storage and Retrieval System (STORET). DEP pulls water quality data directly from WIN and U.S. Geological Survey (USGS) databases for impaired waters evaluations and TMDL development. Data providers are required to upload their data regularly, so the information can be used as part of the water quality assessment process and for annual reporting. Data providers should upload their data to WIN upon the completion of the appropriate quality assurance/quality control (QA/QC) checks. All data collected in the last quarter of the calendar year should be uploaded no later than April 1 of the following year.

Biological data collected by DEP are stored in the DEP Statewide Biological (SBIO) database. Biological data should be collected and regularly provided to DEP following the applicable

standard operating procedures. All biological data collected in the last quarter of the calendar year should be uploaded or provided no later than April 1 of the following year.

The water quality data will be analyzed during BMAP implementation to determine trends in water quality and the health of the biological community. A wide variety of statistical methods are available for the water quality trend analyses. The selection of an appropriate data analysis method depends on the frequency, spatial distribution, and period of record available from existing data. Specific statistical analyses were not identified during BMAP development.

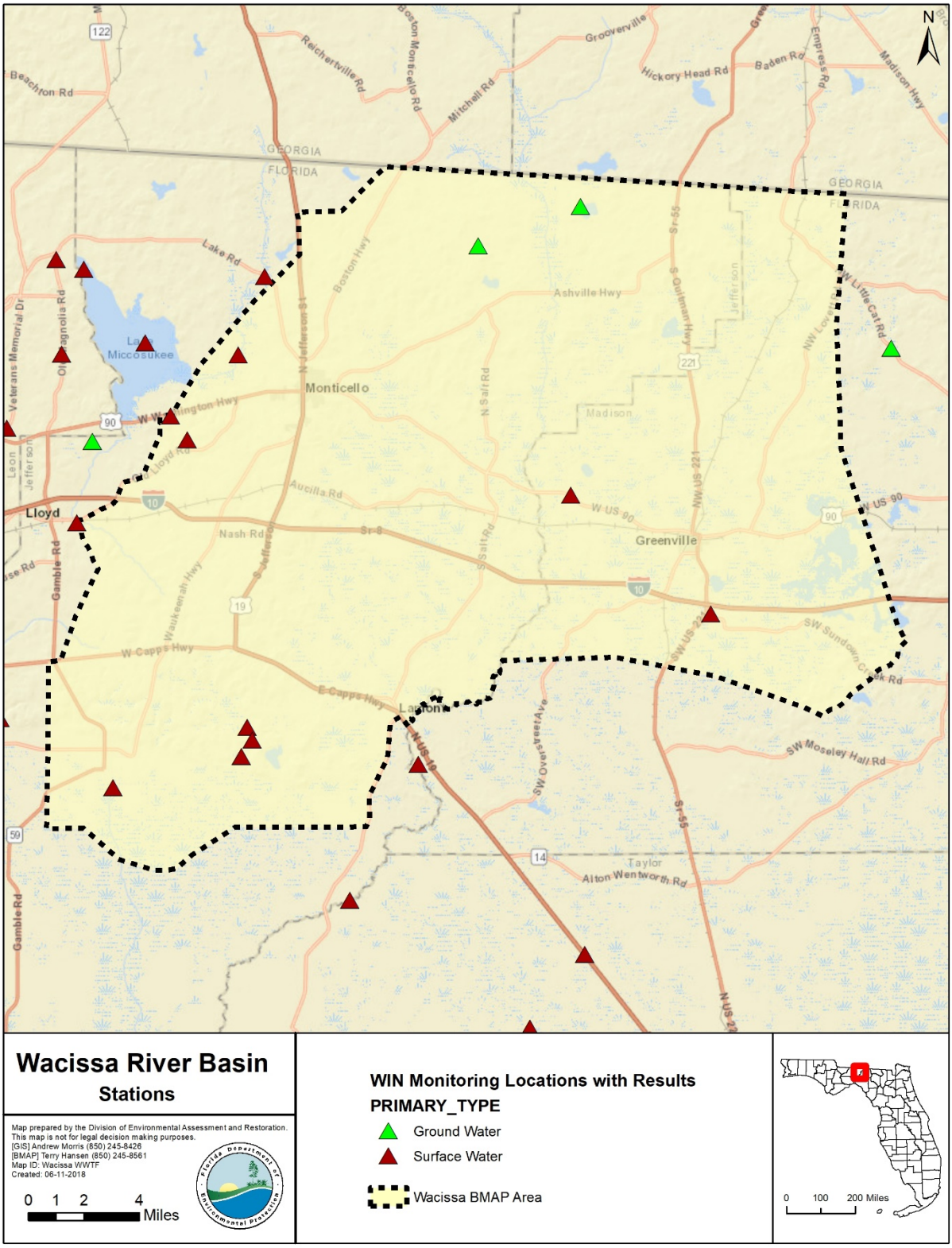


**Figure 5. Groundwater and surface water stations sampled in the Wacissa River Basin & Wacissa Spring Group**

### *3.3.5 QA/QC*

Stakeholders participating in the monitoring plan must collect water quality data in a manner consistent with Chapter 62-160, F.A.C., and the DEP standard operating procedures (SOPs) for QA/QC required by rule. The most current version of these procedures is available on the DEP website. For BMAP-related data analyses, entities should use National Environmental Laboratory Accreditation Conference (NELAC) National Environmental Laboratory Accreditation Program (NELAP)–certified laboratories or other labs that meet the certification and other requirements outlined in the DEP SOPs.

# Appendices

## Appendix A. Important Links

The links below were correct at the time of document preparation. Over time, the locations may change and the links may no longer be accurate. None of these linked materials are adopted into this BMAP.

- DEP Website: http://www.floridadep.gov
- DEP Map Direct Webpage: https://ca.dep.state.fl.us/mapdirect/
- Searchable online version of PFA maps: https://www.floridadep.gov/pfamap
- Florida Statutes: http://www.leg.state.fl.us/statutes:
    - Florida Watershed Recovery Act (Section 403.067, F.S.)
    - Florida Springs and Aquifer Protection Act (Part VIII of Chapter 373, F.S.)
- DEP Model Ordinances: http://fyn.ifas.ufl.edu/fert_ordinances.html
- DEP Standard Operating Procedures for Water Quality Samples: http://www.dep.state.fl.us/water/sas/sop/sops.htm
- NELAC NELAP: https://fldeploc.dep.state.fl.us/aams/index.asp
- FDACS BMPs: https://www.freshfromflorida.com/Business-Services/Best-Management-Practices-BMPs/Agricultural-Best-Management-Practices
- FDACS BMP and Field Staff Contacts: http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy
- Florida Administrative Code (Florida Rules): https://www.flrules.org/
- SRWMD Surface Water Improvement and Management (SWIM) Plans: http://www.srwmd.state.fl.us/index.aspx?NID=447
- NWFWMD SWIM Plans: https://www.nwfwater.com/Water-Resources/Surface-Water-Improvement-and-Management/SWIM-Plan-Updates
- SRWMD 2017 Consolidated Annual Report: http://www.srwmd.state.fl.us/DocumentCenter/View/11712
- UF–IFAS Research: http://research.ifas.ufl.edu/

# Appendix B. Projects to Reduce Nitrogen Sources

## Prioritization of Management Strategies

The management strategies in **Table B-1** are ranked with a priority of high, medium, or low. In 2016, the Florida Legislature amended the Watershed Restoration Act (Section 403.067, F.S.), creating additional requirements for all new or revised BMAPs. BMAPs must now include planning-level details for each listed project, along with their priority ranking.

Project status was selected as the most appropriate indicator of a project's priority ranking based primarily on need for funding. Projects with a "completed" status were assigned a low priority. Projects classified as "underway" were assigned a medium priority because some resources have been allocated to these projects, but additional assistance may be needed for the project to be completed. High priority was assigned to projects listed with the project status "planned" as well as certain "completed" projects that are ongoing each year (any project with one of these project types: "street sweeping," "catch basin inserts/inlet filter cleanout," "public education efforts," "fertilizer cessation," "fertilizer reduction," or "aquatic vegetation harvesting"), and select projects that are elevated because substantial, subsequent project(s) are reliant on their completion.

## Description of the Management Strategies

Responsible entities submitted these management strategies to the department with the understanding that the strategies would be included in the BMAP, thus requiring each entity to implement the proposed strategies in a timely way and achieve the assigned load reduction estimates. However, this list of strategies is meant to be flexible enough to allow for changes that may occur over time. Any change in listed management strategies, or the deadline to complete these actions, must first be approved by the department. Substituted strategies must result in equivalent or greater nutrient reductions than expected from the original strategies.

While the 20-year planning period for this BMAP is 2018 to 2036, projects completed since 2004, count toward the overall nitrogen reduction goals.

Estimated nitrogen reductions are subject to refinement based on DEP verification and/or on adjustment to calculations based on loading to groundwater rather than surface water. Agriculture load reductions (FDACS-01 and FDACS-02) assume 100 % enrollment and verification. Projects with a designation of TBD (to be determined) denotes information is not currently available, but will be provided by the stakeholder when it is available. Projects with a designation of N/A (not applicable) indicates the information for that category is not relevant to that project. Projects with a designation of "Not Provided" denotes that information was requested by DEP but was not provided by the lead entity.

## Table B-1. Stakeholder projects to reduce nitrogen sources

| Lead Entity | Project Number | Project Name | Project Description | Project Type | Project Status | Start Date | Estimated Completion Date | Nitrogen Source Addressed by Project | Estimated Nitrogen Load Reduction (lb-N/yr) | Cost Estimate | Funding Source | Funding Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FDACS | FDACS-01 | BMPs Implementation and Verification - Farm Fertilizer | Implementation of existing BMPs on applicable acreage. Up to 15% reduction in load to groundwater. | Agricultural BMPs | Underway | Not Provided | N/A | FF | 51,480 | TBD | FDACS | TBD |
| FDACS | FDACS-02 | BMPs Implementation and Verification - Livestock Waste (Non-Dairy) | Implementation of existing BMPs at applicable facilities. Up to 10% reduction in load to groundwater. | Agricultural BMPs | Underway | Not Provided | N/A | LW | 6,843 | TBD | FDACS | TBD |
| Golf Courses | GC-01 | Golf Course Reduction Credits | 6% BMP credit on golf course load to groundwater, assuming 100% BMP implementation by golf course owners. | BMPs | Planned | TBD | TBD | STF | 19 | TBD | TBD | TBD |
| Jefferson County | JC-01 | Wacissa Springs Park Improvement Phase I | Construct picnic shelters, restroom facilities, and boardwalk. | LID-Other | Underway | 2017 | 2018 | UTF | TBD | $390,126 | DEP/ County | DEP: $195,063 County: $195,063 |
| Jefferson County | JC-02 | Wacissa Springs Park Improvement Phase II | Provide slope protection in eroded areas around the main springs of Wacissa Springs. Remove sediment at Aucilla Springs and Thomas Springs to open non-flowing vents. Replace dirt parking lot with asphalt and stormwater management facility. TN reduction to land surface of 42,303 lb-N/yr adjusted to reflect load to groundwater. | Shoreline Stabilization | Underway | 2017 | 2019 | UTF | 11,422 | $521,500 | DEP/ County | DEP: $517,500 County: $4,000 |
| Local Governments | LG-01 | Public Education | Adopted fertilizer ordinance. | Education Efforts | Planned | TBD | TBD | UTF | 19 | TBD | TBD | TBD |

| Lead Entity | Project Number | Project Name | Project Description | Project Type | Project Status | Start Date | Estimated Completion Date | Nitrogen Source Addressed by Project | Estimated Nitrogen Load Reduction (lb-N/yr) | Cost Estimate | Funding Source | Funding Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NWFWMD | NWF-01 | St. Marks River and Apalachee Bay Surface Water Improvement Management (SWIM) Plan | Implementation and periodic review and update of the SWIM Plan which includes the Aucilla River and Wacissa Spring Group. | Study | Completed | 2015 | 2017 | Other | N/A | Not Provided | NWFWMD | Not Provided |
| Permitted Dairies | PD-01 | Dairy BMP Reduction Credits | 15% BMP credit on dairy load to groundwater assuming 100% owner implemented BMPs on all dairy lands. | Agricultural BMPs | Planned | TBD | TBD | Dairy | 4,642 | TBD | TBD | TBD |
| Sports Fields | SF-01 | Sports Field Reduction Credits | 10% BMP credit on sports field load to groundwater, assuming 100% BMP implementation by sports field owners. | BMPs | Planned | TBD | TBD | STF | 7 | TBD | TBD | TBD |
| SRWMD | SRWMD-01 | Coastal Rivers Basin SWIM Plan | Implementation and periodic review and update of the Coastal Rivers SWIM Plan which includes the Aucilla River and Wacissa Spring Group. | Study | Completed | 2015 | 2017 | Other | N/A | Not Provided | SRWMD | Not Provided |
| SRWMD | SRWMD-02 | Lower Aucilla River Hydrographic Survey | Complete digital hydrographic survey that will allow creation of a hydrological model of the Aucilla/Wacissa watershed. | Study | Completed | 2014 | 2014 | Other | N/A | $200,000 | SRWMD | SRWMD: $200,000 |
| SRWMD | SRWMD-03 | Walker Springs Road Cross Drains | Improve flood protection and erosion at three unpaved road crossings over Bailey Mill Creek. | Stormwater System Rehabilitation | Completed | 2016 | 2018 | UTF | N/A | $45,920 | SRWMD | SRWMD: $39,420 County: $6,500 |

| Lead Entity | Project Number | Project Name | Project Description | Project Type | Project Status | Start Date | Estimated Completion Date | Nitrogen Source Addressed by Project | Estimated Nitrogen Load Reduction (lb-N/yr) | Cost Estimate | Funding Source | Funding Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF-IFAS | IFAS-01 | Winter Forage Demonstration Plots | Established winter forage demonstration plots on farms in 2014, 2015, 2016, and 2017 to demonstrate the benefits of overseeding legumes on pastures to reduce dependence on nitrogen for winter forage production. Two field days were held in 2014 and 2016. | Agricultural BMPs | Completed | 2014 | 2017 | FF | N/A | Not Provided | Not Provided | Not Provided |
| UF-IFAS | IFAS-02 | Cover Crop Demonstrations | Established long-term cover crop demonstrations on three farms to demonstrate the multiple benefits of cover crop blends. These demonstrations will reflect cover crops ability to reduce soil erosion, improve water filtration, recycle nutrients, make nitrogen, improve beneficial insect habitat, and improve soil health. | Agricultural BMPs | Underway | Not Provided | TBD | FF | TBD | Not Provided | Not Provided | Not Provided |
| Various | OSTDS-01 | Enhancement of Existing OSTDS - Voluntary | Repair, upgrade, replacement, drainfield modification, addition of effective nitrogen reducing features, initial connection to a central sewerage system, or other action to reduce nutrient loading, voluntarily taken by the owner of an OSTDS within the BMAP. | OSTDS Enhancement | Underway | 2018 | N/A | OSTDS | TBD | TBD | DEP | TBD |

| Lead Entity | Project Number | Project Name | Project Description | Project Type | Project Status | Start Date | Estimated Completion Date | Nitrogen Source Addressed by Project | Estimated Nitrogen Load Reduction (lb-N/yr) | Cost Estimate | Funding Source | Funding Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wastewater Utilities | WU-01 | Wastewater Treatment Facility Reduction Credits | Achieved by WWTF policy if implemented BMAP-wide, achieving 3 or 6 mg/L. | WWTF Upgrade | Planned | TBD | TBD | WWTF | 2026 | TBD | TBD | TBD |

# Appendix C. PFAs

A PFA is defined as the area(s) of a basin where the Floridan aquifer is generally most vulnerable to pollutant inputs and where there is a known connectivity between groundwater pathways and an OFS. As required by the Florida Springs and Aquifer Protection Act, DEP delineated a PFA for the Wacissa Spring Group. The PFA is adopted and incorporated by reference into this BMAP. Detailed information on the PFA is available in report format at the following link: http://publicfiles.dep.state.fl.us/dear/PFAs.

# Appendix D. OSTDS Remediation Plan

The Florida Aquifer and Springs Protection Act specifies that if during the development of a BMAP for an OFS, DEP identifies OSTDS as contributors of at least 20 % of nonpoint source nitrogen pollution in a PFA or if DEP determines remediation is necessary to achieve the TMDL, the BMAP shall include an OSTDS remediation plan. Based on the Wacissa River and Wacissa Spring Group NSILT estimates and GIS coverages, OSTDS contribute approximately 4 % of the pollutant loading in the PFA. Irrespective of the percent contribution from OSTDS, DEP has determined that an OSTDS remediation plan is necessary to achieve the TMDLs and to limit the increase in nitrogen loads from future growth.

## D.1 Plan Elements

### *D.1.1 Installation of New OSTDS*

Per statute, new OSTDS on lots of less than one acre are prohibited within PFAs, if the addition of the specific systems conflicts with an OSTDS remediation plan incorporated into an OFS BMAP (see Section 373.811(2), F.S.). This OSTDS remediation plan prohibits new conventional systems on lots of less than one acre within the PFAs, unless the OSTDS includes enhanced treatment of nitrogen or unless the OSTDS permit applicant demonstrates that sewer connections will be available within 5 years. To aid in implementation, the DEP Map Direct webpage includes a detailed downloadable springs PFA boundary shapefile. DEP also maintains on its website an interactive map of the PFA and BMAP boundaries; the map can be easily searched for specific street address locations.

FDOH permits the installation of new OSTDS pursuant to Chapter 64E-6, F.A.C., which includes not only systems installed on a property where one has not previously been installed, but also systems installed to replace illegal systems, systems installed in addition to existing systems, and other new systems. FDOH permitting requirements with respect to the definition of "new" or "less than one acre" will be followed for this remediation plan. To meet the enhanced treatment of nitrogen requirement the system must include at least one of the following nitrogen reducing enhancements:

- Features allowed pursuant to FDOH rule, such as in-ground nitrogen-reducing biofilters (media layer systems)

- Features consistent with and identified in the FDOH Florida Onsite System Nitrogen Removal Strategy Studies report, such as in-tank nitrogen-reducing biofilters

- Other FDOH-approved treatment systems capable of meeting or exceeding the NSF International (formerly National Sanitation Foundation [NSF]) Standard 245 nitrogen removal rate before disposing the wastewater in the drain field, such as aerobic treatment units (ATU) and performance-based treatment systems (PBTS). For FDOH-approved treatment systems that meet NSF 245, but do not meet or exceed the minimum treatment

level expected from the in-ground nitrogen-reducing biofilters, the drain fields, at minimum, shall be installed with a 24-inch separation between the bottom of the drain field and the seasonal high-water table.

### *D.1.2 Modification and Repair of Existing OSTDS*

At this time, this remediation plan does not require the addition of nitrogen reducing enhancements upon modification or repair of existing OSTDS.

### *D.1.3 Other Plan Elements*

Statutes also require that OSTDS remediation plans contain the following elements.

- An evaluation of credible scientific information on the effect of nutrients, particularly forms of nitrogen, on springs and spring systems. (See **Section D.2**.)
- Options for repair, upgrade, replacement, drain field modification, the addition of effective nitrogen-reducing features, connection to a central sewer system, or other action. (See **Section D.3**.)
- A public education plan to provide area residents with reliable, understandable information about OSTDS and springs. (See **Section D.4**.)
- Cost-effective and financially feasible projects necessary to reduce the nutrient impacts from OSTDS. (See **Section 2** and **Appendix B**.)
- A priority ranking for each project for funding contingent on appropriations in the General Appropriations Act. (See **Section 2** and **Appendix B**.)

The Florida Springs and Aquifer Protection Act defines an OSTDS as a system that contains a standard subsurface, filled, or mound drain field system; an aerobic treatment unit; a graywater system tank; a laundry wastewater system tank; a septic tank; a grease interceptor; a pump tank; a solids or effluent pump; a waterless, incinerating, or organic waste–composting toilet; or a sanitary pit privy that is installed or proposed to be installed beyond the building sewer on land of the owner or on other land on which the owner has the legal right to install such a system. The term includes any item placed within, or intended to be used as a part of or in conjunction with, the system. The term does not include package sewage treatment facilities and other treatment works regulated under Chapter 403, F.S.

## D.2 Collection and Evaluation of Credible Scientific Information

As discussed in **Section 2,** DEP developed the NSILT, a planning tool that provides estimation of nitrogen loading sources to groundwater based on the best available scientific data for a particular geographic area. The NSILT estimates prepared for the Wacissa Spring Group PFA

were peer reviewed by NWFWMD, SRWMD, FDOH, and FDACS. Additional technical support information concerning the NSILT can be found in **Appendix E**.

## D.3 Remediation Options

The NSILT estimates that OSTDS contribute approximately 4 % of the pollutant loading to groundwater in the PFAs. **Table D-1** lists the number of existing OSTDS in the PFAs and the estimated nitrogen reductions associated with enhancement or connection to sewer.

**Table D-1. Estimated reduction credits for additional OSTDS enhancement or sewer***

***Estimated reductions are for either enhancement or sewer per parcel classification. Reductions cannot be combined for the same parcel classification, but can be combined between the different classifications. For example, the sewer credit associated with parcels less than one acre in size can be combined with the sewer credit associated with parcels one acre or greater in size.

| Recharge Area | OSTDS Parcels Less Than One Acre in PFAs | Credit for Sewer (lb-N/yr) | Credit for Enhancement (lb-N/yr) | OSTDS Parcels One Acre and Greater in PFAs | Credit for Sewer (lb-N/yr) | Credit for Enhancement (lb-N/yr) |
|---|---|---|---|---|---|---|
| **High** | 161 | 1,420 | 972 | 728 | 6,423 | 4,395 |
| **Medium** | 74 | 363 | 248 | 715 | 3,505 | 2,398 |
| **Total** | **235** | **1,783** | **1,220** | **1,443** | **9,927** | **6,792** |

As required by statute, this OSTDS remediation plan identifies remediation options for existing OSTDS, including repair, upgrade, replacement, drain field modification, the addition of effective nitrogen-reducing features, connection to a central sewer system, or other action. More simply, remediation options can be classified as enhancement or replacement. Enhancement options consist of systems identified in either existing FDOH rules or existing and ongoing FDOH studies, or systems not otherwise prohibited by FDOH. Examples of enhancements include in-ground nitrogen-reducing biofilters (media layer systems); in-tank nitrogen-reducing biofilters; and ATU or PBTS capable of meeting or exceeding the NSF Standard 245 nitrogen removal rate before disposing wastewater in the drain field.

Nitrogen impacts from new development could also be reduced through prohibiting new conventional OSTDS on all lots in the PFAs, throughout the BMAP area, or both.

DEP, FDOH, and local governments will develop programs to help fund the additional costs required to upgrade existing OSTDS to include nutrient reducing features. Although upgrading existing OSTDS to include nitrogen reducing features is not required by this BMAP, upgrades would be beneficial within the PFAs and throughout the BMAP area. The funding program will be designed to prioritize OSTDS where it is most economical and efficient to add nutrient reducing features (i.e., systems needing a permit for a repair or modification, within the PFA, and on lots of less than one acre).

To facilitate incorporation of nitrogen reducing features at the time of a permit to repair or modify an existing OSTDS, FDOH will pursue regulatory solutions to accomplish the following objectives:

- Update OSTDS rule language regarding permits, variances, and waivers to include consideration of DEP-adopted OSTDS remediation plans.

- Update OSTDS rules to allow installation of passive remediation systems, including but not limited to systems featuring liners, nitrogen reducing material, or both underneath the drain field.

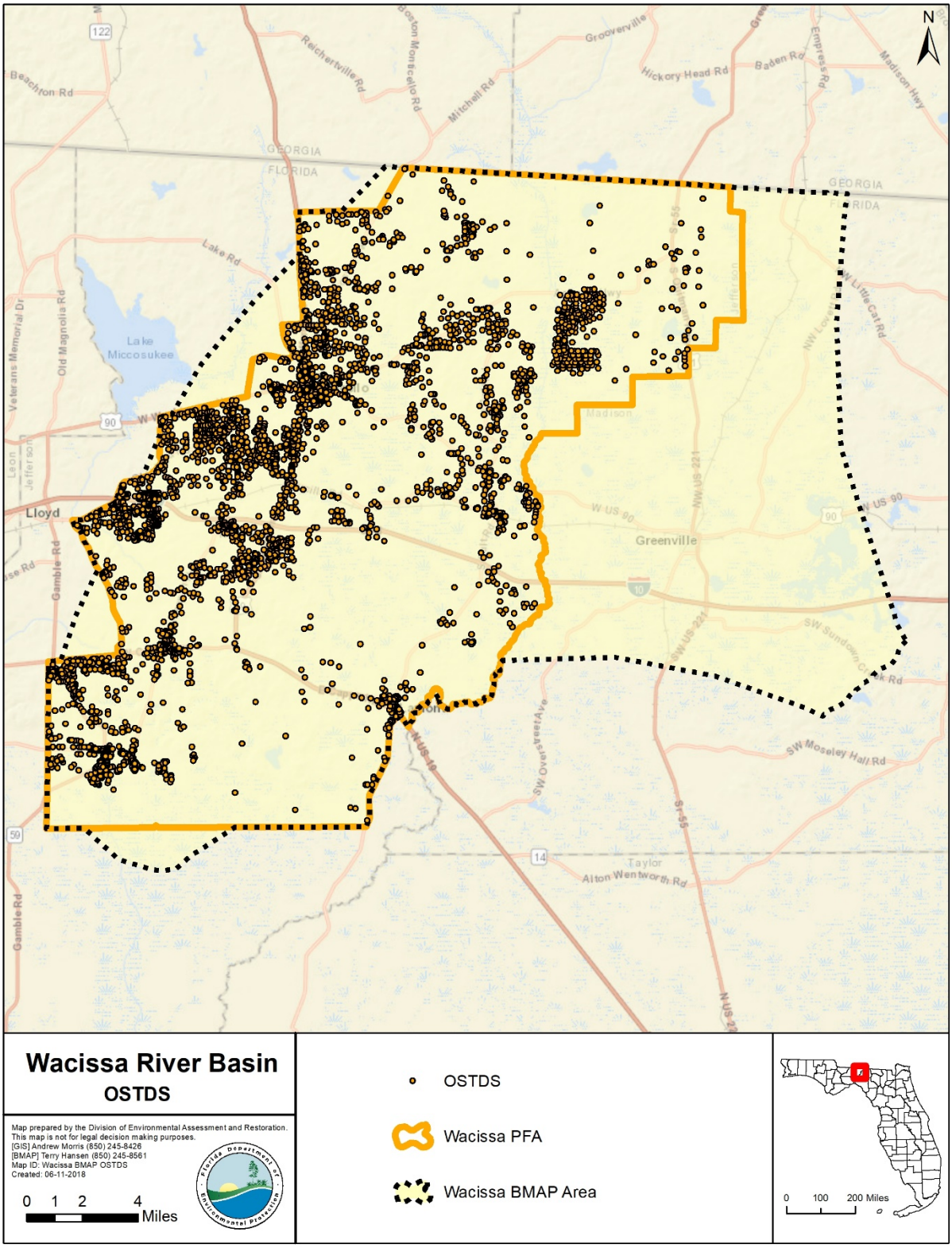


**Figure D-1. OSTDS locations in the Wacissa River BMAP Area**

## D.4 Public Education Plan

DEP and FDOH will develop and disseminate educational material focused on homeowners and guidance for builders and septic system contractors. The materials will identify the need for advanced, nitrogen reducing OSTDS along with the requirements for installing nitrogen reducing technologies under this OSTDS remediation plan. DEP will coordinate with industry groups such as Florida Home Builders Association and the Florida Onsite Wastewater Association (FOWA).

# Appendix E. Technical Support Information

## E.1. NSILT Data

An NSILT workbook was completed for the Wacissa springshed in the Wacissa River and Spring Group BMAP. This technical support information identifies the data sources relied upon during NSILT development and documents the major assumptions used by DEP when applying the NSILT approach to the springsheds in the Wacissa BMAP.

The general NSILT approach involves estimating the nitrogen load to the surface for various source categories based on land use. The NSILT subjects the surface loading to recharge and attenuation to derive the estimated load to groundwater at the top of the aquifer. The estimated load to groundwater determines the scope of reduction strategies needed in the BMAP for each source category. For additional information about the general NSILT approach, see any of the NSILT reports posted online at http://publicfiles.dep.state.fl.us/DEAR/NSILT/.

### *E.1.1 General Data Inputs*

*Hydrogeology and Aquifer Recharge*
Aquifer recharge information is based on a 2009 spatial data layer developed for the Florida Natural Areas Inventory by the FGS. This layer assesses groundwater recharge and attributes a priority ranking to identify significant recharge areas. This layer was reclassified to high, medium, low, and discharge areas that were used in the development of this NSILT.

*Land Use*
Land use information is from SRWMD (2013-14) and NWFWMD (2015-16) based on the Florida Land Use Cover and Forms Classification System (FLUCCS) and 2016 to 2017 property appraiser data for Jefferson and Madison Counties.

### *E.1.2 Land Surface Nitrogen Inputs*

*Atmospheric Deposition*
Atmospheric deposition information is derived from the TDEP hybrid model (Schwede and Lear 2014) that inputs wet and dry monitoring network data for the U.S. and calculates an estimated TN deposition load. The data set is comprised of data from 2011 to 2013.

*WWTFs*
The average annual input of nitrogen to the land surface was estimated for each effluent land application site in the BMAP area using TN concentration and discharge volume data available in the DEP Wastewater Facility Regulation (WAFR) database. The range of years for which data were available varied with the individual WWTFs; however, the majority of the data were from 2016 to 2017.

*OSTDS*

In 2014, FDOH began the Florida Water Management Inventory (FLWMI), a statewide project to develop GIS mapping attributes for water use and wastewater treatment method for all parcels by county. The results of this inventory can be obtained from FDOH.

Results from the 2016 release of the FLWMI were used to estimate the total number of septic systems within the BMAP area boundary. ArcGIS files provided the locations of both known and estimated septic systems.

The population served by the OSTDS was estimated using the 2010 U.S. Census Bureau data. Data were used to estimate the effective population and OSTDS usage. Several literature sources have reported a per capita contribution of 9.012 lb-N/yr, and this value was multiplied by the number of people using septic tanks within the different regions of the BMAP area (U.S. Environmental Protection Agency [EPA] 2002; Toor et al. 2011; Viers et al. 2012).

*UTF*

In 2016, a contractor conducted a telephone survey to solicit information about residential fertilizer use in Leon County (Oppenheim 2016). This survey provided information on urban turf fertilizer application practices near the BMAP area. Information was also obtained from a 2008 study by a SWFWMD contractor in the Springs Coast region (Martin 2008). Some information about fertilizer use was obtained from each survey, although none of them provided a complete picture. The results provided input data on percent of the population that fertilize, the applicator (landscape professional versus homeowner), and application rates.

The type of property where fertilizer is applied is estimated for nonresidential and residential parcels. The acreage receiving fertilizer is estimated the same for both parcel types by using county property appraiser data and zoning data. Impervious and pervious land areas are determined for each parcel.

Nonresidential parcels are assumed to be fertilized by a commercial service provider at a rate of 21.78 lb-N/acre (ac). Residential parcels are evaluated by estimating the percentage of the property fertilized and the probability of fertilization, listed below in **Table E-1**. For residential parcels, these factors are determined by utilizing property values (higher valued properties fertilize more often and in greater amounts) and parcel type (single-family residences fertilize more frequently than other residence types).

**Table E-1. Average distribution of property values and the probability of fertilization within the three springsheds**

| Springshed | Property Value Label | Property Value | Probability of Fertilization (%) |
|---|---|---|---|
| **Wacissa** | Low | < $48,000 | 10 |
| | Medium | $48,001 - $120,000 | 75 |
| | High | > $20,001 | 90 |

*STF*

Sports turfgrass areas include golf courses and sporting facilities. There is only one golf course in the BMAP area, and a fertilizer application rate, of 71.0 lb-N/ac/yr was used based off average application rates from nearby areas.

Sporting facilities are assessed based on property appraiser data. Acreage of sports turfgrass is verified using aerial imagery. The commercial lawn service fertilizer application rate for nonresidential parcels is used (21.78 lb-N/ac).

*Dairies*

DEP permits and industry feedback are used to obtain herd size and characteristics for both permitted and non-permitted dairies. The nitrogen waste factor for each cattle type is based on published literature values (see **Table E-2**; Ruddy et al. 2006; Cabrera et al. 2006). The confinement and grazing times; waste management and disposal methods: and herd characteristics are assessed individually for each dairy when detailed information is provided.

**Table E-2. Daily waste factors for dairy cattle**

| Livestock | Waste Factor (lb-N/day) |
|---|---|
| **Lactating Dairy Cow** | 0.794 |
| **Dry Dairy Cow** | 0.397 |
| **Heifer/Springer** | 0.243 |
| **Springers** | 0.198 |
| **Bulls** | 0.375 |
| **Calves- Dairy** | 0.088 |

*Livestock Waste*

Nitrogen inputs from beef cattle and miscellaneous livestock are included in the livestock waste category.

For cow-calf operations, population numbers are derived from the 2016 U.S. Department of Agriculture (USDA) Survey of Agriculture and the estimated quantity of pasture acreage is based on SRWMD land use.

Populations of other livestock animals (goats, sheep, hogs, etc.) are estimated from the USDA census of agriculture and SRWMD land use coverage adjusted by percent of land likely to contain livestock in the springsheds. The nitrogen waste factor for each animal type is based on published literature values and subdivided into locations and recharge area. The nitrogen waste factors per animal are listed in **Table E-4** (Goolsby et al. 1999; Chelette et al. 2002; Ruddy et al. 2006; Meyer 2012; Sprague and Gronberg 2013).

**Table E-3. Daily waste factors for miscellaneous livestock**

| Livestock | Waste Factor (lb-N/day) |
|---|---|
| **Chicken, Broilers** | 0.002 |
| **Chicken, Layers** | 0.003 |
| **Beef Cows** | 0.337 |
| **Other Beef Cattle** | 0.311 |
| **Calves Beef** | 0.068 |
| **Equine** | 0.273 |
| **Goats** | 0.035 |
| **Hogs** | 0.19 |
| **Sheep** | 0.198 |
| **Turkeys** | 0.006 |

*FF*

Water Management District land use information, and an agricultural land use planning tool called the FSAID Geodatabase, developed for the FDACS, were used to assign and classify crop types grown on identified agricultural acreages.

Agricultural fertilizer is applied at varying rates, depending on crop type and farm practices. Estimated applications rates are based on UF-IFAS recommendations and adjusted rates based on producer feedback. The rates are listed below in **Table E-5.** Application rates are applied to the calculated acreages for the corresponding crop types to estimate FF input.

**Table E-4. Summary of crop types and assumed nitrogen application rates**

* Nursery operations receiving treated effluent from WWTFs, and using supplemental nitrogen fertilizer have a higher application rate
** Three pine plantations containing row crops were identified by FSAID in the springshed

| Crop | Application Rate (lb-N/ac/yr) |
|---|---|
| **Blueberries** | 50 |
| **Container Nursery** | 90 |
| **Container Nursery WWTF*** | 100 |
| **Corn** | 250 |
| **Cotton** | 125 |
| **Cropland and Pastureland** | 60 |
| **Field Corn** | 250 |
| **Field Crops** | 90 |
| **Field Nursery** | 90 |
| **Hay** | 240 |
| **Millet** | 65 |
| **Mixed Shrubs** | 90 |
| **Nurseries and Vineyards** | 90 |
| **Nursery** | 90 |
| **Ornamentals** | 90 |
| **Other Groves (Pecan, Avocado, Coconut, Mango, etc)** | 90 |

| Crop | Application Rate (lb-N/ac/yr) |
|---|---|
| **Row Crops** | 106 |
| **Hunting Plantations**** | 50 |
| **Sod** | 50 |
| **Sweet Potatoes** | 60 |
| **Vegetables** | 151 |
| **Watermelons** | 175 |

*Estimated Nitrogen Inputs to Land Surface*

The estimated input from each source category above is summed and a relative percent calculated.

### *E.1.3 Nitrogen Attenuation and Loading to Groundwater*

The two types of attenuation that are evaluated are biochemical attenuation factors (BAFs) and hydrogeological attenuation (i.e., recharge).

*BAFs and Uncertainty Factors*

The BAFs used to account for the processes affecting the movement of nitrogen from each source category in the subsurface are based on literature review of studies in Florida and similar areas. The BAFs in **Table E-7** are the result of this evaluation. The BAF is used to estimate what percent of the surface input could infiltrate to groundwater. For example, if 70 % of urban fertilizer is biologically attenuated, then the remaining 30 % could infiltrate to the groundwater.

The environmental attenuation of nitrogen from specific sources within the categories can vary substantially, both spatially and with depth in the subsurface, and will affect the amount of nitrogen leaching to groundwater and the relative contribution of nitrogen from each source category. The range in nitrogen attenuation can result from variability in soil properties, crop types, agricultural practices, nitrogen storage, volatilization of ammonia to the atmosphere, uptake by vegetation, denitrification, and other removal processes. The potential range in nitrogen attenuation for each source is shown in **Table E-7**.

**Table E-5. Range of environmental attenuation of nitrogen from a detailed literature review**

| N Source Category | Low-Level Attenuation (%) | Attenuation Used for This Analysis (%) | High-Level Attenuation (%) |
|---|---|---|---|
| **Atmospheric Deposition** | 85 | 90 | 95 |
| **WWTFs-RIBs** | 10 | 25 | 40 |
| **WWTFs-Sprayfield** | 50 | 60 | 75 |
| **WWTF-Reuse** | 50 | 75 | 85 |
| **Septic Tanks** | 40 | 50 | 75 |
| **Dairies** | 30 | 85 | 90 |
| **Farm Fertilizers** | 50 | 80 | 90 |
| **Urban Fertilizers** | 50 | 70 | 85 |

*Hydrogeological Attenuation (i.e., Recharge)*

Most of the nitrogen in a given year does not reach groundwater due to hydrogeologic nitrogen attenuation processes and variations in the rate of aquifer recharge. In areas of the Wacissa Springs BMAP where recharge rates are categorized as medium (3.01 to 10 in/yr) or high (greater than 10 in/yr), the UFA is more vulnerable to contamination than in areas where recharge rates are low (0 to 3 in/yr).

The recharge rate for the area where the surface input is calculated is based on the composite recharge map previously described. To account for variations in recharge rates to the UFA, non-attenuated nitrogen inputs in high rate recharge areas are multiplied by a weighting factor of 0.9, while nitrogen inputs are multiplied by a weighting factor of 0.5 for medium rate recharge areas and 0.1 for low. Groundwater discharge areas were not included in the calculations of nitrogen loads to the groundwater contributing area, as these areas do not contribute nitrogen to the aquifer.

*Estimated Nitrogen Loads to Groundwater*

The surface inputs by source category are adjusted by applying the BAFs for the appropriate source category and location-based recharge factors to estimate the load to groundwater by source category. It is important to note that this load is estimated for the top of the aquifer. As the load interacts with the aquifer, additional factors likely modify it prior to discharge at the spring vents.

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# Appendix F. FDACS Information on BMPs

## F.1 Implementation of Agricultural BMPs

Agricultural nonpoint sources in a BMAP area are required by state law (Subsection 403.067(7), F.S.) either to implement FDACS-adopted BMPs, which provides a presumption of compliance with water quality standards, or to conduct water quality monitoring prescribed by DEP, NWFWMD, or SRWMD. Failure either to implement BMPs or conduct monitoring may result in enforcement action by DEP.

Growers who implement BMPs may be eligible for cost-share funding from FDACS, NWFWMD, SRWMD, or others to defray partially the costs of implementation. Through the OAWP, the Florida Forest Service, and the Division of Aquaculture, FDACS develops, adopts, and assists producers in implementing agricultural BMPs to improve water quality and water conservation.

FDACS identified potential land that could be enrolled in the BMP Program in the Wacissa BMAP area using the FSAID IV geodatabase.

**Table F-1** summarizes the land use data for agriculture in the Wacissa BMAP area. Based on the FSAID IV geodatabase, the total agricultural lands within the Wacissa BMAP area are 50,737 acres. **Table F-2** summarizes the agricultural land that by crop type that was estimated to be fertilized and the corresponding acreages. The primary agricultural fertilized land use in the Wacissa River Basin is Improved Pasture which comprises 46 % of the fertilized land use in the BMAP area. **Table F-3** provides a summary of the agricultural lands with livestock. It is important to note that some of the agricultural lands include more than one agricultural practice.

**Figure F-1** shows the approximate location of the agricultural lands based on the FSAID within the Wacissa BMAP area.

**Table F-1. Agricultural land use by nutrient source in the Wacissa River and Wacissa Spring Group BMAP area**

| Agricultural Nitrogen Loading Category | Acres |
|---|---|
| **Crop Fertilizer Lands only** | 16,494 |
| **Livestock Lands only** | 4,169 |
| **Crop Fertilizer and Livestock Lands** | 30,074 |
| **Total** | **50737** |

**Table F-2. Fertilized croplands in the Wacissa River BMAP area**

| Crop Type | Application Rate (lbs/acre) | Acres |
|---|---|---|
| **Container Nursery** | 90 | 400 |

| Crop Type | Application Rate (lbs/acre) | Acres |
|---|---|---|
| **Corn** | 210 | 390 |
| **Cotton** | 120 | 203 |
| **Cropland and Pastureland** | 60 | 8,032 |
| **Field Corn** | 210 | 180 |
| **Field Crops** | 90 | 167 |
| **Field Nursery** | 90 | 10 |
| **Grass/Pasture** | 80 | 521 |
| **Hay** | 160 | 12,656 |
| **Improved Pasture** | 60 | 21,521 |
| **Millet** | 65 | 238 |
| **Nursery** | 90 | 30 |
| **Ornamentals** | 90 | 151 |
| **Other Groves** | 90 | 124 |
| **Peanuts** | 20 | 1,082 |
| **Pecans** | 90 | 7 |
| **Rye** | 100 | 54 |
| **Sod** | 50 | 623 |
| **Sweet Potatoes** | 60 | 88 |
| **Vegetables** | 151 | 72 |
| **Watermelons** | 175 | 20 |
| **Total** | - | **46,569** |

**Table F-3. Livestock lands in the Wacissa River and Wacissa Spring Group BMAP area**

| Livestock Category | Acres |
|---|---|
| **Cropland and Pastureland** | 8,032 |
| **Improved Pasture** | 21,521 |
| **Grass/Pasture** | 521 |
| **Dairy** | 49 |
| **Herbaceous (Dry Prairie)** | 1,789 |
| **Horse Farms** | 580 |
| **Mixed Shrubs** | 7 |
| **Poultry Feeding Operations** | 4 |
| **Unimproved Pastures** | 717 |

| Livestock Category | Acres |
|---|---|
| **Woodland Pastures** | 1,023 |
| **Total** | **34,243** |

Agricultural land use data are critical for determining agricultural nonpoint source loads and developing strategies to reduce those loads in a BMAP area, but there are inherent limitations in the available data. The time of year when land use data are collected (through aerial photography) affects the accuracy of photo interpretation. Flights are often scheduled during the winter months because of weather conditions and reduced leaf canopies, and while these are favorable conditions for capturing aerial imagery, they make photo interpretation for determining agricultural land use more difficult (e.g., more agricultural lands are fallow in the winter months) and can result in inappropriate analysis of the photo imagery. There is also significant variation in the frequency with which various sources of data are collected and compiled, and older data are less likely to capture the frequent changes that often typify agricultural land use. In addition, agricultural activity is not always apparent, for example, acreage classified as improved pasture may be used for a cow-calf operation, consist of forage grass that is periodically harvested for hay, or simply be a fallow vegetable field awaiting planting. Finally, the classification method itself may be an issue, for example, property appraiser data assigns an agricultural land use designation to an entire parcel, although agricultural production may only be conducted on a portion of the parcel. Because of error in the collection and characterization of land use data and changes in land use over time, agricultural land use acreage estimates are subject to adjustment.

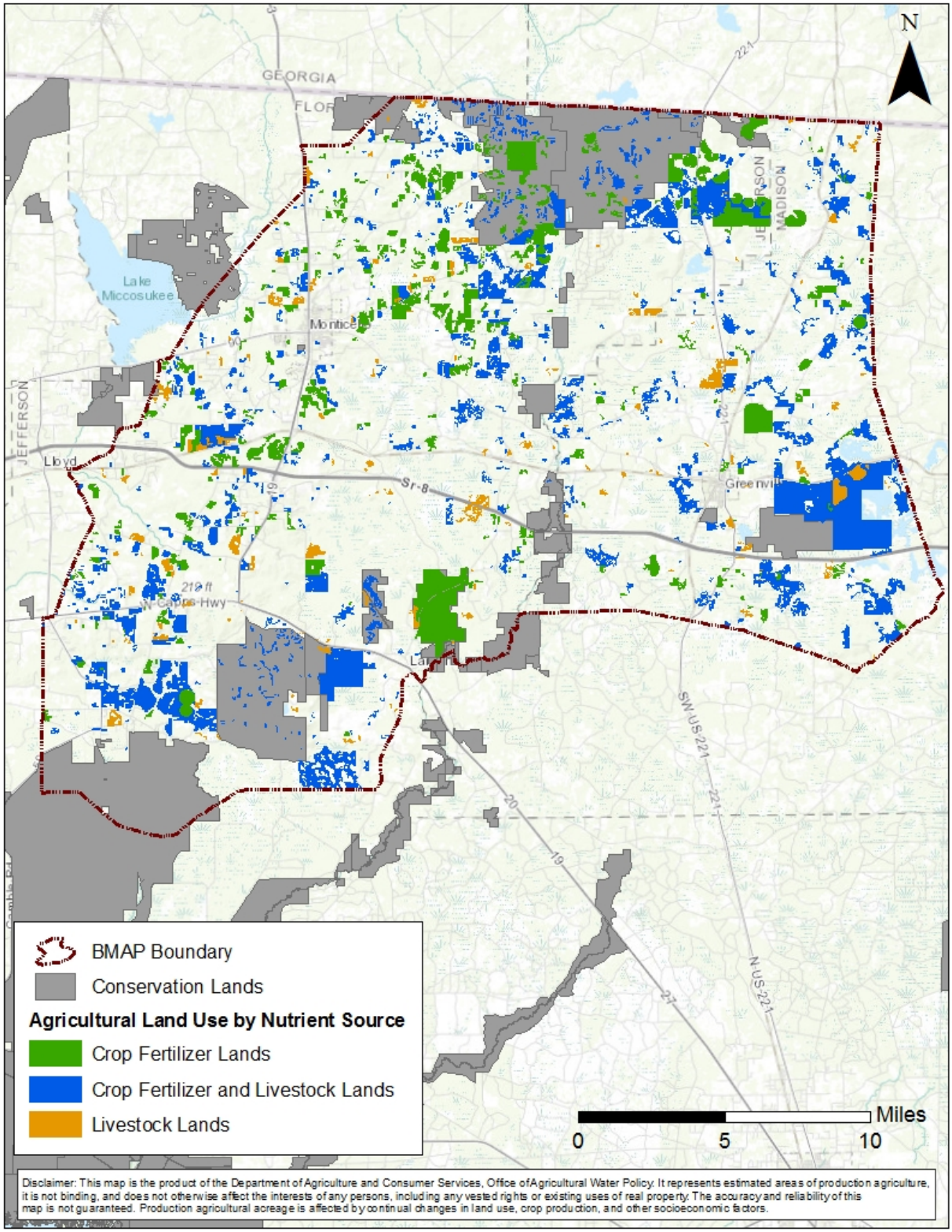


**Figure F-1. Agricultural lands in the Wacissa River and Wacissa Spring Group BMAP area**

## F.2 Agricultural BMPs

Through the Office of Agricultural Water Policy, the Florida Forest Service, and the Division of Aquaculture, FDACS develops, adopts, and assists producers in implementing agricultural BMPs to improve water quality and water conservation. Adopted BMPs are initially verified by the FDEP as reducing nutrient loss (e.g., total nitrogen and total phosphorus [TP]) to the environment. OAWP BMPs are published in commodity-specific manuals that cover key aspects of water quality and water conservation. The BMP categories include:

- Nutrient Management practices that help determine appropriate source, rate, timing, placement of nutrients (including both organic and inorganic sources) to minimize impacts to water resources.

- Irrigation and Water Table Management practices that address methods for irrigating to reduce water and nutrient losses to the environment and to maximize the efficient use and distribution of water.

- Water Resource Protection practices such as buffers, setbacks, and swales to reduce or prevent the transport of nutrients and sediments from production areas to water resources.

The Notice of Intent to Implement (NOI) and BMP checklist are incorporated into each manual.

Information on the BMP manuals and field staff contact information can be obtained here: http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy. Printed BMP manuals can be obtained by contacting OAWP field staff.

OAWP outreach to solicit enrollment extends to all types of agricultural operations, but is more intensive in BMAP areas because of the relationship of BMPs to the presumption of compliance with water quality standards in a BMAP area. FDACS field staff works with producers to enroll in the FDACS BMP program by signing a Notice of Intent to Implement BMPs, and enrollment is based on the expectation that producers recognize and address the water quality and conservation issues associated with their operations. Upon completion of all information in the BMP checklist, an NOI must be signed by the landowner or the landowner's authorized agent (who may be the producer if the producer is not the landowner).

## F.3 BMP Enrollment

**Figure F-2** shows the acres enrolled in the FDACS BMP Program in the Wacissa River and Wacissa Spring Group BMAP area as of December 31, 2017. **Table F-4** lists the acres enrolled in the FDACS BMP Program by manual and the number of NOIs associated with those acres. Given that the enrolled acres on which BMPs are implemented can contain nonproduction acres

(such as buildings, parking lots, and fallow acres), only the enrollment for the land classified as agriculture based on the FSAID land use is included in **Table F-5**.

As of December 31, 2017, NOIs cover 34,066 agricultural acres in the Wacissa River and Wacissa Spring Group BMAP area. No producers are conducting water quality monitoring in lieu of implementing BMPs at this time.

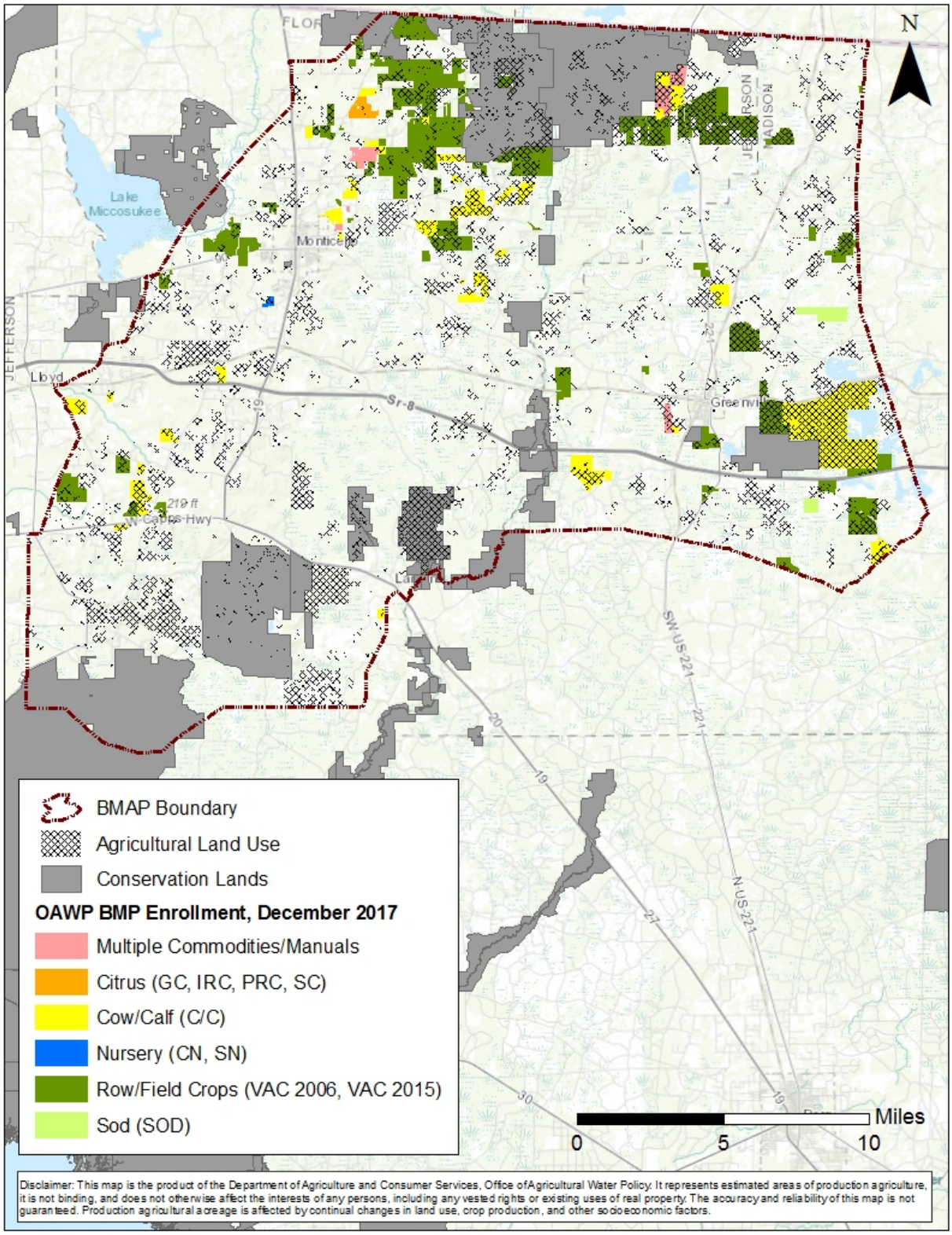


**Figure F-2. BMP enrollment in the Wacissa River Basin and Wacissa Spring Group as of December 31, 2017**

**Table F-4. Agricultural acreage and BMP enrollment in the Wacissa River Basin and Wacissa Spring Group BMAP area as of December 31, 2017**

| Related FDACS BMP Programs | NOI Acreage Enrolled | Agricultural Land Use Acres within NOIs |
|---|---|---|
| **Citrus** | 312 | 11 |
| **Cow/Calf Operations** | 8,792 | 6,453 |
| **Multiple Commodities** | 1,019 | 506 |
| **Nurseries** | 64 | 43 |
| **Vegetable and Agronomic Crops** | 23,274 | 9,804 |
| **Sod** | 605 | 0 |
| **Total** | **34,066** | **16,817** |

## F.4 FDACS OAWP Role in BMP Implementation and Follow-Up

OAWP works with producers to submit NOIs to implement the BMPs applicable to their operations, provides technical assistance to growers, and distributes cost-share funding, as available, to eligible producers for selected practices. OAWP follows up with growers through site visits to evaluate the level of BMP implementation and record keeping, identify areas for improvement, if any, and discuss cost-share opportunities.

When DEP adopts a BMAP that includes agriculture, it is the agricultural producer's responsibility to implement BMPs adopted by FDACS to help achieve load reductions. If land use acreage corrections and BMP implementation do not fully account for the current agricultural load reduction allocation, it may be necessary to develop and implement cost-assisted field- or regional-level treatment options that remove nutrients from farms and other nonpoint sources. In that case, FDACS will work with DEP as well as NWFWMD and SRWMD to identify appropriate options for achieving further agricultural load reductions.

Section 403.067, F.S. requires that, where water quality problems are demonstrated despite the proper implementation of adopted agricultural BMPs, FDACS must reevaluate the practices, in consultation with DEP, and modify them if necessary. Continuing water quality problems will be detected through the BMAP monitoring component and other DEP, NWFWMD, and SRWMD activities. If a reevaluation of the BMPs is needed, FDACS will also include NWFWMD, SRWMD, and other partners in the process.

## F.5 OAWP Implementation Verification (IV) Program

OAWP established an Implementation Assurance (IA) Program in 2005 in the Suwannee River Basin as part of the multi-agency/local stakeholder Suwannee River Partnership. In early 2014, OAWP began to streamline the IA Program to ensure consistency statewide and across commodities and BMP manuals. The IA Program was based on interactions with producers during site visits by OAWP staff and technicians as workload allowed. For the visits, field staff

and technicians used a standard form (not BMP specific) developed in 2014, that focused on nutrient management, irrigation management, and water resource protection BMPs common to all of the BMPs that were adopted by rule. Once completed, these paper forms were submitted to OAWP staff and compiled into a spreadsheet, and the data were reported annually.

On November 1, 2017, the OAWP's IV rule (Chapter 5M-1, F.A.C.) became effective. The IV program provides the basis for assessing the status of BMP implementation and for identifying enrolled producers who require assistance with BMP implementation. The components of the IV program are 1) site visits; 2) implementation status reporting on common practices that apply across all BMP manuals; 3) technical assistance; and 4) external reporting. Implementation verification is confirmed by field staff through site visits and by producers through annual common practices status reports.

Site visits to agricultural operations by OAWP field staff and contract technicians are the most effective means to determine the status of BMP implementation. These visits also provide an opportunity to identify needs for assistance with implementation and explore potential improvements. Resource limitations prevent site visits from occurring on all enrolled operations every year, and for that reason, site visits are prioritized. The program objective is for field staff to conduct site visits for 5 to 10% of active NOIs each year, with approximately 10% of the site visit locations selected randomly.

Per the implementation verification rule, each year, producers participating in the BMP program will be requested to participate in reporting on the status of implementation of common practices only for their operations. Lack of response from enrollees with parcels in a BMAP area raises the priority of the operation for a site visit from field staff. Where a need is identified, the OAWP may facilitate technical assistance for the producer from UF-IFAS or other resources, including third-party vendors. In some cases, cost share support may be available. Data from producers and site visits will be used to complete the annual reports on the status of BMP implementation as required by s. 403.0675(2), F.S., beginning July 1, 2018.

## F.6 Beyond BMPs

Beyond enrolling producers in the FDACS BMP Program and verifying implementation, FDACS will work with DEP to improve the data used to estimate agricultural land uses in the springshed. FDACS will also work with producers to identify a suite of agricultural projects and research agricultural technologies that could be implemented on properties where they are deemed technically feasible and if fding is made available. The acreages provided by FDACS are preliminary estimates of the maximum acreages and will need to be evaluated and refined over time.

As presented here, these projects are based on planning-level information. Actual implementation would require funding as well as more detailed designs based on specific information, such as actual applicable acreages and willing landowners. **Table F-5** summarizes potential practices that could be implemented in this BMAP area. It is important to note that the

research projects listed in the table are being conducted in the Suwannee River Basin. At some future point, the findings of these studies may be applicable to the Wacissa River Basin. Actual implementation would require funding as well as more detailed design based on specific information, such as actual applicable acreages and willing landowners.

**Table F-5. Beyond BMP implementation**

| Category | Name | Description |
|---|---|---|
| **Practices** | Precision Irrigation | Deployment of equipment, procedures, and training to improve location, volume, and timing of irrigation to match crop needs more precisely. |
| **Practices** | Soil Moisture Probes | Deployment, training, technical support, and use of soil moisture probes to manage irrigation systems. |
| **Practices** | Cover Crops | Planting of cover crops between production cycles to increase soil organic content, improve nutrient retention, and reduce erosion. |
| **Research** | Bioreactors | Bioreactors/denitrification walls and onsite capture and reuse of high-N water. |
| **Research** | Rotational Production | Conversion of conventional production operations to planned rotational production incorporating grass and cover crops. May include cattle. |
| **Research** | Soil Moisture Sensor Deployment and Calibration | Installation, training, monitoring, and research on use of electronic soil moisture sensors, including correlations to nutrient movement through the root zone. |
| **Research** | Controlled Release Fertilizer (CRF) | Application of new and developing fertilizer products that become available to crops via dissolution over longer periods in the growing season. |
| **Research** | Reuse of High Nutrient Value Water Sources | Study of potential sources of high nutrient value water, potential beneficial reuse sites, legal and regulatory obstacles, and costs. |

# Appendix G. Future Growth Strategies of Local Jurisdictions

**Table G-1. Future growth strategies of local jurisdictions**

| Lead Entity | Strategy Name | Description | Strategy Type | Status |
|---|---|---|---|---|
| **Monticello** | Ordinance Nos. 90-13 and 2001-06 | Stormwater Management System | Ordinance | Completed |
| **Monticello** | Code 1982 and Ordinance No. 2010-04 | Sewers<br>No septic tank other than those approved by the state health department shall be constructed within the corporate limits of the city. No septic tank shall be constructed within 200 feet of the sewer line. | Ordinance | Completed |
| **Jefferson County** | Future Land Use (FLU) Policy 3-3 | Existing regulations in the Jefferson County Development Code shall be continued; these regulations are designed to ensure protection from flood damage, protection of springs, protection of the aquifer, protection of both historical and archaeological sites, and protection of lands adjacent to lakes, streams, and within wetlands as shown on the FIRM. Regulations will be revised for consistency with the objectives and policies of the Jefferson County Comprehensive Plan. | Comprehensive Plan | Completed |
| **Jefferson County** | FLU Policy 3-5 | Jefferson County shall work with DEP, NWFWMD, SRWMD, and other groups to improve and enhance the County's stormwater management system. Particular emphasis will be placed on the "Saint Marks Watershed" areas that are stream to sink watersheds. | Comprehensive Plan | Completed |
| **Jefferson County** | Utilities Objective 2-2 | The County shall work in concert with the County Health Department and DEP to ensure that mandatory requirements for installation, inspection, operation, and maintenance of on-site wastewater treatment systems are implemented. | Comprehensive Plan | Completed |
| **Jefferson County** | Utilities Goal 3 | Adequate stormwater drainage will be provided to afford reasonable protection from flooding, and to prevent degradation of quality of receiving waters. | Comprehensive Plan | Completed |
| **Jefferson County** | Utilities Policy 3.1-4 | Silviculture and agricultural uses shall be required to use best management practices to prevent drainage and pollution problems. No activities shall alter the hydrologic function of floodplain areas. | Comprehensive Plan | Completed |
| **Jefferson County** | Utilities Policy 4-1.3 | The County shall allow the reuse of treated effluent and stormwater for irrigation and shall encourage such reuse during the site plan review process. | Comprehensive Plan | Completed |
| **Jefferson County** | Conservation Policy 1-2.1 | Protect water quality in the following areas: 1. natural groundwater recharge areas; 2. | Comprehensive Plan | Completed |

| Lead Entity | Strategy Name | Description | Strategy Type | Status |
|---|---|---|---|---|
| | | wellhead protection areas; and 3. areas zoned as conservation by restricting types of land uses in the protective shed of the above-mentioned area types. | | |
| **Jefferson County** | Conservation Policy 1-4.3 | The County shall enact regulations that allow septic tanks only in areas where public sewer is unavailable and only upon issuance of a Jefferson County Health Department permit. | Comprehensive Plan | Completed |
| **Jefferson County** | Conservation Policy 1-5.3 | The County will cooperate with the City of Monticello and adjacent counties to coordinate protection for the natural areas that cross over multi-jurisdictional districts. | Comprehensive Plan | Completed |
| **Jefferson County** | Conservation Policy 1-5.4 | Wetlands, water bodies, springs, sinkholes, caves and habitat of endangered, threatened and species of special concern are designated as environmentally sensitive lands. These lands, when threatened by urban development, shall be protected by land development regulations. In addition, protection shall also be extended to vegetative and wildlife habitats that are critical for designated species. The regulations shall establish performance standards for development in such environmentally sensitive areas. All environmentally sensitive lands designated for silviculture shall require the owner or operator to use the U.S. Forest Service's best management practices. | Comprehensive Plan | Completed |
| **Jefferson County** | Conservation Policy 1-6.2 | The floodplain ordinance shall protect the water quality, the wildlife habitat, the shorelines, and the riparian areas of rivers with the establishment of a contiguous vegetative buffer along the Wacissa and Aucilla Rivers. The minimum width shall be 25 feet as measured from the wetlands jurisdictional line. In these areas, permanent structures shall be prohibited and clearing of native vegetation other than that required for silviculture operations will be limited to reasonable access to shorelines based upon an ecosystem analysis. This shoreline buffer will also apply to Lake Miccosukee. | Comprehensive Plan | Completed |
| **Jefferson County** | Conservation Policy 1-6.5 | The County shall continue its efforts to reduce erosion in coordination with the Soil Conservation Service. To do so, the County shall notify the farmers of the opportunities that are available for reducing erosion under the Aucilla River Water Management Plan. In addition, farmers shall be directed to the local Soil Conservation District to receive technical and other assistance on the subject of erosion control. | Comprehensive Plan | Completed |

| Lead Entity | Strategy Name | Description | Strategy Type | Status |
|---|---|---|---|---|
| **Jefferson County** | Conservation Policy 1-6.6 | The County in cooperation with the U.S. Forest Service shall ensure that all silviculture lands are so managed to reduce and, if possible, prevent erosion and sedimentation of soils into wetlands and water bodies. | Comprehensive Plan | Completed |
| **Jefferson County** | Coastal Management Policy 1.2 | Prevent new discharge of untreated stormwater from all sources into the County's receiving waters through the use of land development regulations that prohibit discharge of untreated stormwater into any surface water. | Comprehensive Plan | Completed |
| **Jefferson County** | Coastal Management Policy 1.2.3 | The County shall require that any new sewage treatment plants, or industries, or other facilities which discharge waste products to dispose effluents by way of spreading, or spray irrigation, or recycling, or by other means approved by the County's Public Health Department. Whatever system is chosen all direct discharge into receiving waters shall be avoided. | Comprehensive Plan | Completed |
| **Jefferson County** | Coastal Management Policy 1.3.2 | In order to protect the Aucilla River Estuary, the County shall develop coordinate mechanisms with Suwannee River Water Management District regarding estuarine pollution, surface water runoff, protection of living marine resources, reduction of exposure to natural hazards, and ensuring safe public access. Coordination mechanisms shall include consideration of an informal agreement between all entities that each will notify the other jurisdictions upon receipt of development proposals along the estuary which may affect the above issues. Further, all entities should notify each other upon receipt of proposals for plan amendments affecting these issues. | Comprehensive Plan | Completed |